A Trade Development Report

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Boom, Bust and Up Again? Evolution, Drivers and Impact of Commodity Prices: Implications for Indonesia

Multi Donor Facility Trade and Investment Climate

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Preface

The studies enclosed in this report touch on the rise (and fall) of commodity prices and their effect on the Indonesian economy. The report was born out of the mid-2007 observation that commodity prices had broken out of their secular downward trend and what this might mean for Indonesia if it persisted. In fact, rising commodity prices were estimated to be adding 0.4 percent to GDP annually and dramatically changing geographical growth patterns. However, these positive trends in energy and mineral prices contrasted with a dearth of greenfield investment in mining and a decline in oil and gas output. This raised a number of questions including the sustainability of the increase in commodity prices, what their effects had already been and what would be the outcome for Indonesia if the pattern of higher commodity prices were to persist.

However, we certainly did not appreciate the rollercoaster ride we were embarking on when we got this underway. By the end of 2007 food prices had joined the spiral in other commodity prices triggering alarm worldwide. By early 2008, Indonesia and other countries were working to mitigate the impact on their poor changing our focus in mid-stream. The severity of these price increases escalated the importance of the short-run impacts of commodity prices and increased their role in our analysis. The focus on the implications for Indonesia's long-run development was reduced and the assessment here is now intended as an initial exploration on a topic that will be the focus of further work as the underlying trends are still a critical issue for Indonesian development.

The report is a compilation of stand-alone notes/papers. This approach was chosen to allow us to disseminate findings as they became available given the speed with which the boom (then bust) was occurring. This approach also reflected our engagement with different actors in the Indonesian Government, and especially with the Ministry of Trade, the Coordinating Ministry for Economic Affairs, and ultimately the National Logistics Agency (Bulog) and academics. These papers are pulled together in the final chapter, which steps back and draws broader conclusions. The rest of the report consists of six chapters on selected topics and several two-page notes prepared for quick dissemination.

Due to the analysis being undertaken, the report team raised the issue of the causes and sustainability of commodity price increases to DECPG (Prospects Group of the World Bank Research Department) in July 2007. A natural starting point before examining the implications of high commodity prices on Indonesia was to examine the drivers of such price increases, as the policy implications would be different if the drivers were cyclical rather than structural. Reports at the time identified both types of drivers as the main causes of high food prices: China's increasing food demand and recent droughts. The report team asked Don Mitchell (former DECPG) to analyze the drivers of food prices. This study was the first to quantify the impact of the different drivers of food prices, and it identified biofuels as a major cause of the food price increase. This finding ended up increasing the international focus on biofuels as a main driver of the food crisis. The study was subsequently published as a World Bank Working Paper and included as Chapter 1 in this report.

The preliminary results of the study were available by the end of 2007 and were particularly useful as the media in Indonesia was very much focused on blaming the increase in domestic prices on

middlemen and requesting price controls. The study's contribution was its demonstration that there were fundamental internationally based causes of higher food prices, which contributed to shifting the debate to policy actions rather than price controls.

The question then shifted to exactly how Indonesia could mitigate the impact of food price increases on its poor population. The team had been preparing short notes on price stabilization based on the existing literature. It then combined them with a note on best practices that the World Bank team in Washington DC had prepared based on the latest price stabilization measures as reported by World Bank country offices across the world. These notes are merged into Chapter 5, which draws lessons from Indonesia's recent successes and failures with price stabilization and provides recommendations on how to develop a more structured approach for future price stabilization.

To understand the timing and impact of price shocks, Chapter 3 examines how international price shocks are transmitted into Indonesian prices and the determinants of the speed of such transmission. The findings were presented at a one-day workshop on commodity prices organized by the Bogor Institute of Agriculture (IPB) and the report team in June 2008. This workshop was well attended, opened by the Minister of Trade and closed by the Minister of Agriculture. The domestic newspapers covered the transmission results and Bulog requested that the simulation be run with its data on rice. The team provided training on the price transmission methodology to government officials at the Ministry of Trade's request.

Rice prices, the main staple consumed by the poor, spiraled much higher than other prices, trebling between April and May 2008 to the surprise of price forecasters. As other grain prices were not experiencing this dramatic spike, biofuels could not be the main driver. It was critical to identify what was driving this increase and, if possible, ways to mitigate it. Two international rice experts were hired to explore the international issue and its consequences for Indonesia. Their findings and recommendations were shared through video-conference with other World Bank country offices (Philippines and Vietnam) and Bank headquarters. The team wrote several notes on the increase in rice prices and the country offices and headquarters combined efforts to increase awareness of the issue internationally. In fact, the authors had meetings with the US Rice Association and were interviewed by media (*Bloomberg TV* and newspapers worldwide). As a result, the findings were discussed in the US Congress, which authorized Japan to resell its stock of rice as the study had recommended. The announcement and decisions by exporting countries to stop export restrictions were followed by a fall in rice prices and eventually the rice spiral unwound. The experience illustrated how trade restrictions applied to mitigate domestic price increases can lead to a price bubble that worsens the situation for all stakeholders.

We were also able to begin to estimate the impact of the rise in commodity prices on the economy. A Computable General Equilibrium (CGE) model, including a household survey, and an industry survey were ultimately employed to assess the impact of high commodity prices on Indonesia. The CGE work was performed by Peter Warr (Australian National University) with support from Rina Oktaviani (Bogor Institute of Agriculture) and Dominique van der Mensbrugghe (World Bank, DECPG). The CGE simulation indicated that high commodity prices were overall beneficial for Indonesia and contributed to the reduction in poverty, unlike in other countries. The positive effects from the increase in agricultural real wages, in operator real wages and in real returns to forms of capital owned by the poor outweighed the negative effects from the increase in the price of commodities consumed by the poor. However, this economic impact differs greatly across regions. These results were presented at the June 2008 workshop.

By mid-2009 commodity prices had dropped significantly in line with the unfolding financial crisis, but most forward estimates continue to suggest they will remain at levels that are elevated. This leaves us with the question of how a natural-resource-abundant country should best use commodity revenues to spur economic growth. With this assessment in mind, Chapter 6 reviews Indonesia's past growth and export trends and provides insights into the sectoral composition that would support Indonesia's objective of high and broad-based growth in a world of elevated commodity prices. Chapter 7 draws from the findings of the previous chapters to suggest a strategy for long-term sustainable high and broad-based growth on Indonesia's natural resource wealth. The findings of Chapters 6 and 7 were used as inputs into the trade section in the Indonesia Development Policy Review 2009.

The studies' findings were shared in workshops with the private sector and civil society such as the International World Bank-Civil Society Organizations conference, the Executive Network roundtable discussion (which published the presentation in its magazine), a presentation for the European Chamber of Commerce, a workshop at the Economic Research Institute for ASEAN and East Asia on Asia's food strategy for sustainable economic growth (the workshop's findings were converted into a Food Strategy Paper for ASEAN), a workshop on food security at the University of Indonesia, and a half-day training session on food prices for East Asian government officials during a WTO training course in Singapore.

Acronyms

ADB	: Asian Development Bank
ASEAN	: Association South East Asian Nations
Bappebti	: *Badan Pengawas Perdagangan Berjangka Komoditi* or Commodity Futures Trading Regulatory Agency
BPS	: *Biro Pusat Statistik* or Central Bureau of Statistics of Indonesia
CCT	: Conditional Cash Transfer
CEIC	: Census and Economic Information Center
CES	: Constant Elasticity of Substitution
CGD	: Center for Global Development
CGE	: Computable General Equilibrium
CPO	: Crude Palm Oil
CV	: Coefficient of Variation
DECPG	: Development Economics and Prospects Group
DMO	: Domestic Market Obligations
EC	: European Community
EU	: European Union
EWCPI	: Export-Weighted Commodity Price Index
FAPRI	: Food and Agricultural Policy Research Institute
FAO	: Food and Agriculture Organization of the United Nations
FAOSTAT	: Food and Agriculture Organization of the United Nations Statistics
FDI	: Foreign Direct Investment
FOB	: Free On Board
GDP	: Gross Domestic Product
GRDP	: Gross Regional Domestic Product
IEA	: International Energy Agency
IFPRI	: International Food Policy Research Institute
IMF	: International Monetary Finance
IO	: Input-output
IPB	: *Institut Pertanian Bogor* or Bogor Institute of Agriculture
JORR	: Jakarta Outer Ring Road
KAM	: Knowledge Assessment Methodology
MEP	: Minimum Export Price

MMBTU	: Million British Thermal Units
MMT	: Million Metric Tons
MUV	: Manufacturing Unit Value
NFA	: National Food Authority
OECD	: Organization for Economic Cooperation and Development
OLS	: Ordinary Least Square
OREC	: Organization of Rice Exporting Countries
PCI	: Per Capita Income
R&D	: Research and Development
SAM	: Social Accounting Matrix
SITC	: Standard International Trade Classification
SNI	: *Standar Nasional Indonesia* or Indonesian National Standard
TFP	: Total Factor Productivity
TREDA	: Trade Research and Development Agency
USDA	: US Department of Agriculture
WTO	: World Trade Organization

Executive Summary

Indonesia is one of the largest commodity exporters in the world, and given its mineral potential and expected commodity price trends, it could and should expand its leading position. Commodities accounted for one fourth of Indonesia's GDP and more than one fifth of total government revenue in 2007. The potential for further commodity growth is considerable. Indonesia is the largest producer of palm oil in the world (export earnings totaled almost US$9 billion in 2007 and employment 3.8 million full-time jobs) and the sector has good growth prospects. It is also one of the countries with the largest mining potential in view of its second-largest copper reserves and third-largest coal and nickel reserves in the world.

Rising commodity prices from 2003 to mid-2008 significantly benefited Indonesia's economy. They led a growth in total exports of around 14 percent per year over that period, the highest and most sustained export expansion experienced by Indonesia since the East Asian crisis. Four commodities alone—palm oil, nickel, copper and coal—accounted for almost half of total non-oil export growth in 2007. The windfall in export revenues increased the trade balance surplus and helped Indonesia to almost double its foreign reserves from 2002 to 2007. High commodity prices lifted Indonesia's total income by on average 1.2 percent of GDP in 2004-07. Stocks of Indonesian companies with commodity interests led the performance of the Indonesian stock market, which increased nearly 2.5 times and was one of the world's best performers between 2005 and 2007. The increase in the value of commodity production accounted for 40 percent of nominal GDP growth in 2005-07. Incomes in resource-rich provinces off-Java, particularly in the plantations and mining areas of Sumatra and Kalimantan, were significantly boosted leading to a remarkable expansion in sales of cars and motorbikes—sales of motorbikes in these provinces increased 60-80 percent in the first half of 2008 compared with the first half of 2007—as well as in the establishment of new supermarkets. Rising commodity prices also increased government revenues and contributed to a fall in the poverty rate from 2005 to 2008 thanks partly to increases in agricultural incomes.

However, Indonesia did not fully utilize its natural resources and windfall revenues, missing an opportunity to place the country on a sustainable high growth path. First, commodity growth was mostly in nominal terms rather than real terms. The supply response from the mining and oil and gas sectors, which represent 11 percent of GDP, was disappointing. Instead of increasing oil and gas production to respond to the rising international prices since early 2000, oil production volumes have fallen by half over the past decade and mining investment in new production capacity has been almost non-existent. Four fifths of the growth in total commodity exports from 2005 to 2007 resulted from the increase in prices rather than from an increase in production. Second, the country received less revenue from its natural resource endowments than its competitors because of the low value-added content of its exports. Third, a large part of the commodity revenues was spent on subsidies rather than on productive investments, unlike in the 1970s when Indonesia used the commodity windfall to improve infrastructure and revamp its agricultural sector.

Despite the recent fall in commodity prices, most of the currently available projections suggest that commodity prices are not going to go back to historical norms and that they will remain relatively high for the medium to longer term. The main drivers of this structural break are the stronger link between commodity prices and global growth due to developing countries' greater integration

into the global economy and the stronger link between agricultural prices and energy prices due to biofuels. The World Bank forecasts that mining and food prices in 2020 will be over 50 percent higher than in early 2000 relative to manufactures.

The likely upturn in commodity prices provides Indonesia with an opportunity to develop a strategy for long-term sustainable high and broad-based growth based on its natural resource wealth. Recent economic literature based on countries' experiences concludes that when managed well, natural resources can be vital for development (De Ferranti *et al.* 2002, Lederman *et al.*, 2007). The empirical evidence strongly indicates that the exploitation of natural resources can lead growth for long periods of time and does not preclude the development of manufacturing or other activities. What is important is not what is produced but how it is produced. Rich endowments of natural resources, combined with the aggressive pursuit and adoption of new comparative advantages by investing in skills, innovation and good institutions are a proven growth recipe. The most convincing evidence is offered by history: Australia, Canada, Finland, Sweden, and the United States based their development technological progress on their natural resources.

Thus, rather than turning its back on its mineral and oil and gas resources, it makes more economic sense for Indonesia to rely on its resource sectors to generate needed revenues to develop the rest of the economy. The potential benefits of properly exploiting the natural resources are too big to be ignored. The main change needed to spark a boom in oil and gas and mining is to improve the regulatory environment. The new Law on Mineral and Coal Mining approved in January 2009 does not appear to constitute an improvement with respect to the former legislation, as it is perceived by investors as being unclear on key issues. The development of the related regulations provides an opportunity to increase certainty and trigger a robust response from domestic and international mining investors to the profitable prices. The windfall revenue generated by a boom in these sectors and the sustainable development of palm oil would enable the Government to implement an ambitious program to spur broad-based and inclusive development.

Unless carefully managed, a boom in mining, oil and gas and palm oil production can lead to Dutch disease. Unless addressed, the resource windfall will put pressure on inflation, the price of capital and the exchange rate, causing non-resource tradable sectors to lose competitiveness and non-tradables to expand. This would dramatically exacerbate Indonesia's increasing export concentration on commodities since the East Asian crisis, which would not be desirable for two reasons. First, a concentrated economy would not generate sufficient jobs for the more-than-two-million new entrants to the labor force each year as the resource sectors are not as job intensive. Indonesia's own past growth experience suggests that growth in manufacturing will also be necessary to absorb the growing labor force. Second, an excessive economic concentration would increase Indonesia's exposure to the costly boom-and-bust cycles associated with commodities and this would lead to unstable growth. A balanced export structure is key to a healthy economy.

The Government of Indonesia can prevent the resource boom from causing Dutch disease by increasing the competitiveness of the tradable sectors and/or mitigating the exchange rate appreciation. Dutch disease can be prevented by increasing the competitiveness of tradable sectors to compensate for the loss of competitiveness created by exchange-rate appreciation. Competitiveness is an area where there is plenty of scope for improvement given the low technological sophistication and the low economic dynamism of Indonesian products. Dutch disease can also be prevented by mitigating exchange-rate appreciation through the creation of a sovereign wealth fund to sterilize boom revenues or by increasing savings.

To increase competitiveness, technological sophistication and dynamism of Indonesia's tradable sectors the Government needs to develop a comprehensive strategy. This strategy should focus on improving logistics, fostering FDI flows to attract the skills and knowledge needed, and promoting the development of knowledge industries, particularly in natural-resource-based activities where Indonesia has a comparative advantage. This will require building new endowments in human capital and knowledge, and developing better institutions and services to facilitate diversification into higher value-added products and spur dynamism.

The Government also has a role to play in redistributing the resource windfall in a way that mitigates the negative effects of commodity price volatility on vulnerable households and that promotes social and political stability. To avoid misusing money, the Government needs to develop operational procedures for mitigating the impact of price volatility on poor net food consumers. Such a framework would ideally comprise the following five steps: a) an effective price-monitoring system; b) an assessment of the impact of price changes on the economy and population; c) an assessment of the most efficient policy options and their desirable duration based on cost-benefit analysis; d) a predictable, transparent and consultative process for price stabilization; and e) an evaluation system to track the implementation of policy responses and to assess their impact so that adjustments can be made if needed. Furthermore, unless appropriately redistributed, the income generated from commodities can create tensions, such as conflicts between regions over the use of the income, social tensions due to higher income inequality and governance issues such as the risk of corruption.

A summary of the main contents and findings of each chapter in this report can be found in the next section.

Summary of the Chapters

This report consists of seven chapters. The first six chapters present an examination and an analysis of the factors driving increased commodity prices, price forecasts, economic impact of commodity price increases, effective price stabilization policies, and insights from Indonesia's past growth experience. The final chapter draws on the findings of the previous chapters and suggests a development strategy for Indonesia in the context of high commodity prices. This section summarizes the contents of the chapters and their main findings.

Chapter 1 – Rising Food Prices: The Impact of Increased Production of Biofuels

Internationally traded food commodity prices increased sharply after 2002, with the most dramatic increases occurring in the period from January 2006 to June 2008. As a result, the cost of food for consumers also increased across the world. This increase in the cost of food has been a burden on the poor in developing countries, who spend roughly half of their household incomes on food. Chapter 1 examines how price patterns for internationally traded food commodities have changed and analyzes the causes of these increases. These causes include factors such as the increased volume of production of biofuels from food grains and oilseeds; the weak US dollar; and increased energy prices.

The chapter starts by describing the trends in the prices of food commodities. The International Monetary Fund's (IMF) index of internationally traded food commodity prices indicates that these prices increased by 130 percent in the period from January 2002 to June 2008. Prior to this period, food commodity prices had been relatively stable, after sinking to their lowest point in 2000 and 2001 following the East Asian financial crisis. Of all food commodities, the prices of grains were the first to increase dramatically in the period in question. This suggests that the demand for biofuels, which are produced using at least some grains as a primary raw material and compete with other grains on land use, could be involved in the increase of grain and food prices.

The chapter then reviews a number of studies into the impact of the increased demand for biofuels on food commodity prices. Despite all the differences in approach between these different studies, the vast majority of them recognize the increased volume of production of biofuels as a major contributing factor to increased food prices.

The chapter then looks at a number of other factors that may have contributed to the dramatically increased price of food commodities, including increased fuel and energy costs, downturns in production, the decline in the value of the US dollar, and speculation and increased investor involvement in commodities.

The analysis performed in this chapter shows that the increase in internationally traded food prices in the period from January 2002 to June 2008 was caused by a confluence of factors. However, it confirms that the most important contributing factor to the increased cost of food commodities was the large increase in the volume of production of biofuels from grains and oilseeds in the US and EU.

Without these increases, global wheat and maize stocks would not have declined appreciably and price increases due to other factors would have been moderate. The rapid rise in oilseed prices was caused mostly by demand for raw materials for the production of biodiesel, which in turn was driven by incentives created by policies introduced in the EU in 2001 and in the US in 2004.

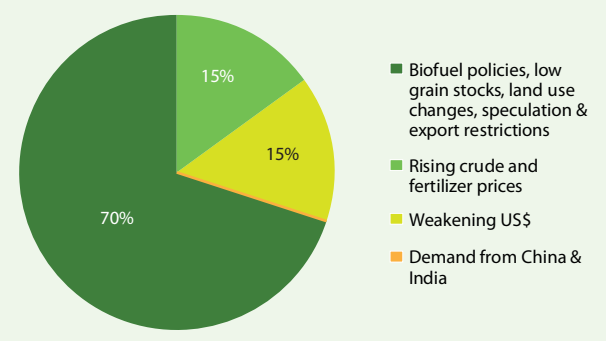
Changes in patterns of land use in wheat-exporting countries resulting from the increased area of land devoted to oilseeds for biodiesel production made it difficult to expand wheat production. This contributed to large declines in global wheat stocks and hence to increased wheat prices. The large increase in rice prices was largely driven by the increase in wheat prices, rather than to changes in rice production or stocks. In this light, the increased price of rice can be indirectly attributed to a significant degree to the increased demand for biofuels, rather than directly attributed to this cause, considering that rice is not commonly used as a raw material for the production of biofuels.

The export bans on grains and speculative activity would probably not have occurred without the large price increases in grains due to the increased demand for biofuels. While the bans and the speculative activity definitely did exacerbate price increases, they can be seen more as a perhaps ill-conceived response to rising prices that had an opposite-from-intended effect than as a primary cause.

Higher energy and fertilizer prices would have resulted in increased crop production costs of between 15 and 20 percentage points in the US and by lesser amounts in countries with less intensive production practices. The back-to-back droughts in Australia would not by themselves have had a major impact on prices, considering that they resulted in declines in levels of global grain exports of only around 4 percent. Under normal circumstances, other exporters would have been able to offset this loss. The decline of the US dollar contributed to about 20 percentage points to the rise in US dollar food prices.

The combination of higher energy prices and related increases in fertilizer prices and transport costs and the decline in the value of the dollar caused food prices to rise by about 35-40 percentage points in the period from January 2002 to June 2008. These factors contributed to about 25-30 percent of the total increases in food prices. Most of the remaining 70-75 percent increase in food commodity prices was due to the increased demand for biofuels and the related consequences of low grain stocks, large land-use shifts, speculative activity and export bans (Figure 1).

Figure 1: Drivers of food price increases



Source: World Bank staff calculations based on findings of Chapter 1.

The most significant increases in the volume of production of biofuels were in the US and the EU, and these were largely driven by subsidies, mandates, and tariffs on imports. Without such measures, the volume of production of biofuels would have been lower and food commodity prices would not have increased to the extent that they did. The production of biofuels from sugar cane in Brazil is much cheaper than the cost of production of biofuels in either the US or the EU. In Brazil, the production of ethanol from sugar cane has not resulted in significant increases in the price of sugar, because cane

production has expanded sufficiently rapidly to meet the production needs for both sugar and biofuels. Removing tariffs on ethanol imports in the US and EU would allow more efficient producers, such as Brazil and other developing countries, including many African countries, to produce ethanol profitably for export to meet the mandated levels of renewable fuel in the US and EU.

The contribution of biofuels to the rise in food prices raises an important policy issue, since much of the increase was due to US and EU government policies that provided incentives to biofuels production. In the light of their impact on food prices, policies that result in the subsidization of the production of biofuels should be seriously reconsidered.

Chapter 2 – Pricking the Price Bubble to Avert a World Rice Crisis

In the period prior to the writing of this chapter, the price of rice on global markets increased dramatically. In the period from December 2007 to April 2008, the price of benchmark Thai 100B white rice rose from US$368/ton to more than US$1,200/ton. This surge in price clearly represents a break in the historic trend. International rice prices fell to an all-time low in 2001 in inflation-adjusted terms. Following that, the price of rice increased moderately until December 2007, when prices spiraled upwards in a fashion reminiscent of the 1974 price spike.

A huge number of people in the East Asian region spend a large proportion of their disposable income on this single commodity: one third of the daily calorific of the average East Asian households' intake is derived from the consumption of rice. Thus, the price increases threatened to cause a major poverty crisis.

Given the potentially negative impact of increased prices of this fundamentally important commodity on household consumption levels, it is vitally important for policymakers to understand the factors driving this price increase and to formulate policies that could facilitate the pricking of the price bubble. This chapter intends both to assist in the understanding of these factors and to present a series of recommendations to achieve this end.

The chapter starts by reviewing the specific nature of rice markets, paying particular attention to those aspects that might amplify the sensitivity of these markets to price shocks. These include the fact that rice markets are politically sensitive and that they are thin markets with a small number of exporters trading relatively low volumes of the commodity. As a result, very small changes in supply and/or demand can have a dramatic impact on prices.

The chapter then looks at a number of factors that have been put forward to attempt to explain the dramatic spiraling in rice prices. These factors include those that have been recognized as driving increases in the prices of a number of other commodities, such as wheat. In particular, the spike in rice prices has been attributed to the weak US dollar, increased energy prices, and the increased demand for biofuels.

The chapter argues that the price increases cannot primarily be attributed to the causes that have driven up other commodities, including grains. Rather, it argues that the price increases were due to a sudden change in the trade policies of rice-exporting countries and the urgent efforts of some rice-importing countries to secure supplies at any price, leading to hoarding and speculation. The 'thinness' of global rice markets made rice prices particularly vulnerable to such short-sighted policies. The effect of these policies was to close down the rice trade and create a price bubble that had the potential to exacerbate poverty in areas where rice is a major consumable staple food.

A number of scenarios are presented of the direction that the rice markets might have taken in May 2008. At the time of writing, the chapter suggested that rice-exporting and importing countries and the international community could have helped to prick the rice bubble by collaborating to ease the tightening of trade. The most feasible immediate solution identified by the chapter was the release of stocks by Japan, Thailand and China; the removal of bans on exports; and the halt to large public tenders in favor of direct negotiations.

The chapter ends with a postscript that describes what happened after the original policy paper was presented to policymakers in the region. On 2 May 2008, the Philippines publicly disclosed that it was negotiating with Japan for 60,000 tons of its domestic rice. The US publicly indicated that it would not oppose Japan's re-export of rice. At the FAO summit on the food crisis on 2 June 2008, Japan committed to releasing 300,000 tons of imported rice to the world market in the near future. The public commitment, while more cautious than had been hoped, nonetheless played a major role in calming markets. By June, with increases in the volume of exports and production and decreases in import demand, the market fundamentals had begun to improve. Following the completion of negotiations for a government-to-government sale with the Philippines, Vietnam lifted its export ban on new sales. As a result of increased supply from Asian growers reacting to the high prices, demand for imports weakened significantly.

It is important that lessons from this experience be drawn and that governments take measures to prevent such bubbles occurring in the future. In particular, it is vital to realize that the escalating rice prices were not the result of natural causes, such as weather or crop failures, or causes such as the weak US dollar or the increased demand for biofuel. Rather, they were the result of destructive trade restrictions that did not even serve the short-term interests of those who implemented them. It is important that governments avoid such behavior and that they establish agreements that help prevent a repeat of this bubble in the future.

Chapter 3 – Commodity Price Shocks and Market Integration in Indonesia

Over the past several years, the prices of commodities have fluctuated dramatically. With a tendency towards increased prices, it has become increasingly vital for policymakers to understand spatial market integration: the extent to which international commodity price shocks are transmitted to domestic markets, and the speed with which these price shocks are transmitted, and the main drivers and geographical patterns that define them. This is an area that has received surprisingly little attention until recently.

This chapter examines the extent to which the Indonesian markets for rice, sugar, cooking oil, soybean and maize are integrated with world markets. The five commodity markets are found to be integrated with world markets to a significant extent. Over a period of about one year, a 1 percent increase in world prices leads, on average, to a 1 percent increase in domestic prices. Although the five commodity markets are integrated with world markets, the different commodities are found to respond to world price shocks at varying speeds. In general, the speed of adjustment to world price shocks is fastest in the sugar and cooking oil markets and slowest for soybean and maize markets. Even if there are some divergences in the patterns of changes between world and domestic prices, these move together closely when looked at over a longer period of time. This is consistent with the concept of integration.

The speed of transmission of a shock in the international price to the domestic economy also varies between the different provinces. For instance, in the case of rice, simulations indicate that the adjustment to a shock in the international price of rice would be fastest in Jakarta. Half of the divergence could be corrected in about 5 months in Jakarta, whereas in West Kalimantan it could take about 25 months for half of the divergence to be corrected (this simulation assumes the Government does not prohibit exports to shield the domestic economy from the shock).

Within Indonesia, the main factors determining the extent of market integration between the various provinces are remoteness and the quality of transport infrastructure in that province. In general, remote provinces are found to be less integrated. However, this effect is reduced by good infrastructure.

The analysis also shows that those commodity markets with the highest degree of integration across provinces have smaller price differences across provinces: in the sugar and rice markets, the average price differences across regions is 5 and 12 percent, respectively, while in the maize, soybean and cooking oil markets they are 16 percent and 22 percent, respectively. Similarly, the differences between the maximum and minimum price in the country are lower for commodities that are deeply integrated across provinces. Buying rice in the most expensive province (Jakarta) can cost up to 64 percent more than buying it in the cheapest province (West Nusa Tenggara), whereas for maize, the price difference can be up to 117 percent.

Up to 70 percent of price differences across provinces can be explained by differences in the degree of remoteness, transport infrastructure, output of the commodity, land productivity and income per capita. Remote provinces pay more unless they have a good transport infrastructure. For people in West Kalimantan, being remote implies paying about Rp 133/kg more for rice than in the other provinces.

The data show that the transmission of price volatility from global markets to domestic markets is incomplete. Exchange-rate variations matter more than world price variations as a determinant of domestic price volatility. After controlling for exchange rates and world prices, remote provinces appear to have a higher level of price volatility than well-connected provinces.

The results of the study suggest that international commodity price shocks are fully transmitted to domestic prices. Thus, their impact on the economy is not just through changes in the prices and volumes of exports and imports, but also through changes in domestic production caused by changes in domestic prices. The results also imply that the economic impact is not homogenous across the country because of the differing degree of integration between provinces. The speed and magnitude of price changes in remote provinces will be generally slower and less significant than in other regions.

The analysis has some important policy implications. It confirms the importance of investment in infrastructure. In particular, it demonstrates that the constraints created by geography and remoteness to the transmission of price signals can be alleviated by improving the quality of infrastructure. This has important implications for food security. Policies that aim at decreasing transportation costs by improving infrastructure or by eliminating bureaucratic impediments to transport will enhance integration within Indonesia and contribute to a reduction in price differentials between provinces. This study highlights the importance of measures to achieve improvements in the productivity of agriculture as a way to reduce prices for consumers, while at the same time increasing incomes for farmers. Finally, the study suggests that government intervention may not be the most effective means of reducing volatility.

Chapter 4 – Impact of Commodity Prices on Indonesia's Economy

Chapter 4 estimates the effect that changes in the international prices of food, petroleum, minerals and other commodities have on the structure of the economy, aggregate economic welfare and poverty within Indonesia. The study combines a general equilibrium model of the Indonesian economy with observed changes in commodity prices in 2005 - 08 and long-run projected commodity price increases in 2005 - 20 to examine their different impacts.

It is often assumed that poor people in developing countries have been harmed by the increased price of commodities in international markets over recent years. However, this chapter suggests the opposite conclusion for Indonesia. The short-run effects of the commodity price increases that occurred between 2005 and 2008 were generally positive for Indonesia's poor. These effects derived from increases in agricultural real wages, operator real wages and increases in the real returns to forms of capital owned by the poor. It is true that the prices of commodities consumed by the poor increased, but these negative effects were outweighed by the benefits they received on the income side.

It is estimated that the increases in agricultural commodity prices that occurred between 2005 and 2008 reduced rural poverty incidence in the short run by 2.2 percent, leaving the rate of urban poverty virtually unchanged. Taken together, this indicates a reduction in the overall national rate of poverty of 1.7 percent.

Urban poverty remains unchanged because of the balancing of the positive and negative impacts of price increases on urban dwellers. An increase in agricultural commodity prices also increases the consumer prices of food items that urban residents purchase. On the other hand, these increases affect the structure of agricultural production in a way that influences factor prices, especially by raising returns to unskilled labor and capital items owned by the poor. While increased commodity prices put pressure on the expenditure of urban residents, this effect does not operate through the price of rice, the major staple of Indonesia, because the simulations recognize that domestic rice prices were insulated from international prices by Indonesia's rice import ban. However, the effect does operate through the consumer prices of other, less important, food items. By contrast, the impact on factor prices increases the incomes of the urban poor and alleviates the impact on urban poverty. In the simulations, the two opposing effects offset one another almost exactly.

Indonesia's ban on rice imports shielded domestic consumers and producers of rice from the nine-month spike from March to December 2008. However, it did so at a high cost. The rice import ban resulted in domestic rice prices that were considerably higher than international prices had been since 2004. Thus, a measure intended to protect domestic consumers actually resulted in the imposition of considerable costs on them.

The combined short-term effect of all commodity price increases (energy, agricultural and mining commodities) was a decline in rural poverty of 4.7 percent and a decline in urban poverty of 2.7 percent. Taken together, these figures indicate a decline in the overall national rate of poverty by 4.1 percent. The cash transfer system introduced by the Government to compensate poor consumers for the partial transmission of increased international petroleum prices on domestic prices further accentuated the decline in the rate of incidence of poverty.

With the exception of the economies of DKI Jakarta and Banten province, the short-run effect of all commodity price increases on the economies of the regions of Indonesia was positive, as reflected by significant increases in regional gross domestic outputs. This result is consistent with media reports

of impressive increases in the consumption of goods, such as motorbikes and cars, in areas outside Java, due to the wealth created by high commodity prices, particularly in mining and plantations areas. In contrast, manufacturing and services in DKI Jakarta were hurt by the increased cost of commodities (energy, agricultural and mining).

The long-run 2005-20 projected price increases in energy, agricultural and mining prices are smaller than the observed 2005-08 changes and the simulated effects of these commodity price changes were correspondingly less favorable. The simulated long-run impact of an improvement in investment climate in mining is a large increase in aggregate real consumption and a corresponding reduction in the incidence of poverty in both rural and urban areas.

Chapter 5 – Managing Commodity Price Shocks in Indonesia

While high commodity prices are in general good news for net commodity producing and exporting countries such as Indonesia, sudden increases in fuel and food prices have a serious impact on consumers, particularly poor households, and on producers, particularly those that make intensive use of commodity inputs in their production processes.

To mitigate the impact of price fluctuations on consumers, particularly the poor, and support some producers, Indonesia has implemented a range of programs and policies since the 1960s to stabilize the prices of those commodities that make up a large proportion of the consumption basket and of those commodities crucial for the economy. The programs and policies implemented by the Government have had mixed success. Some have had unintended negative consequences. In particular, prolonged fuel subsidies have benefited non-poor consumers and limited the ability of the Government to invest in other public needs such as health, education, and infrastructure. The experience, both within Indonesia and abroad, shows that certain other measures are often ineffective or not cost efficient. These include quantitative controls over exports and artificially controlled prices regulated by administrative measures.

This chapter aims to assist policymakers to design more efficient instruments to tackle changes in commodity prices. It starts by examining the impact of high commodity prices and volatility on exporters, consumers, producers and the Government. It then looks at the Indonesian experience in coping with commodity price shocks and ends by presenting policy recommendations for Indonesian policymakers.

The chapter concludes that Indonesia needs to establish a more predictable, better targeted, less costly and more effective approach to mitigate the impact of price shocks. The recent crisis in food prices has shown how critical it is for the Government to have a framework for action. A well-established framework would provide the ground rules for the Government to methodically monitor the evolution of prices; to assess their impact on the economy; to assess available policy options through a cost-benefit analysis; and to properly implement and monitor the adopted measures. Such a framework should involve four major components. The first is an effective price-monitoring system that shares information between the different public and private stakeholders.

The second is the implementation of a system to assess the likely impact of a change in commodity prices on the economy and population. Policymakers need to be able to determine the impact of increased prices, whether positive or negative, on different segments of the population. In rural areas in Indonesia, the majority of households are net food buyers, with only a minority of wealthier

households consisting of net food sellers. The poor are overwhelmingly net food purchasers. They suffer disproportionately from increased food prices. Among producers, the impacts of low food prices are at least partially offset by prices and output being negatively correlated.

The third component of the framework involves an assessment of appropriate policy instruments based on a cost-benefit analysis. Policy instruments should be designed carefully with three goals in mind: to protect vulnerable consumers, to maintain and create incentives for producers, and to be fiscally sustainable. Fuel subsidies do not satisfy these criteria: they are not pro-poor and thus it is preferable to replace them with more effective instruments. Some price stabilization measures may make sense when price increases are due to temporary shocks. But if the price increases are due to structural factors, the Government will feel forced to keep the stabilization measures indefinitely, which could prove extremely costly to its budget as well as distortive to the economy. In practical terms, it is often difficult to distinguish when price changes are due to a short-term shock and when they are due to a longer-term structural change. Often, the distinction only becomes apparent with the benefit of hindsight. For this reason, if the Government decides to go down the route of price stabilization, it is best to have a target or trigger price that is automatically correlated with the international market price at any particular time, rather than a permanently fixed target.

The best options to mitigate the impact of price shocks are likely to involve improved social safety net programs, such as targeted cash transfers to poor households, and the smart use of trade policies and import regulations, such as tariff cuts and relaxation of import regulations, and prudent fiscal management. In addition, they could involve measures that help promote market stabilization. These involve measures such as improved infrastructure; greater reliance on private sector stocking; improved legal systems, information networks and standards; and the development of price stabilization mechanisms for the benefit of small holders (for example, index-based weather insurance).

The fourth component of the framework is a monitoring system that tracks the implementation of policy responses to assess their impact so that appropriate adjustments can be made. Not only is it essential to conduct a thorough analysis of options and expected costs and benefits before the implementation of such programs, it is vital to implement a system to monitor their impact after they have been implemented. Policies should be implemented in such a manner that it is possible to review and reverse or revise them if they are found not to have the desired effects.

Chapter 6 – Indonesia's Growth and Exports Trends: Macro and Sectoral Perspective

This chapter reviews Indonesia's economic growth and export trends to determine the sectoral composition that would allow Indonesia to achieve high, broad-based growth in the context of high global commodity prices.

It starts by examining Indonesia's long-term macroeconomic trends to determine the main driving engines of growth. It then reviews sub-national growth trends, identifying growth imbalances between varying regions in the 2000s. It also examines the long-term trends affecting Indonesia's exports and their relationship with growth. It then focuses on the performance of export-orientated sectors during the past decade and reviews the main causes of Indonesia's relatively poor performance in terms of achieving a diversification of its exports.

The four principal lessons from this analysis are as follows:

a. The most striking feature of Indonesian growth in the past four decades is that it has not been labor intensive. Hence, while it is likely that the future engines of output growth will be the manufacturing and service sectors, the evolution of the agricultural sector, where most of the population is still employed, remains crucial in the short run. In the long run, preparing workers to move towards, and participate in, the modern sectors of the economy should be a priority.

b. Sub-national growth patterns suggest that there is room to improve labor and capital mobility in order to increase labor participation in the dynamic sectors of manufacturing and services, particularly outside Java. This could be achieved by promoting public infrastructure and by implementing other policies intended to improve productivity in the regions.

c. Manufacturing exports have historically been an engine of growth and diversification. However, since the late 1990s, this pattern has reversed to the advantage of services. Manufacturing export performance since the East Asian crisis has been disappointing, with manufactured exports declining as a proportion of GDP since 2000.

d. The declining performance of the manufacturing sector appears to be the result of a complex set of interacting causes. The principal external cause has been the emergence of China as a producer of labor-intensive assembled manufactured products. The principal internal cause has been Indonesia's lack of success in encouraging the development of the skills and capabilities needed to move up the value/quality ladder. The causes for this are two: (i) the poor investment climate makes it hard to attract FDI and knowledge from abroad, and (ii) domestic investments to develop a "national innovation system" have been far less significant in Indonesia than among its direct East Asian competitors, particularly Thailand and Malaysia. At the same time, given its large endowments of abundant natural resources, Indonesia has found it much easier to shift its relative specialization towards natural resources and commodities and away from manufacturing goods.

The main policy implication for Indonesia is that it would need to develop a dual strategy involving short-term and long-term components. In the short term, it needs to exploit its natural resources and labor endowments to stimulate a job-intensive growth. Tapping into the potential of the mining sector at a time of high commodity prices could generate the necessary resources to revamp the agricultural sector and help it move towards the production of higher value-added crops. In the long term, Indonesia needs to promote the accumulation of skills and human capital to avoid becoming overly dependent on a few commodities and low value-added/low quality goods.

This dual strategy is likely to require the development of a more conducive business climate to promote domestic and foreign investment, investment in the "knowledge and skills infrastructure" (a national system of innovation), labor mobility, and targeted export promotion services to encourage diversification and upgrading.

Chapter 7 – Making the Most of High Commodity Prices for Indonesia's Development

In the wake of the surge in commodity prices and given the likelihood that they will remain high in the mid-term, there has been a significant rethink of the role of commodities in the development of natural-resource-abundant countries such as Indonesia. This concluding chapter reflects this rethink by drawing upon the findings of the previous chapters in order to assess both the development challenges and the opportunities that a greater emphasis on commodity production would entail. In particular, this chapter tries to address the following questions: How dependent is Indonesia on commodity exports? What are the main challenges and opportunities created by a higher specialization in commodities? How has the boom in commodity prices impacted Indonesia's economy? What is the outlook for commodity prices? How can Indonesia best manage revenues derived from the commodities sector for its development? Should Indonesia remain focused on developing its manufacturing sector or should it encourage increased commodity production?

There is little doubt that commodities are of huge importance to the Indonesian economy, borne out by the fact that revenues from commodities accounted for one fourth of Indonesia's GDP and more than one fifth of total government revenue in 2007. Indonesia is also one of the largest commodity exporters in the world and in view of the unexploited mineral reserves that remain to be discovered it can continue to expand its leading position as a commodities exporter. Just to illustrate Indonesia's importance: it has the second-largest copper reserves and third-largest coal and nickel reserves in the world. Indonesia is also the world's largest producer of palm oil, with export earnings totaling almost US$9 billion in 2007 and providing employment for about 3.8 million people.

The desirability of commodity-led development has long been controversial and the source of considerable debate among economists and planners. An over-reliance of commodities can have adverse consequences, such as price volatility, governance issues pertaining to corruption, 'Dutch disease' effects, and low levels of job creation. Some economists believe that Indonesia needs to design policies that encourage the development of a labor-intensive manufacturing sector if it is to create sufficient employment opportunities for its rapidly expanding workforce. On the other hand, there is also a strong argument that it makes sense to use the commodities sector to create development opportunities, especially when commodity prices are high and likely to remain so for the medium term. Furthermore, the major commodity producing areas in the outer islands of Indonesia have considerable potential to generate revenues that could be channeled into productive investments to increase the value-added and also the technological content of production, in commodities, manufactures and services.

As the previous chapters point out, the overall Indonesian economy has been a major beneficiary of rising commodity prices over the past decade. However, the Government has missed an important window of opportunity to take full advantage of high commodity prices for its development, using the commodity windfall to a large extent for unproductive public spending. Added to this, the potential supply response to high commodity prices has been stifled by a non-conducive business climate.

Although commodity prices have weakened with the onset of the global financial crisis post-2008, there is a widespread expectation that high commodity prices will remain a constant factor in the medium to long term, although price volatility may also be pronounced. As the global economy gradually recovers from the crisis and demand picks up, so the demand for energy and metals in developing countries will continue to grow, supporting stronger prices of commodities going forward. There is also an expectation that agricultural prices will follow energy prices given the link between biofuels, fertilizers and energy prices.

High commodity prices going forward provide Indonesia with an opportunity to develop a strategy for long-term sustainable high and broad-based growth. Recent economic literature based on international experience concludes that, if well managed, natural resources can be key to development (De Ferranti et al. 2002, Lederman et al., 2007). The empirical evidence strongly suggests that the exploitation of natural resources can lead to prolonged periods of growth and does not preclude the development of manufacturing or other activities. Indeed, international experience from Australia, Canada, Finland, Sweden, and the United States shows that rich endowments of natural resources combined with the pursuit and adoption of new comparative advantages by investing in skills, innovation and good institutions are a recipe for economic growth.

Therefore, it makes good economic sense for Indonesia to rely on its mineral and oil and gas resources to generate the revenues required to develop the rest of its economy. However, the current regulatory environment is not conducive to supporting a boom in the oil and gas and mining sectors. For instance, the January 2009 Law on Mineral and Coal Mining does not appear to constitute an improvement over the previous legislation, as it is perceived by investors as being unclear on key issues. In this case, therefore, the drafting of implementing regulations provides an opportunity to increase certainty and to create a more conducive environment. Such an improvement in regulatory clarity could help to generate a more robust response by domestic and international mining investors to high commodity prices. This in turn would enable the Government to implement an ambitious program to spur broad-based and inclusive development based on the windfall revenue generated by a boom in these sectors.

However, the dangers of Dutch disease cannot be ignored, and so any boom in the mining, oil and gas and palm oil sectors would need to be carefully managed. Failure to do so could cause non-resource tradable sectors to become less competitive and non-tradables to expand, exacerbating Indonesia's increasing concentration on the export of commodities. This would be undesirable for two reasons. First, the resource sectors are not labor intensive and so concentrating on them would not generate sufficient jobs for the more than two million annual entrants to the workforce. Indonesia's own past growth experience suggests that manufacturing sector growth will continue to be necessary to absorb the expanding workforce. Second, an excessive economic concentration on commodities would increase Indonesia's exposure to boom-and-bust cycles, leading to unstable growth. Consequently, a balanced export structure is the key to a healthy economy.

A resource boom in Indonesia could be managed so as to avoid the dangers of Dutch disease by increasing the competitiveness of the tradable sectors and/or mitigating the exchange rate appreciation. Dutch disease can be prevented by increasing the competitiveness of the tradable sectors to compensate for the loss of competitiveness created by exchange rate appreciation. Given the low levels of technological sophistication and dynamism in the manufacturing sectors, there is plenty of scope for improvement. Dutch disease can also be prevented by controlling exchange-rate volatility through the creation of a sovereign wealth fund to sterilize the boom revenues, while increasing the level of savings in the public and private sectors would also be beneficial.

To this end, the Government would need to consider developing a comprehensive strategy aimed at increasing the competitiveness, technological sophistication and dynamism of Indonesia's tradable sectors. This strategy should focus on improving logistics, fostering FDI flows to attract the skills and knowledge needed, and promoting the development of knowledge industries, particularly in natural-resource-driven activities in which Indonesia has comparative advantages. This will require building new endowments in human capital and knowledge. It will also require the development of better institutions and services to facilitate diversification into higher value-added products and to spur dynamism.

The negative impacts of commodity price volatility on the economy and, in particular, on the poor, can also be mitigated by the Government. Regarding exports, the diversification of export markets and products to reduce export volatility is important. Well-targeted cash transfer measures would limit the impact of price spikes in basic products, reducing the impact of commodity price volatility on the poor. Policymakers can also make use of instruments that decrease transaction costs, encourage supply and reduce price volatility, including reducing bureaucratic obstacles that constrain the transportation of goods and reducing quotas and import tariffs.

Over the medium term, policymakers could encourage the development of market-based instruments that act as price stabilizers, for instance by promoting investments from the private sector in storage and warehouse receipt systems; developing a domestic market for forward contracts; and developing a futures market and index-based weather insurance. The public sector can assist in developing such instruments by fostering an appropriate regulatory environment and providing direct support to overcome market failures in the early stages.

Inequity and governance issues generally associated with greater commodity production can also be mitigated by the Government through redistributing the resource windfall in ways that promote social and political stability. A natural resource boom could increase inequities between Indonesian regions, leading to tensions between regions over increased income disparities. Such a boom could also undermine governance by increasing the opportunities for corruption. Rebalancing revenue sharing between regions and establishing a social welfare system to support the poor would make growth more inclusive and help to reduce the potential for increased political instability.

Chapter 1

Rising Food Prices: The Impact of Increased Production of Biofuels

Abstract: *Internationally traded food commodity prices have increased sharply since 2002, and especially since late 2006. The rise in food prices has been a burden on the poor in developing countries, who spend roughly half of their household incomes on food. This chapter examines the causes for these increases to determine the contributing factors. These include factors such as the increased volume of production of biofuels from food grains and oilseeds; the weak dollar; and increased energy prices. This examination demonstrates that the most important factor was the large increase in the volume of production of biofuels in the US and the EU. Without this increase, the impact of droughts and other factors would have been much more moderate. The bans on the exports of certain food commodities imposed by a number of countries and associated speculative activities would probably not have occurred, as these were largely responses to rising prices — although in the end, these measures actually exacerbated the situation. The contribution of biofuels to the rise in food prices raises an important policy issue, since much of the increase was due to EU and US government policies that provided incentives to biofuels production. In the light of their impact on food prices, policies that result in the subsidization of the production of biofuels should be reconsidered.*

1.1 Introduction

Internationally traded food commodity prices have increased sharply since 2002 and especially since late 2006. In the period between 2006 and 2008, prices of major staples, such as grains and oilseeds,[1] doubled. Rising prices have caused food riots in several countries and led to the implementation of often destructive policies, such as the banning of grain and other food exports by a number of countries and tariff reductions on imported foods in others. These policy actions reflect the concern of governments regarding the impact of food price increases on the poor, particularly in developing countries where the average consumer spends about half of their household incomes on food. This chapter examines how price patterns for internationally traded food commodity prices have changed and analyzes the causes of these increases. In particular, it looks at the contribution of the increased volume of production of biofuels, particularly ethanol and bio diesel, on the increased cost of food commodities.[2]

The chapter is structured as follows: Section 1.1, this section, defines the questions explored by this chapter and describes its organization. Section 1.2 describes the trends in prices of food commodities, noting that these prices increased dramatically in the period from January 2002 to June 2008. Section 1.3 looks at a number of recent examinations of the impact of the increased demand for biofuels on food commodity prices, noting that despite all the differences in approach between these different studies, most of them recognize the increased volume of production of biofuels as a major contributing factor to increased food prices. Section 1.4 looks at a number of other factors that may have contributed to the dramatically increased price of food commodities, including increased fuel and energy costs; downturns in production; the decline in the value of the US dollar; and speculation and increased investor involvement in commodities. Section 1.5 concludes that the most important contributing factor to the increased cost of food commodities was the large increase in levels of production of biofuels from grains and oilseeds in the US and EU. In turn, this increase in levels of production of biofuels was driven by government subsidization and other government policies in these two regions.

1 Oilseeds are crops with high oil content such as soybean, rapeseed, sunflower, flax and cottonseed.

2 Ethanol is produced from sugar crops, such as sugar cane or beets, or starchy crops such as maize. Biodiesel is produced from vegetable oils or animal fats.

Figure 1.1: International food prices

Source: DECPG, World Bank.

1.2 The rise in global food prices

The IMF's index of internationally traded food commodity prices[3] indicates that these prices increased dramatically in the period from January 2002 to June 2008 and particularly dramatically in the period from January 2007 to June 2008. The index shows that these prices increased by 130 percent in the period from January 2002 to June 2008. In the period between January 2007 and June 2008 alone, they increased by 56 percent (Figure 1.1). Prior to this period, food commodity prices had been relatively stable after reaching lows in 2000 and 2001 following the Asian financial crisis. Prior to the rapid increase in prices, the low levels of global grain had been identified as a cause for concern in a number of fora (Mitchell and Le Vallee, 2005). In addition, the risk of higher food prices was highlighted in a World Bank publication (World Bank, 2007) and online (Mitchell, 2007).

The prices of grains were the first to increase dramatically. An examination of international food price sub-indices shows that of all food commodities, the prices of grains were the first to increase dramatically in the period in question (Figure 1.2). In the 2004/05 crop year,[4] a record global crop of grains was recorded. In this crop year, the volume of production was 10.2 percent larger than the average of the three previous years. In 2005/06, the volume of production was even higher, by 8.9 percent. Despite this increased volume of production, a sustained increase in prices began at the beginning of 2005. With the high level of production, global stocks of grain increased in 2004/05. However, they declined in 2005/06 as demand outstripped production. In the period from January 2005 to June 2008, maize prices increased by almost 200 percent; wheat prices increased 127 percent; and rice prices increased 170 percent.

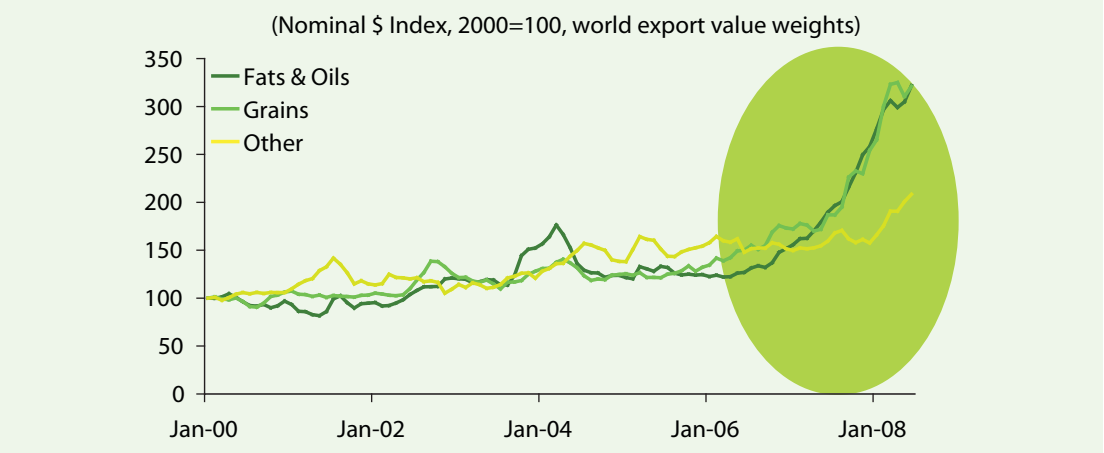
The increase in grain prices was followed by an increase in prices of fats and oils in mid-2006. Again, this increase was attributable to increased demand rather than decreased supply. In the 2004/05 crop year, the volume of oil seed produced globally was 13 percent higher than in the previous year. This was followed by an even higher level of production in 2005/06. In the following

3 A nominal dollar index of food commodity prices using global export value weighs.

4 Crop years begin with harvest and continue until the next harvest.

years, fat and oils prices have increased to a similar degree as grains, with palm oil prices increasing by 200 percent in the period from January 2005 until June 2008. During the same period, soybean oil prices increased by 192 percent, with the price trends for other vegetable oils prices showing similar patterns. The price of other food commodities, including sugar, citrus, bananas, shrimp and meats, increased by an average of 48 percent in the period from January 2005 to June 2008.

Figure 1.2: International food price sub-indices



Source: DECPG, World Bank.

1.3 Recent examinations of the contribution of increased biofuels production on increased food prices

There have been a number of examinations of the extent to which the increased volume of production of biofuels has exacerbated the increased cost of food commodities. However, estimates of the extent of the contribution of this increased volume of production are difficult, if not impossible, to compare due to widely varying methodologies and definitions. Estimates can differ widely due to different time periods considered; whether export, import, wholesale, or retail prices are considered; and which food commodities are considered. Moreover, the analyses depend on the currency in which prices are expressed and whether the price increases are inflation-adjusted or expressed in nominal terms.

In addition, other studies using a variety of methodologies are likely to yield varying results. General equilibrium models demonstrate the long-term price impacts of specific shocks. These models take into account interactions with other markets, but they do not capture short-term price dynamics that are significantly more pronounced. Detailed studies of specific crops may include the short-term dynamics, but often exclude impacts on other markets. Methodologies may also differ to the extent they consider shocks to be independent. For example, speculation may be seen as an independent driver or it may be attributed to a change in fundamentals that would not have otherwise occur.

Despite all the differences in approach, many studies recognize the increased volume of production of biofuels as a major contributing factor to increased food prices. The USDA's chief economist, testifying before the Joint Economic Committee of Congress on 1 May 2008, clearly stated that the increase in farm prices of maize and soybean was largely attributable to biofuels production (Glauber, 2008). The IMF estimated that the increased demand for biofuels accounted for 70 percent of the increase in maize prices and 40 percent of the increase in soybean prices (Lipsky, 8 May 2008). Collins (2008) used a mathematical simulation to estimate that about 60 percent of the increase in maize prices in the period from 2006 to 2008 may have been due to the increase volume of maize used for the production of ethanol. Rosegrant, *et al.* (2008), using a general equilibrium model, calculated the long-term impact on weighted cereal prices of the acceleration in biofuels production from 2000 to 2007 to be 30 percent in real terms. Maize prices were estimated to have increased 39 percent in real terms; wheat prices by 22 percent; and rice prices by 21 percent. During this period, the US CPI increased by 20.4 percent, which would imply nominal price increases of 47 percent for maize; 26 percent for wheat; and 25 percent for rice. These estimates are of the same order of magnitude as calculated with the World Bank's linkages model (van der Mensbrugghe, 2006).

Estimates of the impact of the increased volume of production of biofuels on the price index depend on which assumptions are made. Differences in the estimates of the impact of the increased volume of production of biofuels on the price index of all food depend largely on how broadly the food basket is defined and what assumptions are made regarding the interaction between the prices of maize and vegetable oils, which are clearly directly influenced by the demand for biofuels, and other crops, such as rice, through substitution on the supply or demand side. Thus, the Council of Economic Advisors (Lazear, 14 May 2008) estimated that ethanol production accounted for only a 3 percent increase in retail food prices, in part because they only considered the impact of maize prices, directly and indirectly, on retail prices.

Many other potential drivers of escalating food prices are mentioned in discussions. These include the impact of the declining dollar, rising energy prices, increasing agricultural costs of production, growing foreign exchange holdings by major food-importing countries, and recent policies by some exporting countries to mitigate their own food-price inflation. For example, a recent USDA report (Trostle, May 2008) attributed the increase in global prices of major food commodities to all these factors, in addition to the impact of the demand for biofuels. However, there are few quantitative estimates of the impact of these factors.

The methodology used in this chapter is ad hoc, as it does not use structural models to calculate the driving factors. Instead, the chapter tries to identify a few key factors that have contributed to the increase in food commodities prices, as well as other indirect impacts that were the result of scarcity in agricultural markets that was caused by the key drivers. This is an ad hoc approach, but it has the advantage that indirect, difficult-to-quantify, and short-term impacts can be explored in detail. The analysis focuses on the increase in prices of individual food crops, including maize, wheat, rice, oilseeds, and on the index of food commodities prices since 2002. These prices reflect the export prices of food commodities, not retail prices or import prices of developing countries, which are influenced by factors such as freight rates, exchange rates and domestic inflation. The analysis does not make predictions about the future and does not consider how supply would respond to high commodity prices and moderate price increases over time.

1.4 Estimates of factors contributing to the rise in food commodities prices

There are clearly a number of factors that have contributed to the rise in food prices. Among these are the increase in energy prices and the related increases in prices of fertilizer and chemicals, which are either produced from energy or which utilize a higher level of energy in their production process. The increased cost of energy has increased the cost of production, which is ultimately reflected in higher food prices. Higher energy prices have also increased the cost of transportation. Higher fuel costs have also made the production of biofuels more financially attractive and encouraged policy support for their production. The increase in volume of production of biofuels has not only increased demand for food commodities, it has also led to significant land-use changes that have reduced supplies of wheat and crops that compete with food commodities used for biofuels. Drought in Australia in 2006 and 2007 and poor crops in Europe in 2007 exacerbated the grain and oilseed price increases, while significantly increased demand for oilseeds by China to feed its growing livestock and poultry industry also contributed to these increases. Other factors, including the decline of the dollar and the increased level of investment in commodities by institutional investors as a hedge against inflation and to diversify portfolios may have also contributed to the price increases. This section will examine the impact of these various features.

High energy prices have contributed to about 15-20 percent of the increases in US food commodities production and transport costs. In the period from 2002 to 2007, the cost of production of maize in the US increased by 32.3 percent; of soybean by 25.6 percent; and of wheat by 31.4 percent, according to the USDA's cost-of-production surveys (USDA, 2008a) and forecasts (Table 1.1). However, yield increases during this period reduced the per bushel cost increases to 17.0, 24.1 and 6.7 percent respectively. The contribution to price increases of the energy-intensive components of production costs, particularly fertilizer, chemicals, fuel, lubricants and electricity, was 13.4 percent for maize, 6.7 percent for soybean and 9.4 percent for wheat per bushel. The production-weighted average increase in the cost of production due to these energy-intensive inputs for these crops was 11.5 percent between 2002 and 2007. In addition to the increase in production costs, transport costs also increased due to higher fuel costs. The margin between domestic and export prices reflect this cost (Table 1.2). However, these margins also include handling and other charges, such as insurance, which increase with crop prices. The margin for maize between central Illinois cash and the Gulf ports barge increased from US$0.36 to US$0.72 per bushel, representing an increase of 15.5 percent, while the margin between Kansas City and the Gulf ports wheat increased only US$1 per metric ton. An export weighted average of these prices suggests that transport costs could have added to as much as 10.2 percent to the export prices of maize and wheat. Comparable data were not available for soybean. Thus, the combined increase in production costs and transport costs for the major US food commodities was at most 21.7 percent. This is likely to be an overestimation, because transport costs are not estimated separately. Therefore, it seems reasonable to conclude that higher energy and related costs resulted in increases in the export prices of major US food commodities by about 15-20 percent between 2002 and 2007.

Table 1.1: Costs of production for maize, soybean and wheat, 2002 vs. 2007 (US$ per acre)

	Corn		Soybeans		Wheat	
	2002	2007**	2002	2007**	2002	2007**
Operating costs:						
Seed	31.84	48.93	25.45	38.27	6.65	9.51
Fertilizer	42.51	93.96	6.79	13.94	17.71	33.33
Chemicals	26.11	24.67	17.12	14.79	7.13	9.23
Custom operations	10.79	10.93	6.16	7.25	5.67	6.93
Fuel*	18.93	30.98	6.98	16.98	8.67	19.20
Repairs	13.91	14.86	9.76	11.93	10.15	12.78
Other	0.22	0.12	0.63	0.15	0.61	0.34
Interest	1.17	5.16	0.61	2.37	0.48	2.14
Total operating	145.48	229.61	73.5	105.68	57.07	93.46
Allocated overhead:						
Hired labor	3.06	2.22	1.84	2.15	2.53	2.52
Unpaid labor	25.74	23.86	15.59	17.02	16.72	21.97
Capital recovery	55.26	69.99	43.30	54.00	48.97	53.86
Land	87.44	95.44	80.74	92.72	39.19	42.93
Taxes & ins.	5.42	7.39	5.66	6.93	3.90	7.24
Overhead	11.91	13.83	11.37	12.90	7.25	8.78
Total allocated overhead	188.83	212.73	158.5	185.72	118.56	137.3
Total costs ($/acre)	334.31	442.34	232	291.4	175.63	230.76
Yields	134	151.5	40	40.5	27.9	34.4
Total cost ($/bu)	2.49	2.92	5.80	7.20	6.29	6.71

Source: USDA Cost of Production Surveys and Forecasts, July 2008.
Note: *Fuel include lubricants and electricity. ** is USDA's forecast.

Table 1.2: Margins between major production areas and the US Gulf ports

Crop year	Corn prices $/bu.			Wheat prices $/metric ton		
	Central Illinois	Gulf Port	Margin	Kansas City HRW	Gulf Port HRW	Margin
2002	2.34	2.70	0.36	155	160	5.00
2003	2.52	2.94	0.42	148	156	8.00
2004	1.93	2.48	0.55	147	151	4.00
2005	2.00	2.69	0.69	164	168	4.00
2006	3.33	3.94	0.61	198	204	6.00
2007	4.43	5.16	0.72	335	341	6.00
Increase 2002-07 (percent)			15.53			0.65

Source: USDA Feed Grains and Wheat Yearbook Tables, July 2008.

The increased volume of production of biofuels has increased the demand for food commodities. The use of maize to produce ethanol increased especially rapidly from 2004 to 2007. In this period, about 70 percent of the global increase in maize production was utilized for this purpose (Figure 1.3). In contrast, the use of maize for food production, which accounts for 65 percent of global maize use, grew by only 1.5 percent year from 2004 to 2007. In this period, the volume of ethanol used as fuel increased by 36 percent per year. The proportion of maize used for food production declined in response to rises in maize prices from 69 to 64 percent from 2004 to 2007. If the feed byproducts from biofuels production are included in feed use, then the proportion declined from between 70 to 67 percent in the same period.[5]

The US is the largest producer of ethanol from maize. It is expected to use about 81 million tons of maize for the production of ethanol in the 2007/08 crop year. Between them, Canada, China and the EU used about 5 million tons of maize for the production of ethanol in 2007 (USDA, 2008b). In total, about 86 million tons of maize, representing about 11 percent of the total volume of production, was used around the world for the production of ethanol. The heavy use of maize for the production of ethanol in the US has important global implications, considering that the US accounts for about one-third of global maize production and two-thirds of global exports. In 2007/08, about 25 percent of its domestically produced maize was utilized for the production of ethanol.

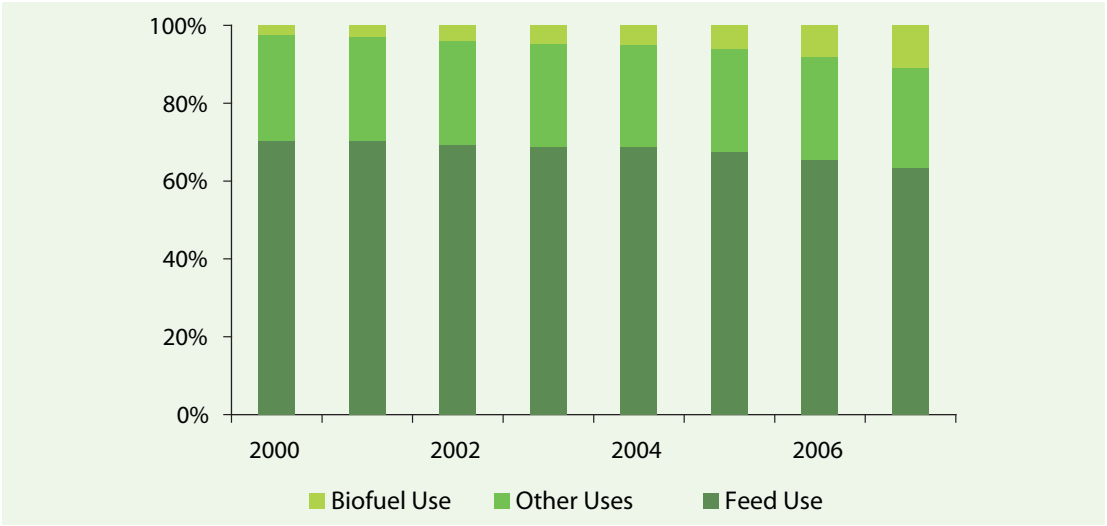
About 7 percent of global vegetable oil supplies were used for biodiesel production in 2007. About one-third of the increase in consumption from 2004 to 2007 was due to use for the production of biodiesel.[6] The largest biodiesel producers were the EU, the US, Argentina, Australia, and Brazil. Together, they used about 8.6 million tons of vegetable oils for the production of biodiesel in 2007. According to the USDA, the total global volume of global vegetable oils produced in that year was 132 million tons (2008f). From 2004 to 2007, global consumption of vegetable oils for all uses increased by 20.8 million tons, with food use accounting for 80 percent of total use and 60 percent of the increase. Industrial uses of vegetable oils, which include the production of biodiesel, grew by 15 percent per annum from 2004 to 2007. This compares with an annual average increase of 4.2 percent for food use. The proportion of all oils consumed for industrial use rose from 14.4 percent in 2004 to 18.7 percent in 2007 (Figure 1.4).

The level of imports of vegetable oils by the EU and US has increased substantially over the years in question. In the period from 2000 to 2007, the total volume of oil imported by the EU-27 increased from 4.4 to 6.9 million tons. In the same period, the volume imported by the US increased from 1.7 million tons to 2.9 million tons (Figure 1.5). The increase in the level of imports coincided with an increase in biodiesel production in the EU-27 from 0.45 billion gallons in 2004 to 1.9 billion gallons in 2007. In the same period, levels of production increased from 0.03 billion gallons in the US in 2004 to an estimated 0.44 billion gallons in 2007.

5 Biofuels production from maize uses only the starch in the maize kernel and 30 percent of the maize kernel remains as by-product called distillers dried grains with solubles (DDGS) which is a high-protein livestock feed.

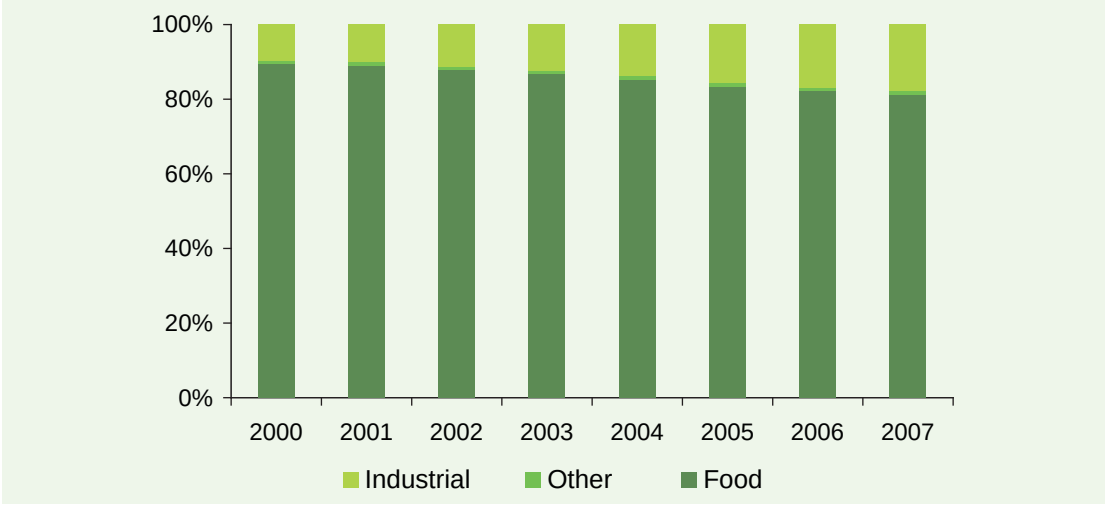
6 Data on biodiesel are incomplete and do not allow a precise estimate.

Figure 1.3: Global maize use



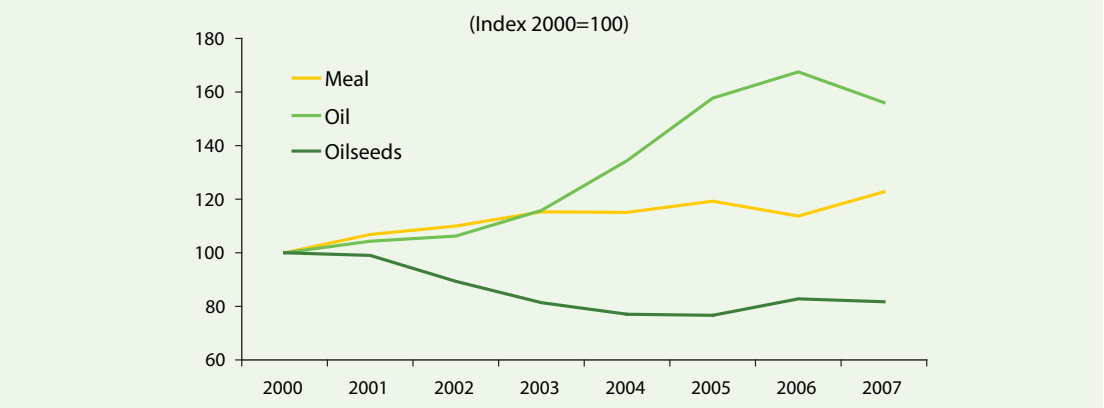
Source: DECPG calculations based on USDA data.

Figure 1.4: Global vegetable oils use



Source: DECPG calculations based on USDA data.

Figure 1.5: EU oil seeds imports



Source: DECPG calculations based on USDA data.

The production of ethanol from sugar cane in Brazil has not contributed appreciably to the recent increase in food commodities prices. This is because the level of production of sugar cane in Brazil has increased rapidly, with sugar exports nearly tripling since 2000. Brazil uses about half of its domestically produced sugar cane to produce ethanol for domestic consumption and for export, with the remainder being used to produce sugar. The increase in volume of sugar cane production has been significant enough to allow sugar production to increase from 17.1 million tons in 2000 to 32.1 million tons in 2007. In the same period, exports increased from 7.7 million tons to 20.6 million tons. Brazil's share of global sugar exports increased from 20 percent in 2000 to 40 percent in 2007. This was sufficient to prevent significant increases in the price of sugar, except for 2005 and early 2006, when Brazil and Thailand had poor crops due to drought.

The increases in biofuels production in the EU, the US and most other biofuel-producing countries have been driven by subsidies and mandates. The US has a tax credit system available to blenders of ethanol of US$0.51 per gallon and an import tariff of US$0.54 per gallon. In addition, biodiesel blenders benefit from a tax credit of US$1.00 per gallon. The US mandated the production of 7.5 billion gallons of renewable fuels by 2012 in legislation introduced in 2005. Similarly, energy legislation passed in late-2007 mandated an increase to 15 billion gallons of ethanol from conventional sources (maize) by 2022 and 1.0 billion gallons of biodiesel by 2012.

These incentives and mandates are driving the rapid expansion in the production of biofuels in both the EU and US. The new US mandates will require the volume of ethanol production to more than double and biodiesel production to triple if mandated levels are to be reached through domestic production by 2012. The EU has a specific tariff of €0.192 per liter of ethanol, which is equivalent to about €0.727 or US$1.10 per gallon). It imposes an ad valorem duty of 6.5 percent on biodiesel. EU member states are permitted to exempt or reduce excise taxes on biofuels and several EU member states have introduced mandatory blending requirements. Individual member states have also provided generous excise tax concessions. Germany, for example, has provided tax exemptions of €0.4704/ (US$0.64) per liter of biodiesel and €0.6545 (US$0.88) per liter of ethanol prior to new legislation in 2006 (Kojima, Mitchell and Ward, 2007; Global Subsidies Initiative, 2008). These strong incentives and mandates have encouraged the rapid expansion in the production of biofuels in both the EU and US.

The EU began to rapidly expand biodiesel production after the EU directive on biofuels (2003/03/EC) came into effect in October 2001. This directive stipulated that individual EU countries should aim to replace 5.75 percent of all transport fossil fuels with biofuels by 2010. This

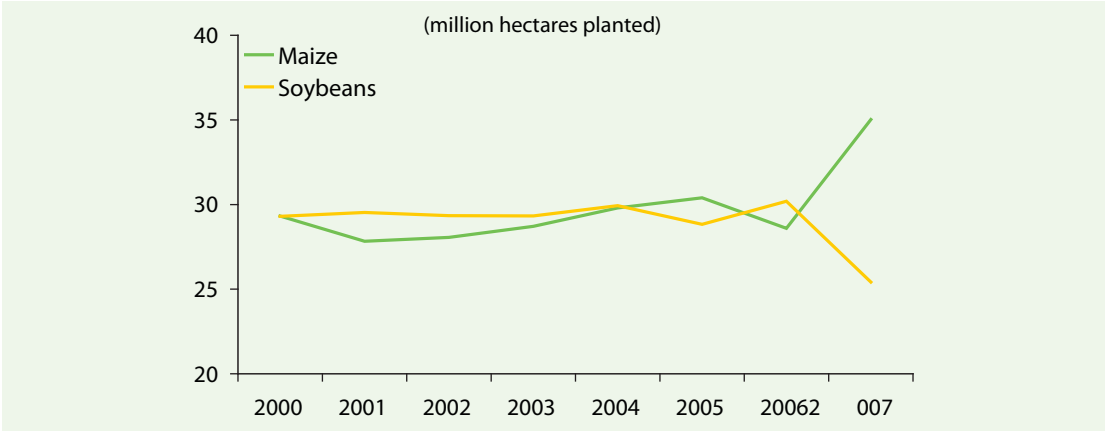
led to an increase in the volume of production of biodiesel from 0.28 billion gallons in 2001 to 1.78 billion gallons in 2007 (FAPRI, 2008). Rapeseed was the primary raw material for the production of biofuels, followed by soybean oil and sunflower oil. The combined total of vegetable oils used for the production of biodiesel was 6.1 million tons in 2007, compared with about 1.0 million tons in 2001.

The US increased its volume of production of biodiesel following legislation passed in 2004. This legislation, which took effect in January 2005, provided for an excise tax credit of US$1.00 per gallon of biodiesel made from agricultural products. This contributed to an increase in the volume of production of biodiesel in the US from 0.03 billion gallons in 2005 to 0.44 billion gallons in 2007. By 2007, about 3.0 million tons of soybean oil and 0.3 million tons of other fats and oils were utilized for this purpose. These two policies encouraged the rapid expansion of oilseeds production and contributed to a surge in vegetable oils prices. Annual average soybean oil prices increased from US$354 per ton in 2001 to US$881 per ton in 2007. Monthly soybean oil prices rose to US$1,522 per ton in June 2008. Since the varying oilseeds can be substituted for each other both in the production of food and of biofuels, prices are highly correlated. Thus, the increase in the price of soybean correlated with similar increases in the prices of other oilseeds.

Land-use changes due to the increased use of the commodities in question for the production of biofuels have been significant, leading to a reduced production of other crops. In the US, the total area of land utilized for the production of maize increased by 23 percent in 2007 in response to increased maize prices caused by the rapid growth in demand for maize for ethanol production. This expansion resulted in a 16 percent decline in the area of land utilized for the production of soybean (Figure 1.6). As a result of the corresponding decline in levels of production of soybean, prices of this commodity increased by 75 percent in the period between April 2007 and April 2008.

While maize displaced soybean in the US, other oilseeds displaced wheat in the EU and other wheat exporting countries. The increased levels of production of biodiesel in the EU thus resulted in smaller areas of land being utilized for the production of wheat. This resulted in the deceleration in increases in the volume of production of wheat, which would have otherwise kept wheat stocks higher. In response to the increased demand for and prices of oilseeds, the area of land planted with oilseeds increased, especially rapeseed and, to a lesser extent, sunflower. The increase was primarily in the countries that are also major wheat exporters, such as Argentina, Canada, the EU, Russia and Ukraine.

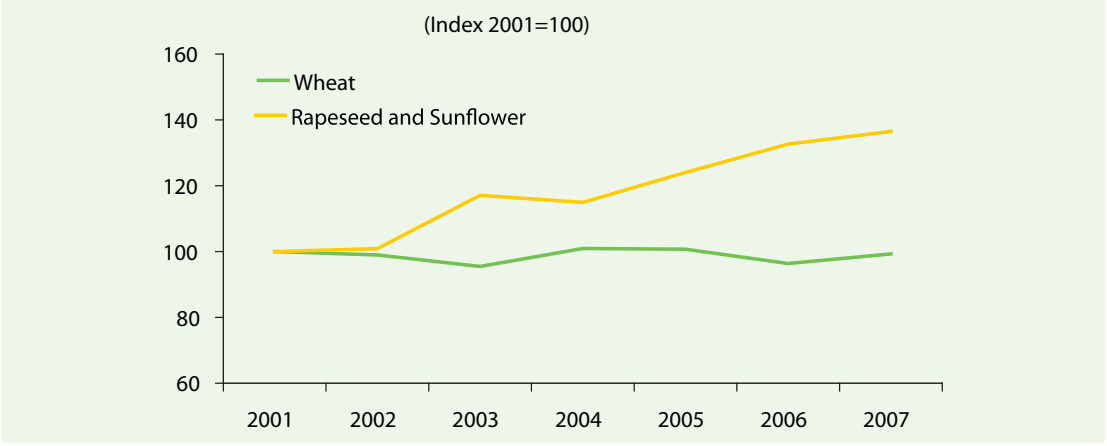
Figure 1.6: US maize and soybean area



Source: DECPG calculations based on USDA data.

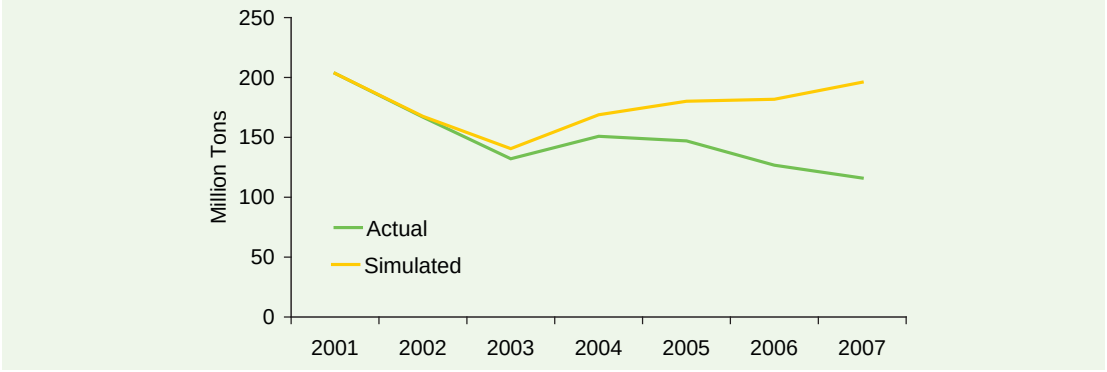
Oilseeds and wheat are grown under similar climatic conditions and in similar areas. Thus the expansion in production of rapeseed and sunflower resulted in the displacement of wheat as a crop. The eight largest wheat exporting countries[7] expanded the area of land devoted to the production of rapeseed and sunflower by 36 percent (8.4 million hectares) between 2001 and 2007. In the same time period, the area of land devoted to the production of wheat fell by 1.0 percent in these countries (Figure 1.7). The volume of wheat that might have been produced on land used to facilitate the expansion in production of rapeseed and sunflower was 26 million tons in 2007, based on average wheat yields in each country. The cumulative volume of wheat that might have been produced from that land amounted to 92 million tons in the period from 2002 to 2007. To illustrate the impact of this displacement on wheat stocks, Figure 1.8 compares actual wheat stock levels with simulated wheat stock levels if the land utilized for the production of rapeseed and sunflower had been planted with wheat and if wheat stocks had increased proportionately. The simulation shows that wheat stock levels would have been almost as large in 2007 as in 2001, rather than lower by almost half. Figure 1.9 shows the relationship between wheat stocks and prices.

Figure 1.7: Wheat and oilseeds area



Source: DECPG calculations based on USDA data.

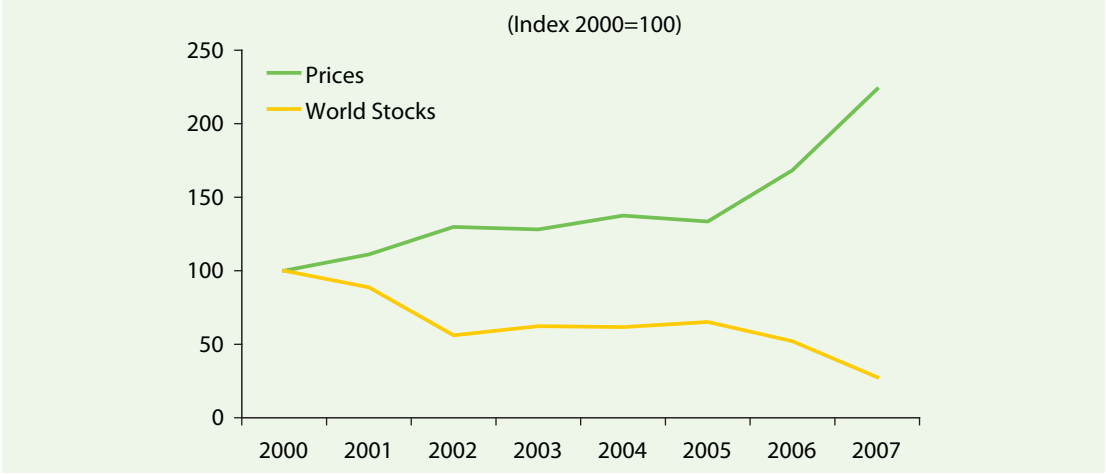
Figure 1.8: Wheat stocks, actual and simulated



Source: DECPG calculations based on USDA data.

7 Eight countries and groups accounted for 90 percent of global wheat exports in 2005-07. These countries and their shares were: US 25.4 percent. Canada 15.3 percent , EU-27 11.9 percent , Russia 9.8 percent , Australia 9.3 percent , Argentina 8.8 percent , Kazakhstan 6.0 percent and Ukraine 3.2 percent .

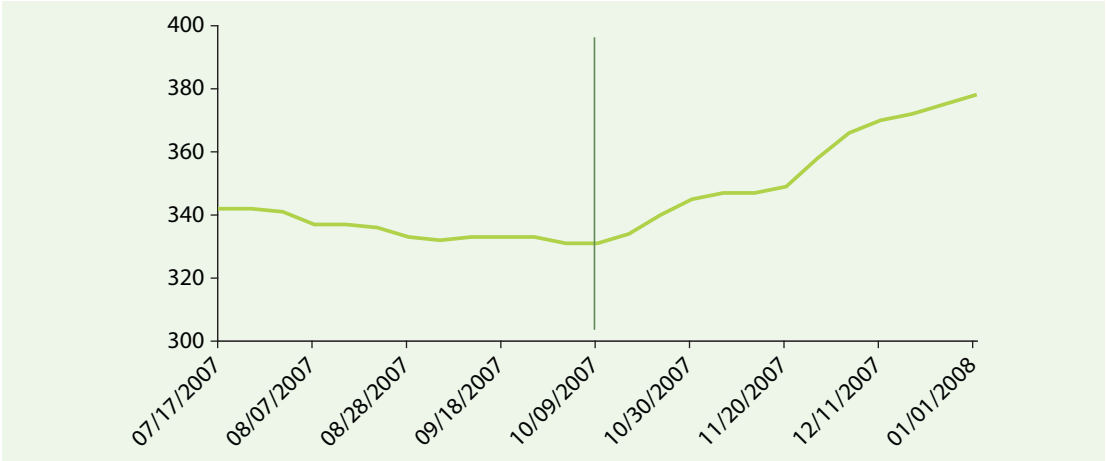
Figure 1.9: Wheat prices vs. stocks



Source: DECPG calculations based on USDA data.

Export bans and restrictions, while usually intended to control price increases in domestic markets, actually had the converse effect of exacerbating price increases by restricting access to supplies. Countries that have imposed export restrictions or bans on grain exports to contain domestic price increases include Argentina, India, Kazakhstan, Pakistan, Ukraine, Russia and Vietnam. The impact of these bans or restrictions is illustrated in Figure 1.10 which shows Thailand's rice export price in the weeks prior to and after India banned rice exports on 9 October 2007. According to the USDA (USDA, 2007) and the International Grains Council (2007), there were no other important market developments at that time that could account for the subsequent rice price increases. The USDA had projected that India would export 4.1 million tons in the month prior to the ban. Following the ban, this projection was revised to 3.4 million tons. The ban on exports led to a steady increase in prices over the following weeks. While it is probably not correct to say that all of the price increases were due to the ban, it probably focused attention on the market fundamentals and the rise in wheat prices and caused market participants to reconsider their level of imports and exports.

Figure 1.10: Impact of India's ban on rice exports (Thai rice export prices, US$/ton)



Source: International Grains Council data.

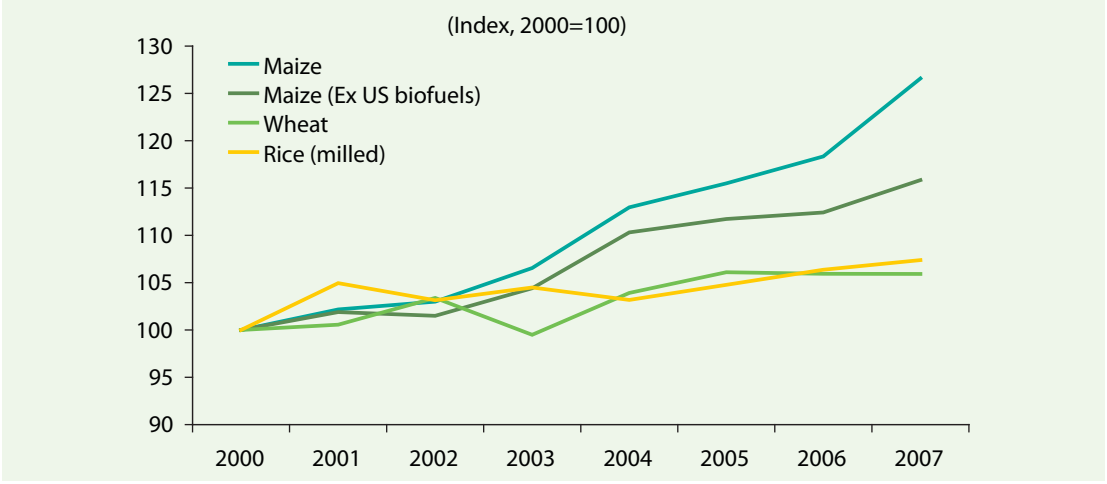
Rice is not used for the production of biofuels. However, the increase in prices of other commodities nonetheless contributed to a rapid rise in rice prices. Rice prices almost tripled in the period from January to April 2008 despite there being little change in levels of production or reserves. Rather, this increase was mostly due to a response to the surge in wheat prices in 2007, which increased by up to 88 percent in the period from January to December. This raised concerns about the adequacy of global grain supplies and encouraged several countries to ban rice exports to protect consumers from international price increases. For similar reasons, it caused others to increase imports.

Weather-related production shortfalls have been identified as a major factor contributing to the increased world cereals prices, especially in Australia, US, EU, Canada, Russia and Ukraine (OECD-FAO, 2007). The back-to-back droughts in Australia in 2006 and 2007 reduced grain exports by an average of 9.2 million tons per year compared with 2005. Poor crops in the EU and Ukraine resulted in a steep increase in exports from those countries by 10 million tons in 2007.

However, these declines were more than offset by large crops in Argentina, Kazakhstan, Russia and the US. In 2007, the total volume of grain exports from these countries increased by about 22 million tons compared with the previous year. Global grain production did decline by 1.3 percent in 2006. However, in the following year it increased by 4.7 percent. This suggests that the production shortfall in grains would not, by itself, have been a major contributor to the increase in grain prices. However, when combined with large increases in the volume of production of biofuels, land-use changes, and stock declines, it undoubtedly contributed to higher prices. The production shortfall was most significant in wheat, where global production declined 4.5 percent in 2006, increasing by only 2 percent in 2007. Global oilseed production rose by 5.4 percent in 2006/07 and then declined by 3.4 percent in 2007/08.

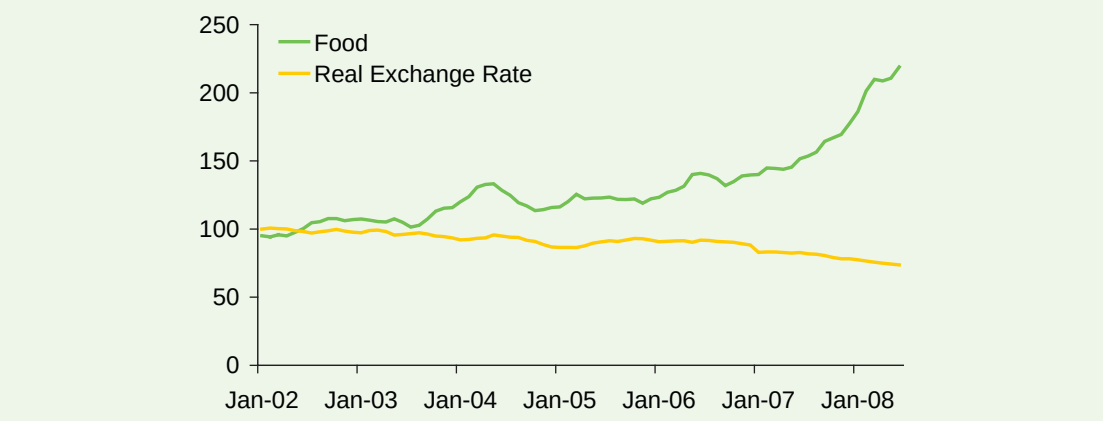
Rapid income growth in developing countries has not led to large global increases in grain consumption and was not a major factor contributing to the large grain price increases. However, it has contributed to increased oilseed demand and higher oilseed prices, as China increased its levels of imports of soybean for its livestock and poultry industry. Both China and India have been net grain exporters since 2000, although exports have declined as consumption has

Figure 1.11: Global grain consumption



Source: DECPG calculations based on USDA data.

Figure 1.12: Food prices vs. exchange rate



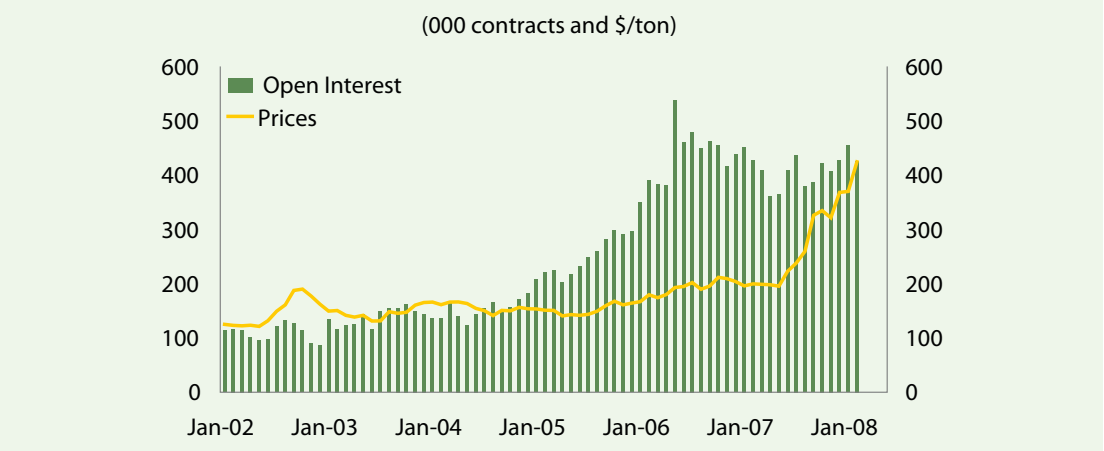
Source: DECPG calculations based on USDA data.

increased. Global consumption of wheat grew by only 0.8 percent and rice by only 1.0 percent per annum in the period from 2000 to 2007, while maize consumption grew by 2.1 percent, excluding the increased consumption resulting from the demand for biofuels in the US (Figure 1.11). These increases in the level of demand were lower than during the period between 1995 and 2000, when consumption of wheat, rice and maize increased by 1.4, 1.4 and 2.6 percent per annum, respectively.

The decline of the US dollar contributed to food commodity price increases. The US dollar depreciated by about 35 percent against the euro in the period January 2002 to June 2008. The depreciation of the dollar has been shown to increase dollar commodity prices with elasticity between 0.5 and 1.0 (Gilbert, 1989; Baffes, 1997). However, the dollar depreciated much less against most Asian currencies and a trade-weighted real exchange rate for US bulk agricultural exports computed by the USDA (USDA, 2008h) depreciated by only 26 percent during the period in question. The elasticity should be less than 1.0, because the exchange rate does not pass-through completely in many countries due to government policies (Shane and Liefert, 2007). A comparison of the real trade-weighted exchange rate and the index of food prices (Figure 1.12) show a general correspondence between dollar depreciation and food price increases. If the elasticity is taken as the mid-point of the range from 0.5 to 1.0, the increase in food prices due to the decline of the dollar would have been about 20 percent (26 percent multiplied by 0.75) between January 2002 and June 2008.

Speculation and investor interest in commodities have also increased. This might have contributed to food price increases. A reflection of increased investor interest in commodities was the quadrupling of the number of wheat futures contracts traded on the Chicago Board of Trade in the period from 2002 to 2006 (Figure 1.13). However, the increased volume of trading in futures contracts does not coincide closely with the increase in wheat prices, which raises doubts about the impact of this trading on prices. The impact on prices is hard to quantify and most studies do not find that such activity changes prices from the levels that would have prevailed without such activity (Gilbert, 2007). However, such trading may have an impact on the rate of adjustment to a new equilibrium when fundamental factors change.

Figure 1.13: Wheat open interest and prices



Source: DECPG, World Bank.

1.5 Conclusion

The most important factor that drove international food prices was a large increase in the production of biofuels from grains and oilseeds in the US and EU. The increase in internationally traded food prices from January 2002 to June 2008 was caused by a confluence of factors. However, the most important contributing factor was the large increase in levels of production of biofuels from grains and oilseeds in the US and EU. Without these increases, global wheat and maize stocks would not have declined appreciably and price increases due to other factors would have been moderate. The rapid rise in oilseed prices was caused mostly by demand for raw materials for the production of biodiesel, which in turn was driven by incentives created by policies introduced in the EU in 2001 and in the US in 2004.

Changes in patterns of land use in wheat-exporting countries resulting from the increased area of land devoted to oilseeds for biodiesel production limited expansion in levels of wheat production. This contributed to large declines in global wheat stocks and hence to increased wheat prices. The large increase in rice prices was largely driven by the increase in wheat prices, rather than to changes in rice production or stocks. In this light, the increased price of rice can indirectly be attributed to a significant degree to the increased demand for biofuels.

The export bans on grains and speculative activity would probably not have occurred without the large price increases due to the increased demand for biofuels. While they definitely did exacerbate price increases, they can be seen more as a perhaps ill-conceived response to rising prices than as a primary cause. Higher energy and fertilizer prices would have still increased crop production costs by between 15 to 20 percentage points in the US and by lesser amounts in countries with less intensive production practices. The back-to-back droughts in Australia would not by themselves have had a large impact on prices, considering that they resulted in declines in levels of global grain exports of about 4 percent. Under normal circumstances, other exporters would normally have been able to offset this loss. The decline of the dollar contributed about 20 percentage points to the rise in dollar food prices.

The combination of higher energy prices and related increases in fertilizer prices and transport costs and the decline in the value of the dollar caused food prices to rise by about 35-40 percentage points in the period from January 2002 until June 2008. These factors contributed to about 25-30 percent of the total increases in food prices.

Most of the remaining 70-75 percent increase in food commodity prices was due to the increased demand for biofuels and the related consequences of low grain stocks, large land-use shifts, speculative activity and export bans. The most significant increases in the volume of production of biofuels were in the US and in the EU, and these were largely driven by subsidies, mandates, and tariffs on imports. Without such measures, the volume of production of biofuels would have been lower and food commodity prices would not have increased to the extent that they did.

Removing tariffs on ethanol imports in the US and EU would allow more efficient producers, such as Brazil and other developing countries, including many African countries, to produce ethanol profitably for export to meet the mandated levels of renewable fuel in the US and EU. The production of biofuels from sugar cane in Brazil is much cheaper than the cost of production of biofuels in either the US or the EU. In Brazil, the production of ethanol from sugar cane has not resulted in significant increases in the price of sugar, because cane production has expanded sufficiently rapidly to meet the production needs of both sugar and biofuels. Considering their potentially disastrous effects on food prices, the subsidization of the production of biofuels should be seriously reconsidered.

Chapter 2

Pricking the Price Bubble to Avert a World Rice Crisis

Abstract: *By May 2008, world rice prices had trebled within less than four months, reaching a 30-year inflation-adjusted high. With a huge number of people in the East Asian region spending a large proportion of their disposable income on this single commodity, these price increases threatened to cause a major poverty crisis. Many observers of this sector have attempted to explain the dramatic spiraling in price in terms of factors that have been recognized as driving increases in the price of wheat. In particular, the spike in rice prices has been attributed to the weak US dollar, increased energy prices, and the increased demand for biofuels. This chapter argues that the price increases cannot primarily be attributed to these causes. Rather, it argues that they were due to a sudden change in the trade policies of rice-exporting countries and the urgent efforts of some rice-importing countries to secure supplies at any price, leading to hoarding and speculation. Rice-exporting and importing countries and the international community can help prick the rice bubble by collaborating to ease the trade tightening. The most feasible immediate solutions are the release of stocks by Japan, Thailand and China, the removal of bans on exports and the halt to large public tenders in favor of direct negotiations.*

2.1 Introduction

In the period prior to the writing of this chapter, the price of rice on global markets has increased dramatically. In the period from December 2007 to April 2008, rice prices roughly tripled around the world. For example, the price of benchmark Thai 100B white rice rose from US$368/ton in December to more than US$1,200/ton in April.

This surge in prices clearly represents a break in the historic trend (**Figure 2.1**). International rice prices fell to an all time low in 2001, measured at constant prices. Since then, the price of rice has been characterized by a moderate upward trend. Average global prices rose by an average real rate of 8 percent per year through mid-2007, before returning to what could be interpreted as normal levels in December 2007. Since then, prices have spiraled upwards in a fashion reminiscent of the 1974 price spike.

The increasing price of rice on global markets has dramatic implications for people throughout the East Asian region. Throughout this region, a significant proportion of the population spends a large portion of its income on this commodity. Specifically, in the average East Asian household, food comprises from 30 to 50 percent of the total consumption basket. In these households, one third of the daily calorific intake is derived from the consumption of rice (FAOSTAT, 2003).

In view of the importance of rice, policymakers need to understand the factors driving price rises. Given the potential negative impact of increased average prices of this fundamentally important commodity on household consumption levels it is vitally important for policymakers to understand the factors driving price increases and formulate policies that could facilitate the pricking of the price bubble. This chapter is intended both to assist in the understanding of these factors and to present a series of recommendations to achieve this end.

Chapter 2 is organized in the following way. Section 2.1, this section, defines the questions and premises explored by this chapter and describes its organization. Section 2.2 explores the specific nature of rice markets, paying particular attention to those aspects that might amplify the sensitivity of these markets to price shocks. These include the fact that rice markets are politically sensitive, thin markets with a small number of exporters trading relatively low volumes of the commodity. Section

Figure 2.1: Real rice prices, 1961-2008

Source: IRRI (Thai 15% brokens) and USDA (Thai 100B).

2.3 looks at a number of factors that have been used to explain the dramatic recent escalations in price, but only to find these explanations inadequate. These explanations include the weakness of the US dollar; increased oil prices; and the increased demand for biofuels. Section 2.4 argues that the main causes for the recent escalation in rice prices are trade restrictions and buying behavior. Section 2.5 presents a number of scenarios to describe the direction that the rice markets might have taken in May 2008. Section 2.6 describes policy responses that were taken or that might have been taken to prevent further escalation of the global rice crisis. Section 2.7 is a postscript that describes what happened after the original policy paper on which this chapter is based was presented to policymakers in the region.

2.2 The nature of rice: Thin markets, quality segmentation, concentrated exports and politically sensitive

Around the world, rice markets have four distinct features that tend to magnify the sensitivity of these markets to price shocks. These are:

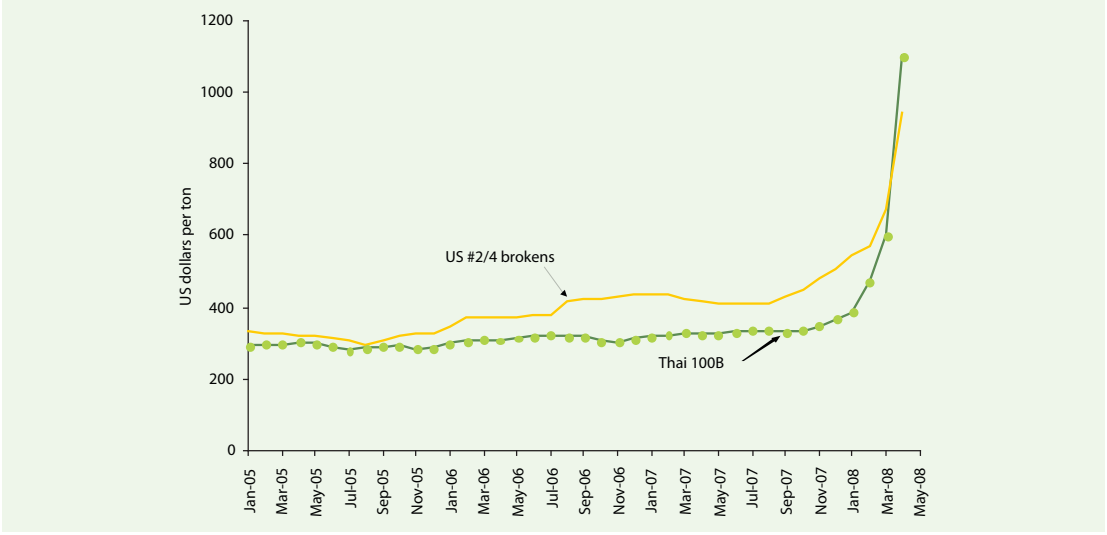
Thin markets: Very small changes in supply and/or demand can have a dramatic impact on rice prices on global markets. This is largely due to the fact that rice trade is a residual activity in most countries. Among most major rice producing countries, almost all rice is consumed domestically. Only a very small share of the total produce is imported or made available for export. Of the total production of 420 million tons of rice produced in 2007, only 30 million tons, or 8 percent of the total, was exported outside the producing nation. In fact, this is a significant increase over the figure of 4 to 5 percent recorded in the 1960s and 1970s. Nonetheless, small declines in levels of production can result in dramatic price increases.

Quality segmentation: Due to strong consumer preferences often tied to deeply held cultural beliefs, there is only a moderate degree of elasticity of substitution between varying strains of rice. In particular, there is little elasticity of substitution between Indica and Japonica rice in differing markets. In addition, there are substantial freight differentials between end-markets. As a result, the price of specific strains of rice can be subject to a particularly high degree of sensitivity (Figure 2.2).

Concentrated exports: A vast proportion of rice produced for export markets comes from only three countries. This makes the price of rice particularly sensitive to economic, environmental or other changes that affect production levels in any one of these three countries. Specifically, in 2007, Thailand, India and Vietnam produced two thirds of the total volume of rice exported to sell on global markets (Table 2.1).

Political sensitivities: Because of the impact of domestic rice prices at the household level on consumption levels, governments in Asia and Africa are under heavy pressure to control rice prices in markets affecting their electorates. In order to prevent the social unrest and other problems arising out of increased rice prices, governments are often tempted to seek to insulate their domestic markets from the impact of instability on world markets. As a result of protectionism and subsidization and other measures, global markets are made even thinner.

Figure 2.2: Comparison of Thai and US rice export prices, 2005-08



Source: FAO through February 2008, Creed Rice Report March-April 2008.

Table 2.1: World rice exports, 2006-08

	2006	2007	forecast 2008
Thailand	7,376	9,500	9,000
India	4,537	5,000	3,000
Vietnam	4,705	4,522	4,000
USA	3,306	3,044	3,500
Pakistan	3,579	2,400	2,900
China	1,216	1,340	1,000
Egypt	958	1,209	800
World Total	**29,403**	**30,299**	**27,485**

Source: USDA.
Note: Units in '000 metric tonnes.

2.3 Factors that were not the key drivers of the 2008 price increases: Oil, biofuels, the US dollar, and shortfalls in production

Economists and other observers have attempted to explain the recent surge in rice prices in terms of a number of different factors, including: shortfalls in production and/or increases in demand; depreciation in the value of the US dollar; increased oil prices; financial speculation; and pressures created by the increased production of biofuels.

Instead, this chapter argues that the two main causes of the recent surge in rice prices have been trade restrictions and buying behavior. This chapter will argue that exporting countries are restricting exports to protect their domestic consumers from rising world food prices; many importing countries are seeking to guarantee supplies at almost any price; and governments and the private sector are building stocks in light of the extreme market turmoil. Before attempting to explore the manner in which these factors have impacted the increase in rice prices, we examine the alternative explanations that have been put forward.

Shortfalls of production and/or increases in demand

It is hard to argue that the surge in rice prices resulted from decreased production or from increased demand. Levels of global rice production have been increasing steadily in recent years, even relative to increased demand. USDA data show both rice production and consumption growing by just over 1 percent per year for the past ten years.[8] Over the past three years, production grew by 2.4 percent per year while consumption grew less than 1 percent per year.[9] All major Asian rice producers experienced good harvests in 2007, despite some local problems. In fact, record crops are forecast for the current year (Table 2.2). At the same time, there has been no significant change in patterns of demand for rice.

Some observers have stated that the sharp fall in world rice stock levels has been a significant factor in driving the surge in rice prices. However, this does not appear to be supported by the data. First, the decline in world rice stocks took place in early 2000. From 2004 onwards, stocks have stabilized (Figure 2.3). Second, the sharp fall in world rice stocks is almost entirely driven by China's destocking.

In both the USDA and FAO series, figures regarding total stocks are heavily influenced by the high rate of both consumption and production of rice by China and India. During the past four years, China and India together have accounted for more than half of the world consumption of rice. Chinese inventories are estimated to account for over half of total global inventories. According to USDA, Chinese inventories account for 51 percent of the total over the past four years, while the FAO gives a figure of 55 percent. Given the prominence of China in these terms, shifts in Chinese government policies or in the supply-demand balance in that country have a significant effect on global figures.

8 USDA, Grain: World Markets and Trade, various issues, downloaded May 4, 2008 from http://www.fas.gov/grain_arc.asp

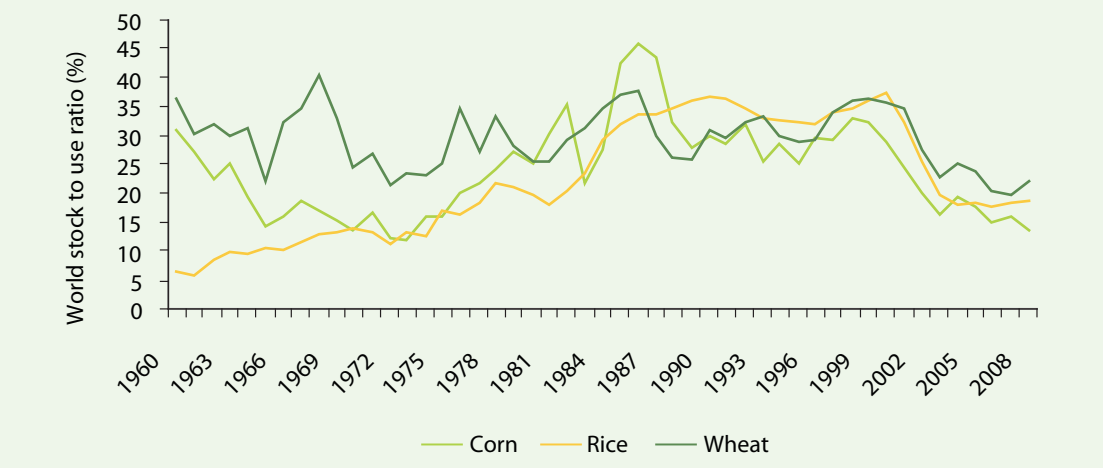
9 USDA, Grain: World Markets and Trade, April 2008.

Table 2.2: Milled rice production

Milled Rice Production, thousand metric tons					Growth	
					Forecast	Forecast
	2003/2004	**2004/2005**	**2005/2006**	**2006/2007**	**2007/2008***	**06/07-07/08 (%)**
China	112,462	125,363	126,414	127,800	129,500	1.3
India	88,530	83,130	91,790	93,350	94,000	0.7
Indonesia	35,024	34,830	34,959	35,300	35,500	0.6
Thailand	18,011	17,360	18,200	18,250	18,500	1.4
Vietnam	22,082	22,716	22,772	22,894	23,261	1.6
Philippines	9,200	9,425	9,821	10,085	10,400	3.1
World	**391,699**	**400,775**	**418,061**	**420,561**	**425,288**	**1.1**

Source: USDA.

Figure 2.3: World grain stock to use ratios



Source: World Bank.

In the late 1990s, China accumulated huge stocks of rice. In the late 1990s, the levels of China's rice stocks soared due to a combination of minimum provincial grain production and reserve stock levels and declining consumer offtake from the state-operated grain shops. Seeking to reign in soaring subsidies, Beijing narrowed the price spread between market prices and the grain shops. This led to an even larger build-up of government stocks.

In the late 2000s, China moved to dispose of these massive rice stocks. In light of this, about ten years ago, the Chinese Government decided to implement a policy of disposing of its stocks through subsidized domestic and export sales. Export subsidies in 2003, for example, were valued at about US$6.3 billion. FAO estimated that Chinese stocks of rice at the end of 2003 amounted to about 74 MMT, amounting to 62 percent of total global inventories. USDA's estimated that figure to be about 64 MMT, or 10 MMT lower. In the intervening years, Chinese holdings are estimated to have declined by 23 percent (FAO estimate) to 42 percent (USDA estimate) (Table 2.3).

Data related to inventory levels are not precise. It should be noted that data related to the inventory levels are extremely imprecise. Most governments do not attempt to survey actual stock

inventories in their country, so both USDA and FAO must attempt to make rough estimates. In China, this is compounded by the fact that information related to rice stocks is a state secret. The difficulty of obtaining precise data is illustrated by the growing difference between the varying estimates prepared by the USDA and FAO (Table 2.3).

China's international rice trade averages only 0.7 MMT of imports and 1.9 MMT of exports, with exports being tightly controlled by the central government. Thus, China's role in the world rice market has not been decisively influential. It can hardly be argued that global food security has declined as a result of the declining inventories in China, regardless of the magnitude of these declines.

Depreciation in the value of the US dollar

US dollar depreciation almost certainly played a role in driving up the price of commodities pre-2008. In the period up to December 2007, a depreciation in the value of the US dollar almost certainly played a role in driving up the price of commodities such as rice that are denominated in this currency. Exporters in countries with relatively strong currencies demanded higher US dollar-denominated prices to offset their costs. By the same token, buyers in countries with appreciating currencies could afford to pay the higher prices.

However, it is much less likely that depreciation in the value of the US dollar played a similar role in the 2008 rice price spike. In the earlier period, the value of Thailand's currency, the baht, appreciated by 14.3 percent. Given the significance of Thailand as an exporter of rice, this probably contributed to the rise in price in 2007. By contrast, in the period from December 2007 to April 2008, when prices spiraled dramatically, the values of Thailand and India's currencies actually depreciated by 4.6 and 2.4 percent, respectively.[10]

Table 2.3: World rice ending stocks (MMT)

Year	USDA					FAO				
	World			China	India	World			China	India
	Total	- China	-China & India			Total	- China	- China & India		
1999/00	143.1	45.7	28.0	97.4	17.7	152.9	59.3	34.4	93.6	24.9
2000/01	146.7	53.7	28.6	93.0	25.1	150.7	60.2	35.2	90.5	25.0
2001/02	133.0	53.8	29.4	79.2	24.4	142.7	59.4	32.8	83.3	26.6
2002/03	103.3	40.2	29.2	63.1	11.0	119.2	45.7	33.7	73.5	12.0
2003/04	82.1	38.2	27.4	43.9	10.8	105.3	46.3	33.3	59.0	13.0
2004/05	73.2	34.3	25.8	38.9	8.5	99.9	43.6	34.6	56.3	9.0
2005/06	75.7	38.9	28.4	36.8	10.5	105.0	49.1	37.5	56.0	11.6
2006/07	75.8	39.9	28.5	35.9	11.4	105.5	48.9	35.7	56.6	13.2
2007/08*	78.5	40.8	27.8	37.7	13.0	105.0	48.6	32.6	56.4	16.0

Source: USDA and FAO.
Note: * Forecast.

10 Timmer (2009) provides a statistical analysis of the relationships between rice prices and exchange rates, stocks, financial speculation and other grain prices which supports the conclusions in this section.

Increased oil prices

While rising oil prices have contributed to increases in the price of grains over recent years generally, they do not explain the sudden spiraling of rice prices relative to other grains. In general, increased oil prices result in increased production costs for all grains through upward pressure on fertilizer and agro chemical prices, irrigation pumping costs, harvesting, drying, milling, and international and domestic transport costs. In the period between 2002 and 2007, increased energy costs are estimated to explain about 20 percent of the rise in the price of staples such as wheat and corn (Chapter 1). However, while higher energy and related costs drove up the prices of all grains (including rice) in the period up to 2007, they do not explain the dramatic increase in the price of rice relative to other grains in 2008.

Financial speculation

One contributor to the dramatic increases in the prices of other foodstuffs over recent years is the role of financial speculation. However, unlike the case of wheat and corn, futures markets for rice are very thinly traded (Timmer, 2009). It is thus highly unlikely that the increases in the price of rice can be explained in these terms.

Increased demand for biofuels

Unlike other grains, the impact of the increased demand for biofuels is not likely to be highly significant as a factor driving the spiraling of rice prices, particularly relative to other staples such as wheat. Rice is not used for biofuel production, nor is land used to produce rice easily utilized for the production of biofuel crops. Thus, any impact of the increased demand for biofuels on rice prices is indirect.

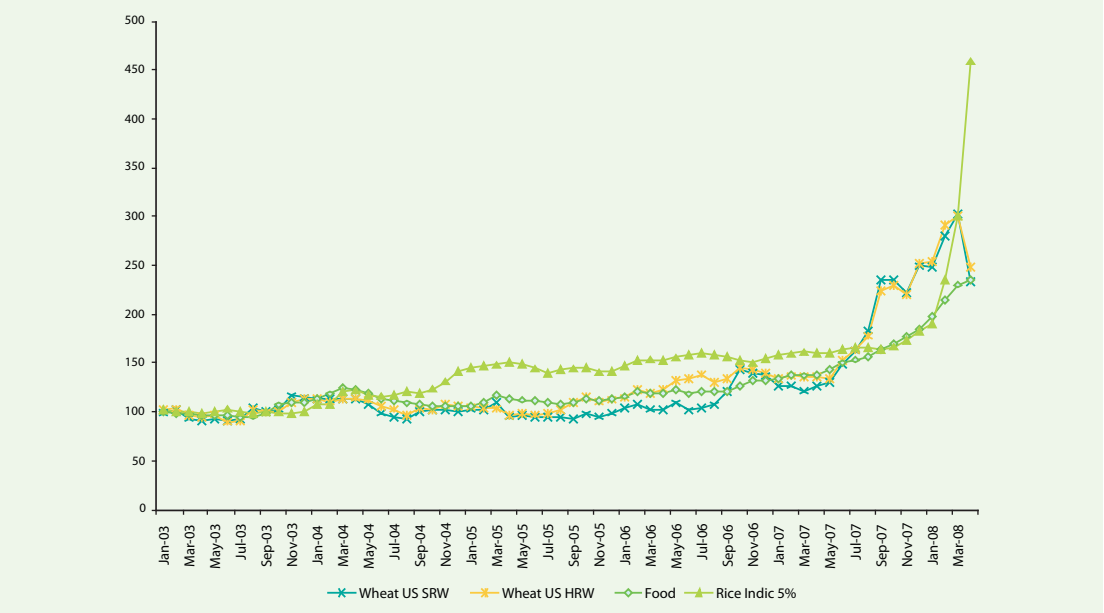
Increased demand for biofuels has a much greater direct effect on wheat prices. The prices of rice and wheat are related because at the level of food consumption, one commodity may often substitute for the other. Thus, Granger causality tests show that hard wheat daily price values are associated with daily rice prices one third of the times in the period between 2000 and mid-2008 (Timmer, 2009).

The relationship between the prices of rice and wheat may explain the trend towards increased prices until 2007. However, it is not sufficient to explain the dramatic increase in prices in 2008 (Figure 2.4). Based on the historical relationship between wheat and rice prices since 1990, it might be predicted that the high price of wheat in 2008 could push rice prices to around US$600 a ton. However, this is substantially lower than actual price of rice, which exceeded US$1,000 a ton in April 2008.

2.4 Factors that were key drivers of the 2008 price increases: trade restrictions and buying behavior

Two main causes of the 2008 surge seem to be trade restrictions and buying behavior. Having examined alternative explanations for the trend towards dramatic increases in the price of rice in 2008, this chapter now argues that the two main causes of this recent surge were trade restrictions

Figure 2.4: Commodity prices in current US$ (2003=100)



Source: World Bank data and staff calculations.

and buying behavior driven by precautionary behavior and market psychology. Specifically, it argues that:

- Major rice exporters are restricting their level of exports to protect their domestic consumers from rising world food prices;
- Many importing countries are seeking to guarantee supplies at almost any price; and
- Governments and the private sector are stockpiling rice in light of the extreme market turmoil.

The trade restrictions and tendering behavior were sparked by the decision of the world's second largest exporter of rice, India, to restrict exports in October 2007. The decision was taken because of fears that the dramatic increase in international wheat prices would lead to food inflation, as wheat is a major food staple in India. Facing an election in 2009 and having been criticized for the previous year's wheat imports, India reduced wheat purchases from the international market by 5 million tons (MMT) and compensated this by banning exports of non-Basmati rice. It was predicted at the time that this would cause India's annual exports to fall by at least 3 MMT in 2008. This is equivalent of 10 percent of the total volume of world rice trade in 2007. The restriction was initially carried out through the establishment of a minimum export price that was well above the prevailing market price, effectively blocking any new export contracts. This led to an acceleration of international rice price increases that put pressure on other exporting countries.

As a result of India's implementation of a minimum export price, other rice exporters also implemented preemptive trade policy measures to secure access to rice supplies. This led to a snowball effect. As international rice prices rose, food inflation reached alarming levels in rice importing and exporting countries. This food inflation threatened to undermine living standards and put heavy pressure on governments to safeguard domestic supplies.

In response to high food inflation, Vietnam, the world's third-largest rice exporter, stopped accepting new export orders in early 2008. India then banned all non-basmati rice exports on 1 April 2008. Together, India and Vietnam accounted for 34 percent of all world trade in 2007.

Other rice exporters, including Egypt, Pakistan, China, Cambodia, and Brazil, followed by taking measures to restrict rice exports. Senior government officials in Thailand's commerce ministry also raised the possibility of rice export restrictions, fueling speculative pressure. However, Thailand subsequently announced that it would not restrict rice exports.

The trade restrictions led to a significant increase in rice prices. However, the main shock was the result of the subsequent tendering and hoarding behavior. The 4 MMT export-supply shortfall resulting from the trade restrictions might have resulted in world prices rising to US$700 per ton. However, in an increasingly tight export market, the urgent efforts of some rice importing countries to secure supplies have had a magnified effect on prices. This has resulted in the current speculative bubble, with prices above US$1,000 per ton.

The export restrictions and surging prices sparked panic buying by the Philippines, the world's largest importer. The Philippines made large purchase tenders and accepted price offers far above the previous market price in its March and April tenders. In its March 2008 public tender, the Philippines National Food Authority (NFA) sought 500,000 tons of rice but had offers for only 60 percent of this amount at an average price of around US$710 per ton. This was almost 50 percent more than the prevailing prices for the previous month. In the NFA's next tender on 17 April, prices skyrocketed to more than US$1,100 per ton. Even so, only 309,000 tons were offered (Figure 2.5).

The surging prices led to hoarding behavior by millions of households, farmers, traders and some governments. This can be classed as precautionary demand by small traders and consumers, rather than speculative demand from outside investors. The trade restrictions, tendering and hoarding behavior changed the gradual rise in rice prices from 2002 to 2007 into an explosion.

Restrictions on rice exports had the opposite of the intended effect in the local markets of those countries implementing the measures. With panic buying and hoarding, domestic rice prices rose dramatically in India, Vietnam and the Philippines. Each country implemented measures to safeguard domestic food security that, examined individually, appeared to make logical sense. However, the impact of a number of countries implementing similar measures had the opposite of the intended effect. By sparking a global panic, the actions of individual countries that were intended to prevent increases in domestic rice prices in fact caused domestic rice prices to rise even faster.

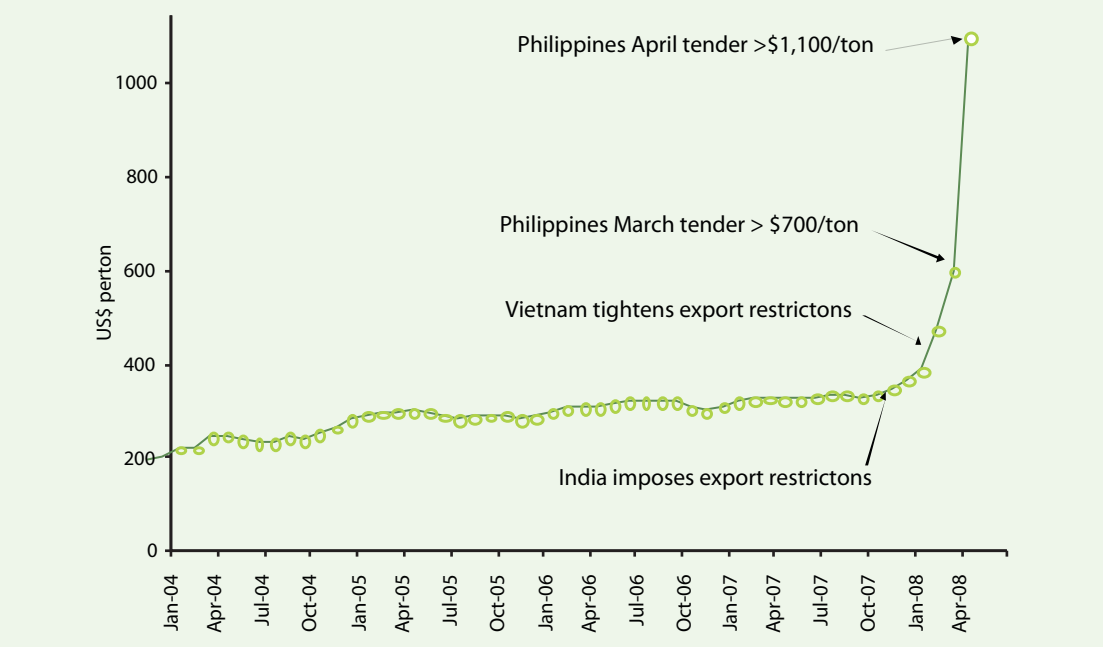
There is a clear moral to be learnt from the story: no country can solve the global rice crisis alone. The cumulative impact of these uncoordinated export restrictions and large public tenders with undisciplined buying decisions, in a tight global rice market, can be seen in Figure 2.5.

2.5 Price scenarios: stay high, escalate further or go down

In May 2008, when this paper was originally written, it was possible to envisage a number of different price scenarios for rice in the following months. Among other scenarios, these included the following:

- Rice prices would remain high, although stabilizing at current levels;
- Rice prices would increase to even higher levels; and
- Rice prices would decline from the current inflated levels to some degree.

Figure 2.5: World market rice price, 2004-08 (Thai 100B export price)



Source: World Bank staff calcualtions based on USDA and FAO data.

Rice prices remain high

In the short term, this appeared to be the most likely scenario. While immediate pressure on the world rice market was relieved by the collapse of the Philippines' 5 May tender of 675,000 tons when only Vietnam participated, demand was expected to remain strong in the following months. The Philippines was still looking for additional supply and other importing countries were urgently building up their domestic stocks, thereby starving the international market. With continued export restrictions, supplies to global markets were expected to be limited. Thailand could not have been expected to continue exporting at record levels of above 1 million tons per month for 7 months.

Rice prices increase to even higher levels

In the very tight markets at the period in question, even a minor constriction of supply could have driven Asian rice prices to US$1,500 per ton or higher. In 1973/74, Thailand stopped exporting rice for several months. During that period, world rice prices reached more than US$630 per ton, equivalent to US$2,700 per ton at today's prices. In the period in question, a repeat of this experience would had been quite possible.

Rice prices decline from inflated levels

During the period in question, it was also possible to envisage a decline in rice prices from the extreme levels of the time if the appropriate measures were taken to encourage the release of rice stocks. In particular, an increase in supply could be achieved by a relaxation of rice export controls by India, Vietnam and China, and by the release of rice stocks by Japan, China or Thailand, all of which had sizeable rice stocks.

2.6 Policy responses to prevent further escalation of the global rice crisis

This section explores measures that might have been (or actually were) implemented to prick the rice-price bubble.

A reduction in prices from the current extreme levels is in the interests of both rice exporters and rice importers. If prices remain high and volatile and if the world market comes to be viewed as an unreliable source of food, rice-importing countries will redouble their efforts to attain self-sufficiency. This would be a severe setback for measures over the past two decades to encourage the development of a bigger and more stable international rice market. These gains were largely due to the entrance of new exporters, specifically India and Vietnam. By sending a clear message that they cannot be relied upon in an emergency, rice-exporting countries risk destroying their own market.

The good news is that it would not have taken much to stop the rice crisis. As stated previously, the world rice market is an extremely tight market, with the volumes of this commodity being traded on global markets extremely small compared with other foodstuffs such as wheat. This has undoubtedly been a factor that has exacerbated the impact of the trade restrictions and irresponsible tendering behavior. However, these characteristics also make solving the problem of dramatically increased rice prices easier than for other commodities.

Because the world rice market is small, an increase in supply of as little as one million tons would have a big impact on prices. One million tons of fresh supply would solve the immediate problems of the biggest rice importers. An additional 2-3 million tons, particularly if it came from an unexpected source, could drive prices down to more reasonable levels. Intervention in the market would not only help address the demand of importers, it would also have a calming effect that could diminish the panic behavior, helping to prick the price bubble. These vital increases in supply could be achieved by the following measures:

- The relaxation of rice export controls, particularly by India, Vietnam and China; and
- The release of stockpiled rice by those with sizeable stocks, particularly by Japan, China and Thailand.

The vital role of Japan and China

Both Japan and China have extremely large stocks of rice. USDA estimates that China's rice stocks amount to 37 million tons. A recent statement by China's Premier Wen Jiabao put China's levels even higher, at 40 to 50 million tons. This latter figure would represent more than half of the world's current rice stocks.[11] Japan has stocks 1.5 million tons of imported rice, in addition to 770,000 tons of domestic rice. Thailand also holds 2.1 million tons of government stocks and about 2 million tons of private stocks.

The most effective way of achieving a decline in rice prices would be for stocks held by Japan and China to be released. The 4.0 MMT export-supply shortfall might have resulted in world prices doubling to US$700 per ton. However, the current speculative bubble has resulted in values well above that level. To bring prices down to levels which more generally reflect production costs of over

11 Reuters, "China trader says rice exports to continue," 22 April 2008.

US$100/barrel, policy decision-makers need to engineer an increase in rice that can be exported into the world market. The most effective means of achieving this would be by encouraging the release of stocks held by Japan and China.

Japan may be willing to release its stock of imported rice if the US was to indicate support for this action. Japan's imported rice stocks incur very high storage costs. In late 2006, these costs were reported to approach US$145 million per annum.[12] However, the US rice industry may have concerns about the re-export of Japanese stocks. Because Japan's rice exports historically were the subject of a contentious dispute with the US, Tokyo is reluctant to export without Washington's approval. Given the serious nature of the crisis at the period, it is doubtful that the Bush administration would have suffered any significant domestic fallout from approving Japan's exports.

China was potentially a second source of additional supplies of rice for world markets. China could have easily doubled the previous year's level of exports of 1.3 MMT of rice. Indeed, an offer of US$600-700/ton in the 5 May NFA tender would have sparked a collapse of current world prices. At the same time, both China and Japan stood to reap substantial political goodwill from the release of stocks.

The involvement of other countries could also have helped to prick the rice price bubble. If Thailand had sold its stocks, rather than holding them until the outcome of the new main harvest was known in November, this would have helped to relieve speculative pressure. Similarly, with India experiencing an excellent wheat crop and comfortable grain stocks, the Indian Government was well placed to relax its rice export ban, which would have had a similar effect.

A number of other measures could have been taken to reduce uncertainty and diminish the panic behavior. In particular, measures might have been taken to deemphasize large public rice tenders in favor of government-to-government arrangements. These might have played a role in reducing speculation and calming markets.

Long-term policy responses to mitigate the impact of the crisis and to prevent future crises

Longer-term policy responses need to be developed to facilitate the emergence of a healthier, less restricted rice market. The measures outlined above may have helped to immediately relieve pressures on rice prices and to avert a world rice crisis. However, in addition to the short-term measures, a number of longer-term policy responses need to be developed to facilitate the emergence of healthier, less restricted rice markets. Such responses include the following:

- Greater regional coordination to address sudden food price increases and to reduce trade distortions, particularly within an ASEAN+3 framework;
- The development of more effective ways of dealing with public tenders and price stabilization; and
- The development of measures to improve agricultural productivity and to reduce rice import tariffs.

The World Bank, other multilaterals, and the donor community could play a key role providing advice and funding for these initiatives.

12 USDA, Japan Grain and Feed Annual Report 2008, 3 March 2008 and MAFF Needs to Reduce Stocks of Imported Rice, Board of Audit Says, 3 November 2006.

2.7 Postscript: What happened next?

It is possible to look back at the study's finding and recommendations to review the impact of the policies it recommended. This paper was originally written in May 2008, at a time when a world rice crisis seemed to be a real and present danger. At this point, it is now possible to look back at the study's finding and recommendations with the benefit of hindsight to review the impact of the policies it recommended. Therefore, this section reviews the events related to the supply and demand for rice on global markets and rice prices in the period following the publication of the original paper. A detailed chronology of events related to these issues can be found in Annex I, which is extracted from Slayton (2009).

In April 2008, the preliminary findings of this paper were shared with World Bank headquarters and World Bank country offices of key rice trading countries in the region, which had played a key role in the formulation of the original paper. The findings of the paper were presented on 7 May 2008 to World Bank country offices in the region and to World Bank headquarters through a video-conference seminar. There was general agreement regarding the paper's assessment of the drivers and causes of the price increases. There was also a consensus that increasing the supply of rice to global markets through the release of stockpiled supplies in Japan was the most feasible solution to reducing prices in the short term. Following the presentation of the paper, the World Bank shared the findings and recommendations with key governments involved in the rice trade. Following this, the following events occurred in sequence:

Philippines tendering process

Fearing that world rice prices would soar to US$1,500/ton, some international institutions and rice-importing countries suggested that the Philippines scrap the tender. Despite these requests, the Philippines' NFA decided to proceed with the tender. The tender was aborted, however, when only one seller submitted an offer. After the aborted tender, the Philippines stated in 5 May that it had purchased sufficient rice to meet its needs. In addition, it stated that while it would consider purchasing additional supplies in fall, it would refrain from paying over US$1,200/ton.

The re-export of rice from Japan

On 9 May 2008, the Center for Global Development (CGD) published a paper *Unwanted Rice in Japan Can Solve the Rice Crisis – If Washington and Tokyo Act* by Tom Slayton and Peter Timmer. This paper, which received much media coverage, presented the findings of the study discussed in this current paper. Slayton and Timmer argued that world rice prices could be cut to US$500-600/ton by the end of June if existing stocks in Thailand, China, and Japan were released for export onto global markets. That same day, the Philippines publicly disclosed that it was negotiating with Japan for 60,000 tons of its domestic rice.

The proposal that Japan be enabled to re-export rice gathered momentum in Washington DC. The issue was intensely discussed in back-to-back congressional hearings on 12 May in both the US Senate and House of Representatives. The next day, the US publicly indicated that it would not oppose Japan's re-export of rice. In addition, Washington privately told Tokyo that it would not press Japan to fulfill the balance of its 2007 commitments for the purchase of rice and for those agreed upon for 2008 until after the crisis abated. When world markets became aware of the possibility of an increased supply of rice driven by a release of rice stocks by Japan, market sentiment began to shift (Figure 2.6).

Figure 2.6: Rice prices (Thai 100% B) and export restrictions

Source: Slayton 2009.

By June, with increases in exports and production and decreases in import demand, the market fundamentals had begun to improve. Following the completion of negotiations for a sale with the Philippines, Vietnam lifted its export ban on new sales. Another factor was that Asian growers had reacted to the very high prices by significantly increasing their rice plantings. As a result of increased supply from these sources, demand for imports weakened significantly.

In the end, there was no significant increase in supplies to global markets through the re-export of Japanese stocks. However, the very possibility of such increased supply played a significant role in facilitating a reduction in global prices. Policymakers in the US quickly responded to political and public pressure ignited by the CGD paper, giving Japan the green light to release its excess imported rice stocks. At the FAO summit on the food crisis on 2 June, Japan's PM Fukuda committed "to release in the near future over 300,000 tons of imported rice" to the world market. The public commitment, while more cautious than hoped for, nonetheless played a major role in calming markets. Once the public spotlight faded, the pledge did not materialize. The fact it had been made had served its purpose.

In mid-June, the Philippines received offers for government-to-government purchases. The Philippines announced a government-to-government purchase of 600,000 tons to Vinafood from Vietnam, the first such purchase since 2003. This provided further reassurance to global markets, reassuring them that additional tenders would not take place.

Although the rice bubble has been pricked, it is important that lessons from this experience are drawn. In this particular case, the story had a happy ending. However, it is important that lessons from this experience are drawn and that governments take measures to prevent such bubbles happening again. In particular, it is vital to realize that the escalating rice prices were not the result of natural causes, such as whether or crop failure, or other causes, such as the strong dollar or the increased demand for biofuels. Rather, they were the result of destructive trade restrictions that did not even serve the short-term interests of those who implemented them. It is important that governments avoid such behavior in the future and that they establish agreements that would help to prevent a repeat of such a price bubble.

Chapter 3





Commodity Price Shocks and Market Integration in Indonesia

Abstract: *Over the past several years, the prices of commodities have fluctuated dramatically. With a tendency towards increased prices, it has become increasingly vital for policymakers to understand the extent to which international price shocks are transmitted to domestic markets and the speed, geographical pattern, and drivers of the transmission of these price shocks. This chapter finds that the Indonesian markets for rice, sugar, cooking oil, soybean and maize are integrated with world markets to a significant extent. However, they are found to respond to world price shocks at different speeds. Furthermore, the speed of transmission of a shock in the international price to the domestic economy also varies between the different provinces. In particular, provinces that import the particular commodity and those that are centrally located adjust faster to price shocks. Within Indonesia, the main factors determining the extent of market integration of the various provinces with each other were remoteness and the quality of transport infrastructure of a province. However, there were also significant differences depending on the particular commodity in question. In particular, sugar and rice markets are found to be highly integrated across provinces. It was found that when there is a higher degree of integration between different provinces, there is also a lower price differential. In the sugar and rice markets price differences are in the range of 5-12 percent, while in the maize, soybean and cooking oil markets the range is 16-22 percent. Price differences across provinces are explained by differences in provincial characteristics. These characteristics include remoteness, transport infrastructure, output of the commodity, land productivity and income per capita. Domestic price volatility for all products is found to be significantly affected by exchange rate volatility.*

3.1 Introduction

The recent wave of high international commodity prices makes an understanding of spatial market integration vital for policymakers. The degree to which markets are integrated determines the extent to which commodity producers benefit from increases in international commodity prices. The degree to which markets are integrated also determines the extent to which consumers are affected by price increases in local markets. Aspects of market integration that need to be considered by policymakers include the magnitude, speed, determinants and geographical impact of the transmission. With an understanding of all these aspects of market integration, policymakers are in a better position to formulate policies that benefit producers, while at the same time protecting consumers.

The sharp increase in global commodity prices creates both challenges and opportunities for economies with an abundance of natural resources, such as Indonesia. The extent to which Indonesian commodity producers benefit from the increases in global commodity prices depends on a number of factors, including the following:

- The degree to which domestic markets are integrated with global markets. This integration will be demonstrated by the degree to which the increases in global commodity prices are reflected by increases in local commodity prices; and
- The degree to which varying provincial markets are integrated with each other. This will be reflected by the degree to which the increases in global commodity prices are reflected by increases in prices on provincial markets.

Weak integration between domestic and global markets implies a weak domestic supply response. It represents a huge lost opportunity for the economy, with agricultural producers generating suboptimal levels of revenues from their products. This chapter attempts to explore these issues by answering the following questions:

- **Spatial integration:** To what extent are Indonesian commodity markets integrated with world markets? Within Indonesia, are provincial commodity markets spatially integrated? Is there a significant degree of co-movement between provincial commodity prices?
- **Determinants of price differences and spatial integration:** What are the factors that explain differences in the price of commodities across provinces? What are the factors that explain spatial integration or the lack of such integration? What role does logistic cost play in achieving or failing to achieve integration? Does a higher level of output imply a lower level of integration with world markets?
- **Determinants of volatility of commodity prices:** What are the factors that explain Indonesian commodity price volatility?

The chapter is organized as follows. Section 3.1, this section, defines the questions explored by this chapter and describes its organization. Section 3.2 assesses the degree of integration of the five major Indonesian commodity markets with world markets. Section 3.3 measures the degree of integration of commodity markets among Indonesian provinces. Section 3.4 examines the drivers of market integration and of differences in prices across provinces. Section 3.5 analyzes the determinants of commodity price volatility. Section 3.6 concludes and draws policy implications.

3.2 Spatial integration of Indonesian commodity markets with the world

The extent to which Indonesian domestic commodity markets are integrated with world markets will determine the impact of the price volatility at home. Commodity prices rose dramatically in the two years leading up to mid-2008 (Figure 3.1). Despite the sudden fall in the second half of 2008, commodity prices are forecast to increase again and remain at high levels relative to manufactures. The extent to which Indonesian domestic commodity markets are integrated with world markets will determine the degree of impact of trends in commodity prices on the economy.

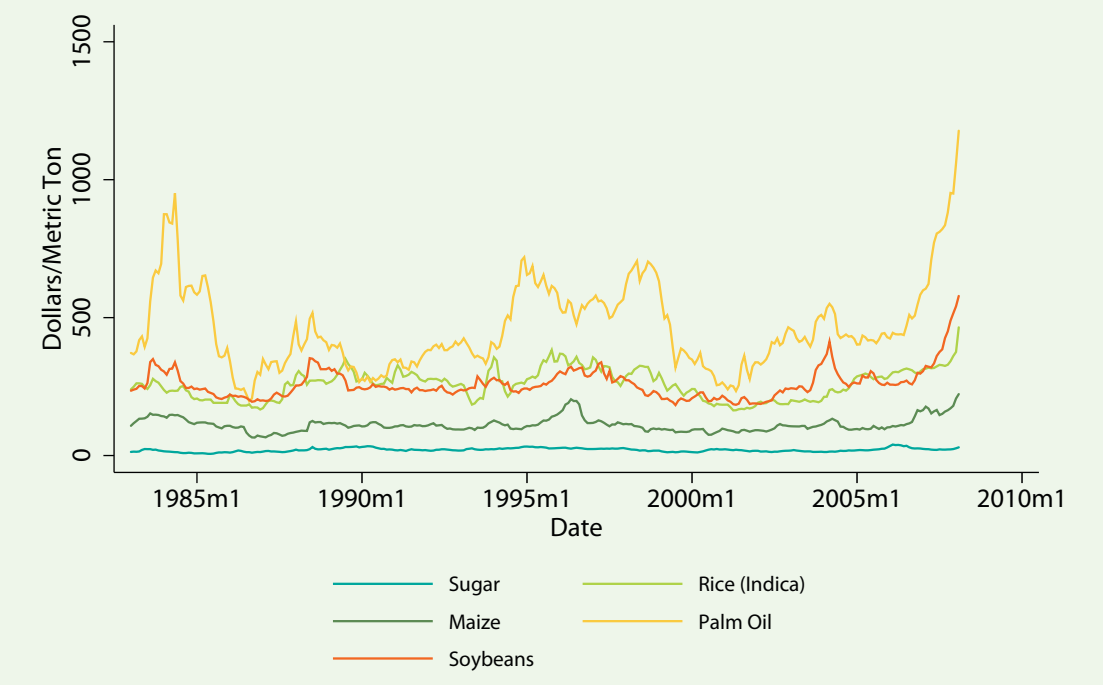
Increases in commodity prices: opportunities and challenges for Indonesia

Increases in commodity prices create opportunities for producers and challenges for consumers. Increases create opportunities for producers as they increase revenues and stimulate greater production. At the same time, these price increases create challenges for consumers as a result of their potential to reduce their purchasing power.

For Indonesian commodity producers to benefit from increased international commodity prices, Indonesian commodity markets need to be integrated with global commodity markets. This implies a free flow of information between global and domestic markets. With this free flow of information, Indonesian farmers will be aware of the relative value of their products on international markets. They will then be better positioned to benefit from rising world commodity prices in terms of optimizing their use of resources and maximizing their revenues.

Thus, it is essential that policymakers understand the degree to which Indonesian markets are integrated with world markets. This will allow them to assess the potential supply response by producers and its geographical pattern. It will also facilitate the design of policies to alleviate the impact of increased commodity prices on the poor.

Figure 3.1: Evolution of world commodity prices



Source: World Bank Database.

Spatial market integration in Indonesia: soybean, maize, rice, sugar and cooking oil

This chapter assesses spatial market integration in Indonesia by examining the degree to which local markets for five major staples are integrated with global markets. Specifically, it looks at markets for soybean, maize, rice, sugar and cooking oil. It examines the extent to which local markets were integrated with world markets over the most recent 14 years of available data (1993/01-2007/12 for rice, sugar and cooking oil and 1992/01-2006/12 for soybean and maize).[13] A clear sign that two markets are integrated is when shocks occurring in one market are transmitted to the other (Fackler and Goodwin, 2001).

The different products: varying degrees of exposure and control

The markets for the various commodities vary considerably in terms of their exposure to international trade. They also vary in the extent and manner to which prices are controlled by government policy.

- **Rice:** Bulog (the government agency in charge of rice policy) has a monopoly on imports and bans export. Imports account for a small portion of domestic consumption. Bulog claims to be keeping domestic rice prices aligned with world prices.

13 For rice, sugar and cooking oil, we use consumer price series for the analysis. For soybean and maize, we use producer prices.

- **Sugar**: In the market for sugar, there was significant government intervention until 1998. Since then, imports have theoretically been allowed for industrial consumers only. However, significant leakages to consumer markets exist.
- **Cooking oil:** The market for cooking oil, which is mainly made from palm oil, is probably the most exposed to international trade. Indonesia is a net exporter of palm oil. Export taxes are in place and have been stable over recent years.
- **Soybean and maize**: In the markets for these products, Indonesia is a net importer. In particular, it imports a significant volume of soybean. Importers need to obtain a license that is issued by the Government.

A high degree of integration between Indonesian provincial markets and world markets

Indonesian provincial markets for the commodities in question can be seen to be integrated to a significant degree with world markets. This is suggested by the results obtained using three different measures of integration:

- Simple comparisons of growth rates of domestic and world prices;
- Correlation coefficients between domestic and world prices; and
- Tests for systematic co-movement and shared long-run trends, using error correction models.

Simple comparisons of growth rates of domestic and world prices

The first integration measure indicates that average domestic price changes are roughly similar to the sum of average world price changes and average exchange rate changes. This integration measure is estimated comparing the growth rates of domestic prices with those of world prices for the time period in question. A complete transmission of world prices to domestic prices (i.e. complete integration of domestic markets with world markets) would imply that domestic commodity prices would increase by the same rate as global commodity prices, with allowance made for exchange rate changes. Table 3.1 presents the growth rates in the prices of selected commodities, together with exchange rate change, over the 14-year period of analysis. With the exception of soybean, the growth in the domestic price of the commodities is relatively similar to the sum of world price and exchange rate growth.

Table 3.1: Average monthly growth rates over 14-year period*

	Rice	Sugar	Cooking Oil	Soybean*	Maize*
Domestic price growth (%)	1.20	0.90	1.20	0.82	1.03
World price growth (%)	0.18	0.14	0.42	0.42	0.23
Exchange rate growth (%)	0.85	0.85	0.85	0.90	0.90

Source: Domestic price data are from BPS, world prices from the World Bank.
Notes: *The time period for rice, sugar and cooking oil is 1993:01-2007:12 and for soybean and maize 1992/01-2006/12.
World prices are expressed in US dollars, domestic prices in rupiah, and exchange rates in rupiah per US$1.

Correlation coefficients between domestic and world prices

An examination of the correlation coefficients between domestic and world commodity prices indicates a significant correlation. For all products, the correlation coefficients for domestic and world prices expressed in rupiah are systematically above 90 percent.

When looking at price changes instead of levels, correlations with world price changes fall. For cooking oil, they fall to an average of 60 percent; for rice and sugar to an average of 30 percent; while for soybean and maize, the correlations of domestic price changes with the world's are below 20 percent. However, these correlations are still significant, implying that domestic price changes move in the same direction as world price changes. The lower coefficients suggest that there is no perfect synchrony in the price movements. This suggests some lags in adjustment in domestic markets.

Tests for systematic co-movement and shared long-run trends

An examination of price trends shows that domestic prices share a long-run trend with world prices for all commodities considered. This evidence confirms that domestic prices are cointegrated with world prices, as testing for cointegration is a more formal way of assessing spatial market integration. The test results are particularly strong for rice and sugar, and less so for cooking oil, soybean and maize. The fact that domestic and world prices are cointegrated implies a systematic price co-movement. In the face of a shock that drives domestic prices away from world prices, a correcting mechanism is triggered, so that in the long run, the two series are aligned with each other.

The intensity and speed of transmission of world shocks to the domestic economy

Having determined that domestic and world markets are cointegrated, we proceed to assess the intensity and speed of transmission of world shocks to the domestic economy by examining two coefficients. The pass-through coefficient measures how much of the world price shock in a commodity is transmitted to its domestic price. The speed of adjustment coefficient measures how long it takes for a domestic price to adjust to this world price shock.

For three commodities, sugar, rice and maize, there is a complete transmission of world price shocks to domestic prices. In other words, the pass-through coefficient equals one: an increase of 1 percent in the price of these commodities leads to an average increase in the long run of 1 percent in the price in domestic markets.

In the markets for cooking oil, the pass-through coefficient is slightly above one. In other words, world price shocks tend to be magnified domestically. By contrast, the pass-through coefficient for soybean is incomplete: a 1.0 percent increase in world prices leads, on average, to an increase in domestic prices of 0.8 percent in the long run, other things being held equal. The first column of Table 3.2 summarizes the estimated pass-through coefficients for all products considered.

A significant variation in the speed of adjustment across provinces

The speed at which provinces adjust their prices after a world price shock varies significantly across provinces. This speed reflects how fast information flows and is an important dimension of how integrated markets are. Let us take rice as an example. Shocks to world markets drove a wedge

Table 3.2: Summary of spatial integration indicators with respect to world markets

	Average	Average	Slowest	Fastest		
Product	**Pass Through**	**Speed of Adjustment (%)**	**Adjustment (%)**	**Where?**	**Adjustment (%)**	**Where?**
Soybean	0.8**	11.1	5.6	C Java	16.7	E Java
Maize	1.03	10.0	6.3	W Sumatra	12.5	Bali/C Java
Rice	1.1	11.1	3.6	S Sulawesi	30.3	Jakarta
Sugar	1.08	33.3	14.3	N Sumatra	66.7	C Java
Cooking Oil	1.15**	25.0	16.7	E Java	40.0	Yogyakarta

Source: World Bank staff calculations based on data from BPS and World Bank.
Notes: ** indicates significantly different from 1, at 5%.
The adjustment is expressed as the % of the shock that is corrected in every period.

of about US$250/ton between world and domestic rice prices by July 2008. Under the assumption that export policy mirrors import policy (which implies that the Government changes its export prohibition and allows some controlled flows of exports as it does with imports) the estimates based on past trends suggest that the province in which the price adjustment will be fastest is Jakarta, where about 30 percent of the disequilibrium between domestic and world prices driven by the shock is adjusted every month. That implies that in about 5 months, half of the divergence will be corrected. In West Nusa Tenggara, half of the correction will take about 9 months, while in West Kalimantan it could take about 25 months. These different processes of adjustment are illustrated in Figure 3.2. (Postscript: these forecasts did not occur because the Government kept the prohibition on exports thus preventing the transmission of the world rice price shock through exports.)

Rice prices: a correlation between slow speed of transmission and remoteness and surplus in production

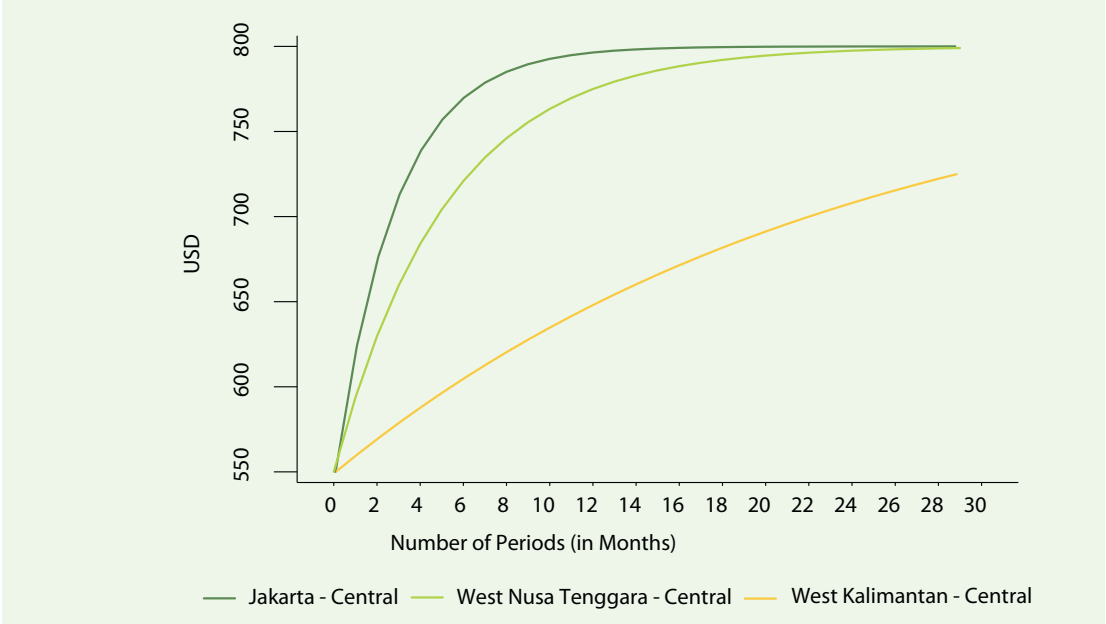
The slow speed at which shocks in world prices of rice are transmitted to domestic markets is to some extent explained by remoteness and surplus in production of the commodity. This is demonstrated by the negative correlation between both the degree of remoteness and provincial output per capita of the commodity with the speed of adjustment coefficients. Remote provinces, which are defined as those distant from the main five cities of Indonesia, face a higher and more volatile burden of transportation costs. This probably translates into a slow transmission of price signals from world markets. Provinces that produce more output than consumed may also be relatively isolated from other markets, as they are self-sufficient.[14]

Different commodities, different speeds of transmission and adjustment

Between the various commodities examined, there is a significant variation in the speed of adjustment to world price shocks. Table 3.2 above summarizes the results of the spatial integration

14 Self-sufficiency is a potential cause for a province to be isolated from foreign price changes if the difference between domestic and foreign prices is lower than transportation costs. In that case, there is no opportunity for that province to export, since the domestic price plus the transport cost is above the foreign price, nor is there an opportunity to import. That would keep the province isolated from foreign price changes, as long as these are not large enough to create the import/export opportunity. Note also that there is a degree of surplus at which the province turns into an exporter of the commodity, and thus, is exposed to extra-provincial prices as much as if the province was a net importer.

Figure 3.2: Adjustment to the shock in the world price of rice



Source: World Bank database.

analysis with respect to world markets. This table shows that the adjustment to world price shocks seems to be faster in markets for sugar and cooking oil. In these markets, in every period, on average, about a third or a quarter of the disequilibrium is adjusted. The rate of adjustment is slower in markets for maize and soybean, where only one tenth to one ninth of the disequilibrium is corrected. The market for cooking oil is the most exposed to international trade. In this market, government intervention, in the form of export taxes, seems to have been relatively stable over the period examined. In the case of maize and soybean, slower rate of adjustment is in line with the low correlation coefficients for price changes and with the milder cointegration results.

3.3 Integration among Indonesian provinces

Attention is now drawn to an analysis of spatial integration within Indonesia to find out how integrated Indonesian provinces are with each other, which is an important feature for policymakers to be aware of. As stated before, two markets are considered to be integrated when shocks arising in one market are transmitted to the other market. This implies a co-movement in price in the long run. However, this does not imply that the prices will be equal. It is possible for price differentials to occur between integrated markets in two different provinces, as long as these differentials are stable over time. In the presence of logistic costs (transport and distribution costs), there can be a high price differential between markets in two different provinces without implying a failure in the flow of information and price signals.

Assessing price differences across provinces at a given point in time and understanding whether these price differences are driven by distance, poor infrastructure, market power, or other factors, also provides essential information to the policymaker. An understanding of the causes of these price differences enables the policymaker to more effectively formulate target interventions, such as the supply of staple foods for the poor, in particular markets. At the same

time, it enables policymakers to reduce price differences between markets in different provinces by addressing those factors, such as a lack of infrastructure, which may be addressed to the mutual benefit of both consumers and producers.

This section therefore looks at the degree of integration and at the price differences between provinces. It starts by reviewing correlations in price levels and price changes and performing cointegration tests to determine the extent of co-movement in the long run. It then calculates price differences across provinces and examines their features and evolution.

Commodity prices: Same direction, but not the same speed

For all commodities, prices seem to move in the same direction, but not at the same speed. High correlation coefficients (close to one) for provincial price levels provide preliminary evidence of price co-movement. When we look at correlations of price changes, the correlations are significant, but substantially lower than one (average: 50 percent, although they vary by product). These results suggest that prices move in the same direction but that the price changes are not perfectly synchronized in all provinces.

Government intervention as a factor for market integration

There is a strong degree of market integration for commodities where there is explicit government intervention. The cointegration tests for rice show that 76 percent of all the possible combinations of provincial prices are cointegrated, implying a strong co-movement between prices in different provinces. The possible explanation for this is that Bulog makes an explicit commitment to buy rice from areas producing a surplus and to sell it in areas with a deficit in production. Through this role in arbitrating prices, Bulog acts as a force for market integration.

In markets for other commodities in which there is also a high degree of government intervention, such as sugar, the level of integration is slightly higher. In the markets for sugar, there is a significant degree of spatial integration between provinces, as indicated by strong price co-movement: 83 percent of all possible provincial market pairs. In the market for cooking oil, about 30 percent of all possible pairs of markets indicate a high degree of market integration. For maize, the portion is around 28 percent, with a cluster found for provinces in Sumatra. In the market for soybean, the portion of integrated provinces falls to 26 percent, with a cluster formed by Java and Nusa Tenggara. Table 3.3 summarizes the cointegration results for the five commodities.

Association of higher price differentials and lower levels of integration between provinces

A lower level of integration between provinces for a commodity is associated with higher price differentials at a given point in time for that commodity. This can be seen from Table 3.3, which presents two different measures of price variation. Column three shows the average of the coefficient of variation of prices calculated at each point in time across the 14-year period considered. The lowest price differentials are found in the most integrated market, which is the sugar market. On average, the variation in sugar prices between provinces is about 5 percent of the mean price, or about Rp 190/kg. In the rice market, the average variation is 12 percent, or Rp 720/kg. By contrast, in the markets for soybean, maize, and cooking oil, which have a lower level of integration, the price differential is considerably higher. The average variation for soybean is 16 percent; the average variation for maize

Table 3.3: Cross-province integration and price differences

Product	Co integration (% of provincial pairs that are integrated)	CV (%)	Max/Min
Soybean	26	16	1.74
Maize	28	22	2.17
Cooking Oil	30	19	2.15
Rice	76	12	1.64
Sugar	83	5	1.22

Source: World Bank staff calculations based on data from BPS and Bulog.
Note: CV is the coefficient of variation.

is 22 percent; and the average variation for cooking oil is 19 percent. Column four shows the average ratio of the maximum price to the minimum price, calculated at each point in time. This indicator measures extreme variations. Again, price differences are lower for the more integrated markets (sugar and rice). Buying rice in the most expensive province (Jakarta) can cost up to 64 percent more than buying it in the cheapest province (West Nusa Tenggara). The ratio between prices reaches a maximum of 2.17 in the market for maize.[15]

Declining price differentials for soybean, cooking oil and rice

Over time, the variations between provinces in prices of soybean, cooking oil and rice have been declining. Figure 3.3 presents the coefficients of variation of prices, calculated for each product, and for each time period, along with a fitted line that shows the trend of the dispersion of prices. A point to note is that price dispersion increased significantly during the financial crisis of 1998. This is because different provinces adjusted their prices to the changes in currency value at different times, causing a larger dispersion in commodity price at that point in time. Also noteworthy is a decline in price dispersion in the markets for soybean, cooking oil, and rice. For maize and sugar, the degree of price dispersion has been relatively stable.

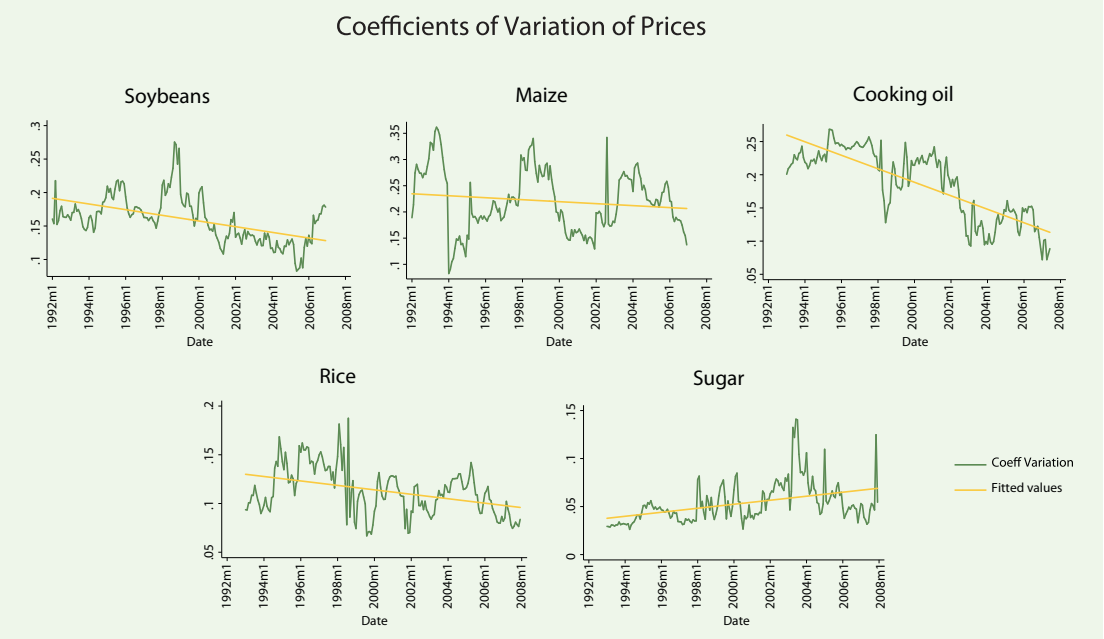
3.4 Determinants of market integration

In addition to understanding the degree of market integration in Indonesia and the differentials in prices between provinces, it is also vital to understand their drivers and causes. Little analysis has been conducted of the determinants of market integration. Exceptions to this include studies conducted by Goodwin and Schroeder (1991) for the cattle market in the US; Goletti *et al.* (1995), for the rice markets in Bangladesh; and by Ismet *et al.* (1998) for the rice markets in Indonesia.[16] This section explores the factors driving the differential between the price of rice in varying provinces (the results for the other commodities can be found in Annex II). It also explores the factors driving market integration for all of the five commodities under consideration.

15 It is worth mentioning that for a given product, there are different qualities, which will imply also different prices. This is particularly relevant for cooking oil, where there is a wide variety of qualities. This may be inflating the differentials we present.

16 A review of this literature can be found in Annex II.

Figure 3.3: Evolution of price dispersion



Source: World Bank staff calculations based on data from BPS and Bulog.
Note: The fitted values capture the trend.

Heterogeneity in incomes, infrastructure, population and production patterns

Between the different provinces, there are substantial variations in per capita income, transport infrastructure, population and production patterns. Statistics for key indicators potentially impacting the costs of trading and spatial integration in various provinces reveal important differences between the provinces (Table 3.4). For example, in one province, almost all roads are asphalted. In various others, only 15 percent of roads are asphalted. Table 3.5 presents average differences in rice prices between provinces, as well as the 'trace statistic', a measure of provincial integration.[17] Important price differences can be observed between provinces.

As expected, in general, cointegrated markets (those with a higher trace) exhibit lower price differences. Papua is the most remote region, both in terms of plain distance to a main city and distance weighted by the population to that city, which serves as our measure of 'remoteness'. At the same time, Papua shows the highest price differential rate with respect to all other provinces. Jakarta can clearly be regarded as the core. The quality of transport infrastructure is low in Papua and in all the provinces of Kalimantan provinces except South Kalimantan. Per capita income (PCI) is highest in East Kalimantan and Jakarta and lowest in East and West Nusa Tenggara.

17 The higher the trace, the higher the degree of integration. For illustrative purposes, we only report price differences and trace statistics for the rice markets. For the rest of the commodities, the data and methodology used for its construction can be found in Annex II.

Table 3.4: Summary statistics by province

Province	Distance	Remote	Population	PCI	Infrast
NAD	424	0.037	3,990	2,714	0.45
North Sumatra	0	0.000	11,600	1,878	0.49
West Sumatra	460	0.123	4,396	1,617	0.71
Riau	291	0.078	3,734	4,880	0.35
Jambi	304	0.082	2,498	1,210	0.58
South Sumatra	424	0.047	6,512	1,714	0.53
Bengkulu	566	0.063	1,520	1,069	0.72
Lampung	195	0.022	6,836	933	0.49
Jakarta	0	0.000	9,000	6,298	0.98
West Java	121	0.000	34,900	1,526	0.70
Central Java	258	0.007	31,400	1,216	0.64
Yogyakarta	264	0.008	3,040	1,542	0.76
East Java	0	0.000	35,000	1,566	0.58
West Kalimantan	607	0.163	3,817	1,667	0.31
Central Kalimantan	624	0.018	1,837	2,066	0.15
South Kalimantan	485	0.014	3,032	1,854	0.56
East Kalimantan	583	0.084	2,543	7,915	0.21
North Sulawesi	953	0.136	1,982	1,235	0.72
Central Sulawesi	484	0.069	2,072	1,046	0.54
South Sulawesi	0	0.000	6,985	1,150	0.51
SE Sulawesi	367	0.053	1,755	901	0.45
Bali	317	0.009	3,085	2,223	0.97
West Nusa Tenggara	402	0.012	3,843	858	0.76
East Nusa Tenggara	726	0.104	3,828	682	0.40
Papua	2381	0.341	1,633	3,132	0.15

Source: World Bank staff calculations based on data from BPS.
Note: Population and PCI are expressed in thousands.

In the markets for all different commodities, price differentials across provinces are negatively correlated with transport infrastructure. The price differentials in markets for rice, maize and sugar are also significantly correlated with distance and remoteness. Table 3.5 presents the correlations of the market integration indicator and the average price differences by province (which is measured as the average price difference between that province and the rest) with a set of potential determinants. The results for remoteness and infrastructure are intuitively obvious: distance implies that transportation costs will be higher and that therefore prices will be relatively higher than in more central provinces. Better transport infrastructure reduces transport costs and is a driving factor for price convergence.

Table 3.5: Correlation matrix

		Distance	Remote	Population	PCI	Infra	Output PC	Productivity	Trace
	Distance								
	Remote	0.901							
	Population	-0.376	-0.349						
	PCI	0.059	0.096	-0.112					
	Infra	-0.461	-0.468	0.209	-0.172				
Rice	**Output PC**	-0.229	-0.222	0.051	-0.155	-0.020			
	Productivity	-0.467	-0.510	0.576	-0.040	0.826	0.127		
	Trace	-0.138	-0.254	0.134	-0.141	0.278	-0.065	0.314	
	Diff Price	0.412	0.486	-0.195	0.276	-0.233	-0.404	-0.268	-0.159
Soybean	**Output PC**	-0.058	-0.312	0.020	0.001	0.254			
	Productivity	-0.119	-0.147	0.137	-0.051	0.125	0.208		
	Trace	-0.043	-0.088	0.100	0.101	0.040	0.034	-0.130	
	Diff Price	0.084	0.232	-0.386	0.152	-0.486	-0.451	0.047	0.183
Maize	**Output PC**	-0.438	-0.413	0.407	-0.444	0.148			
	Productivity	-0.598	-0.716	0.815	-0.244	0.394	0.319		
	Trace	-0.163	-0.345	0.183	-0.052	0.255	0.058	0.398	
	Diff Price	0.180	0.431	-0.364	0.275	-0.346	-0.313	-0.639	-0.342
Sugar	**Trace**	0.189	0.206	-0.215	-0.031	-0.044			
	Diff Price	0.626	0.620	-0.236	-0.064	-0.425			0.013
C Oil	**Trace**	0.061	0.052	-0.065	0.025	0.016			
	Diff Price	-0.006	0.006	-0.008	-0.001	-0.033			-0.209

Source: World Bank staff calculations based on data from BPS and CEIC Data Ltd.
Notes: Productivity is measured as output per hectare. "Trace" is an indicator of spatial market integration.

There is a strong positive correlation between per capita income and price differences in rice, soybean and maize markets. This may be due to a relationship between PCI and consumption patterns (differences in the quality of commodities consumed by households). The correlation with PCI is not significant for sugar and cooking oil.[18]

Rice, soybean and maize products: a negative correlation between market integration and distance

With rice, soybean and maize markets, there is a significant negative correlation between the degree of market integration and distance. The absolute value of the correlation increases when remoteness is considered instead. Remoteness implies two interacting forces: on the one hand, it is an

18 It could be argued that the scope for quality differentials in sugar is lower than in the case of rice. That would explain the insignificant correlation of PCI and Price Diff. However, the same argument would not hold for cooking oil.

important factor in determining the physical cost of moving goods. On the other hand, it also implies distance from a hub, with proximity to a hub possibly being associated with higher information flows and access to better functioning markets, which would be positive driving forces towards integration. The fact that remoteness is more strongly correlated to market integration than distance suggests that it is important to factor in the 'market potential' effect when explaining integration.[19]

Price differences between provinces explained by remoteness, transport infrastructure, output of the commodity, land productivity and income per capita

An econometric analysis reveals that up to 70 percent of price differences across provinces can be explained in terms of differences in the degree of remoteness, transport infrastructure, output of the commodity, land productivity and income per capita. The regression analysis identifying the determinants of price differences between provinces yielded consistent findings irrespective of the commodity analyzed.

The significant factors affecting price differences are output per capita, land productivity, remoteness and the interaction between remoteness and quality of infrastructure. This implies that remote provinces pay a higher price, but that the effect of remoteness is mitigated by good transport infrastructure. In the market for rice, for example, an increase in remoteness of one province by 1 percent will increase the average price difference of that province with the others by about 0.3 percent. However, for the remote province with best transport infrastructure, this effect falls to 0.21 percent, while for the remote province with worst transport infrastructure the effect of remoteness increases to 0.35 percent.

Figure 3.4 illustrates the contributions of remoteness (right hand side) and infrastructure (left hand side) to the price of rice in six selected provinces. The results are based on the regression analysis: the more remote a province is, the higher the price of rice; the better the infrastructure of the province, the lower the price of rice. Both West Kalimantan and North Sulawesi are remote provinces. However, the relatively better quality of transport infrastructure in North Sulawesi reduces the negative impact of remoteness. For people in West Kalimantan, being remote implies paying about Rp 133/kg more for rice than the average price paid in Indonesia. In North Sulawesi, it implies paying about Rp 24/kg more.

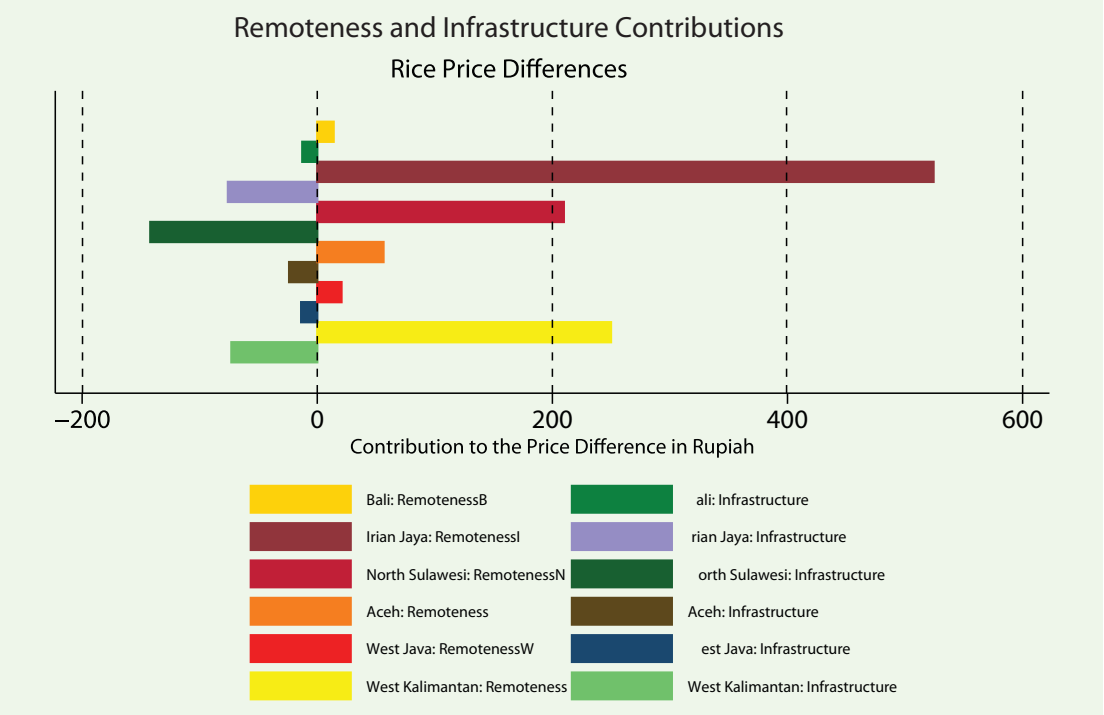
Another factor that explains price differentials between provinces is whether the province has a surplus or deficit in the production of the good considered. Producing more of the commodity within the province means that the price consumers pay there is lower for a given transport and other logistic costs. Thus, we expect to find lower prices in surplus provinces. Considering rice again, the difference in the level of production in the provinces implies that people in Jakarta will pay Rp 210/kg more than people in South Sulawesi.

Levels of land productivity explain price differentials for some commodities, but not others. In the markets for soybean and maize, more productive provinces pay lower prices for the commodity. But this effect was not found for rice markets.[20]

19 Interestingly, for sugar and cooking oil the correlations are positive and they do not change significantly when looking at distance or remoteness

20 For sugar and cooking oil markets, data on productivity were not available.

Figure 3.4: Contributions of remoteness and infrastructure to rice price differences



Source: World Bank staff calculations based on data from BPS and CEIC Data Ltd.

Income per capita is another explanatory factor for price differentials. This is likely to be associated with differences in the quality of commodities consumed by households with varying incomes. If richer households buy better quality products, then the prices of the representative type of product will be higher than in a relatively poorer a one. This will not be related to differences in marketing margins. In the case of the rice market, the Raskin ('poor rice') program, under which Bulog distributes low quality rice among poor households at a subsidized price, also has an impact on price differentials. This program results in increased supply of low quality rice to markets where poverty is higher, and therefore average per capita income is lower, thus reducing the price of rice.

Attention is now turned to the determinants of market integration between provinces. The econometric evidence suggests that markets are less integrated in remote provinces, other things being equal. This is consistent with results from other studies (Goodwin and Schroeder, 1991; Goletti *et al*., 1995; and Ismet *et al*., 1998). The effect of remoteness on market integration is attenuated by the quality of infrastructure. However, while this effect is significant for maize and sugar, it is not significant for rice and cooking oil. The quality effect of PCI seems to dominate in the market for rice, as the coefficient on PCI is negative. For the case of maize and sugar, the 'market development' effect of PCI seems to dominate as PCI increases the degree of market integration.[21]

The data do not fully support the self-sufficiency hypothesis. This hypothesis suggests that markets in provinces that are self-sufficient in the production of a commodity would be

21 The scope for quality differences in the case of sugar is lower than that in the case of rice. For maize, probably the same could be argued, given that maize is generally used for animal feeding purposes.

relatively less integrated and thus less affected by shocks in other provinces. Market integration is related to output in a non-linear way in the case of rice: a higher rate of rice production is correlated with the lower level of market integration, but only up to a certain level, after which market integration becomes stronger with increased production.[22] This result makes intuitive sense: beyond a certain level of production the province moves from being self-sufficient to becoming a rice exporter to other provinces and this causes the provincial rice price to be affected by the rice prices in the destination regions (so there is greater price transmission). However, this result holds only in the rice market.

3.5 Commodity price volatility

Another important dimension in the analysis of commodity market integration is volatility and the extent to which volatility is transmitted from foreign to domestic markets. In more volatile markets, both producers and consumers face a higher level of uncertainty. For producers, this is generally associated with a lower level of willingness to invest and innovate. Small farmers may be particularly vulnerable, because they are not able to hedge against price fluctuations. For consumers, it implies a higher degree of volatility in their spending. If they are risk-averse, it implies a lower level of welfare. This section describes volatility patterns for the five commodity markets under consideration.

Not more volatile, but more extreme

Domestic prices do not appear to be more volatile than world prices. However, they are more prone to extreme changes than the latter. Table 3.6 shows the standard deviation of domestic price changes expressed in rupiah; world price changes expressed in US dollars; and exchange rate changes (rupiah per US$1) for the five products considered.[23]

For rice, cooking oil, sugar and soybean, the level of price volatility is not substantially different for domestic and world markets, as measured by the standard deviation of price changes. It is only for maize that the standard deviation of domestic price volatility is substantially higher than that of world price volatility. The rate of growth of domestic prices deviates on average about 9.6 percentage points away from its mean, while for world prices the average deviation from mean growth rates is of 5.4 percentage points.

Another dimension of price volatility has to do with the likelihood of extreme price movements. The indicator of kurtosis captures this dimension.[24] Domestic prices are systematically more exposed to extreme price changes than world prices are. In the case of rice, the kurtosis for domestic prices is twice as high as that of world prices. For cooking oil and maize, it is more than five times as high. For soybean and sugar, it is about three times as high. The higher propensity to extreme episodes seems to be driven by a high propensity of exchange rates to extreme changes.[25] Thus, exchange rate movements are important determinants of domestic commodity prices.

22 This turning point was estimated at about 0.7 tons per capita of paddy rice. The conversion from paddy to white rice is generally 1.5kg of paddy rice for one of white rice, which would imply, assuming no waste, that the turning point is when the province produces more than about 466kg of rice per capita.

23 Domestic prices for rice, sugar and cooking oil are consumers' prices. Their volatility is not strictly comparable to that of world prices, as these are producer prices. The results should be read keeping this in mind. For soybean and maize, domestic price series correspond to producers' prices.

24 As a benchmark, a kurtosis equal to three is consistent with a process in which the likelihood of being subject to extreme price movements is very low (a normal distribution).

25 The high kurtosis is mainly explained by the sharp movements of exchange rates in 1998.

Table 3.6: Commodity price volatility: summary statistics

Product	Std Dev	Kurtosis
Rice Price – Domestic	0.062	13.095
Rice Price – World	0.054	6.509
Cooking Oil Price – Domestic	0.068	24.613
Palm Oil Price - World	0.065	4.552
Sugar Price – Domestic	0.051	10.224
Sugar Price – World	0.071	3.282
Exchange Rate 1993-2007	0.089	40.385
Soybean Price – Domestic	0.048	15.024
Soybean Price – World	0.049	4.267
Maize Price – Domestic	0.096	33.972
Maize Price – World	0.054	5.568
Exchange Rate 1992-2006	0.089	40.612

Source: Domestic price data from BPS, world prices from World Bank.
Notes: Domestic prices for rice, cooking oil and sugar are consumer prices. Soybean and maize are producer prices.

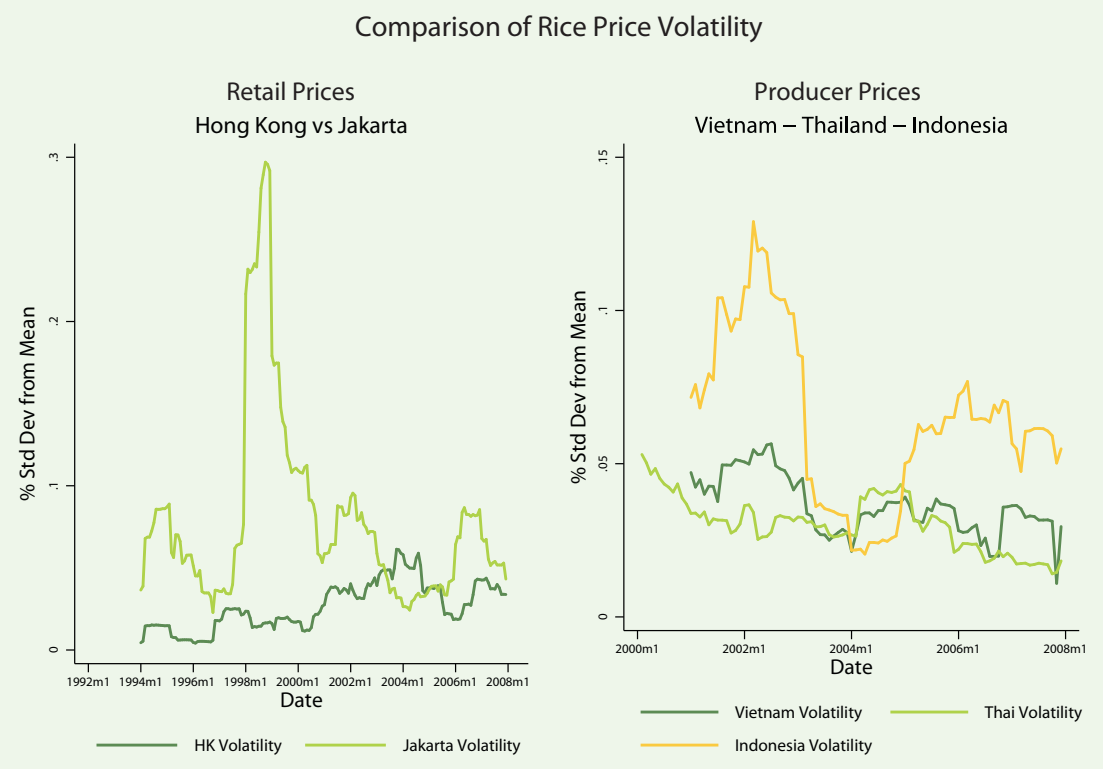
Significant impact of exchange rate volatility on domestic price volatility

For the five commodities under examination, domestic price volatility is significantly affected by exchange rate volatility. However, the transmission of world price volatility to domestic markets is less clear. It is reasonable to expect that world price volatility will not be entirely transmitted to domestic prices, even if domestic markets are integrated with world markets. One reason for this is that consumer prices are significantly impacted by marketing components, which are less volatile than producer prices. In addition, the volatility of the marketing margins themselves is likely to be uncorrelated with that of producer prices. Another factor is that domestic prices may also be affected by government policies specifically intended to reduce volatility. For example, Bulog has an explicit commitment to controlling volatility in the price of rice.

The extent to which world price volatility and exchange rate volatility are transmitted into domestic prices varies between the various commodities under examination. With sugar, the link between domestic and world price volatility is strong. With rice and cooking oil, the link between world and domestic price volatility is much weaker, although it is still significant. With rice, an increase in the volatility of world prices by 10 percent is correlated with an increase in the volatility of domestic prices of 1.1 percent on average. With maize and soybean markets, world price volatility does not seem to affect domestic prices. This is consistent with the slower speed of transmission of price shocks in the markets for these commodities compared with the other three commodities.

However, the impact of exchange rate volatility on domestic price volatility is robust for all five commodities. For instance, an increase in exchange rate volatility of 10 percent increases domestic rice price volatility by an average of 2.2 percent, other factors being equal. Higher exchange rate volatility results in increased domestic volatility because it results in a higher degree of variability in the price paid by the consumer (if the good is imported) or received by the producer (if it is exported). It also affects the volatility of the price of imported inputs.

Figure 3.5: Rice price volatility: Indonesia and abroad



Source: World Bank staff calculations based on data from BPS and World Bank database.

Remote provinces exhibit a higher degree of commodity price volatility

Remote provinces seem to exhibit a higher degree of commodity price volatility than centrally located provinces. The portion of volatility that is not related to world prices or exchange rate volatility varies significantly between various provinces. This specific portion of volatility is mildly correlated to remoteness. Commodity prices in more remote provinces are more volatile and their markets are less integrated. If remoteness is associated with weak infrastructure, it implies high and uncertain transportation costs. This may create difficulties for trade between provinces. It may also cause bottlenecks, increasing the sensitivity of domestic prices to local supply or demand shocks. In turn, this may make domestic prices more volatile. This seems to be the case for provinces in northern Sumatra and in Kalimantan, where commodity price volatility is high and the quality of transport infrastructure is poor.

Self-sufficiency is not a significant factor in volatility

It is often argued that self-sufficiency may contribute to a reduction in commodity price volatility. The results of this study do not support this hypothesis. There is no evidence that the level of output produced is related to the degree of price volatility in a particular province.

Government intervention in the rice market does not appear to reduce volatility

Indonesian rice prices are substantially more volatile than rice prices in other countries' markets where prices are market-determined. This can be demonstrated by comparing the retail prices of rice in Indonesia with those of Hong Kong, in which no intervention occurs. The Indonesian rice market is significantly more volatile than that of Hong Kong, even if we ignore the high exchange rate volatility period of 1998/9 in Indonesia. Despite active policies designed to smooth volatility, Indonesian rice prices are substantially more volatile than others in which prices are market-determined. The left panel of Figure 3.5 shows the rolling standard deviation of retail rice prices in Indonesia and Hong Kong. The right panel of this figure compares volatility in producer, rather than consumer, prices for the period 2000/01-2008/01, when exchange rate volatility is quite low. Indonesian rice prices are generally more volatile than Vietnam's or Thailand's.

3.6 Conclusions and policy implications

In natural resource abundant countries such as Indonesia, the trend towards increased commodity prices creates both opportunities and challenges. **In order to formulate effective policy to deal with these opportunities and challenges, it is vital that policymakers understand the degree to which domestic markets within Indonesia are integrated with each other and with global markets**. An understanding of these matters will enable policymakers to predict the speed and intensity of the pass-through of price shocks and to understand the impact of these price shocks on the nation as a whole and on different provinces within the country. An understanding of these matters will help them to assess the supply response of producers and the geographical pattern of this response. It will also assist in the more effective design of policies to mitigate against the effect of increased commodity prices on poor consumers. Finally, an understanding of the factors that drive market integration will assist policymakers in facilitating measures to achieve the better integration of provincial markets.

This chapter examines estimations of market integration between domestic markets and world markets and between different domestic markets within Indonesia for five main staples (rice, sugar, cooking oil, soybean and maize) over a 14-year period (1993:01- 2007:12 for rice, sugar and cooking oil and 1992/01-2006/12 for soybean and maize). The chapter also attempts to identify the main drivers of and obstacles to integration. It also explores the differentials in the prices of these commodities between the various provinces. Finally, it examines key patterns of commodity price volatility across Indonesian provinces. The key results are presented below.

One point to emerge is that Indonesian markets for rice, soybean, sugar and cooking oil are integrated with world markets to a significant degree. Even if there are some divergences when comparing world and domestic price monthly changes, these move closely together when looked at over a longer period of time, which is consistent with the concept of integration. Over a period of about one year, a 1 percent increase in world prices leads, on average, to a 1 percent increase in domestic prices.

The speed at which provinces adjust their prices after world price shocks was found to vary significantly for the different commodities. Also, for each specific commodity there was a

significant variation in speed between the different provinces. In general, the speed of adjustment to world price shocks is fastest in sugar and cooking oil markets. It was slowest for soybean and maize markets. The variation in speed of adjustment between provinces for a specific commodity is perhaps best demonstrated by the example of rice markets. In the market for this commodity, 30 percent of the disequilibrium with world prices is corrected in Jakarta, while in West Kalimantan only 4 percent is corrected every month. Provinces that are geographically central and that grow a particular commodity tend to adjust fastest to world price shocks.

Within Indonesia, the markets for sugar and rice showed the highest degree of integration

In the sugar market, price series significantly co-move along a trend. Of all possible combinations of provinces, 83 percent are integrated. In rice markets, 76 percent of all combinations of provinces share a long-run trend, while for maize, soybean and cooking oil, the proportion is less than 30 percent.

The lower degree of spatial integration among provinces is associated with higher price differentials

Commodity markets characterized by a lower degree of spatial integration include the markets for soybean, maize, and cooking oil. In these various markets respectively, prices across provinces differed by an average of 16, 22, and 19 percent, respectively. Commodity markets characterized by a higher degree of spatial integration include the markets for sugar and rice. In these two markets, prices across provinces differed by an average of 5 and 12 percent, respectively.

For all commodities, significant factors explaining price differences include output per capita of the commodity, land productivity, remoteness and the interaction between remoteness and quality of infrastructure. The interaction between remoteness and quality of infrastructure measures the impact of infrastructure controlling for a province's remoteness. Remote provinces pay more, but the effect of remoteness is mitigated by good transport infrastructure.

The impact of income per capita on provincial price differentials varies across commodities

It is possible that income per capita captures unobserved commodity quality differences across provinces and local production capacities. In the case of commodities with large quality differences, like rice, richer provinces appear to consume higher quality commodities and hence the average price paid for these commodities is higher. In the case of those commodities where quality differentials are not very important, such as sugar, soybean, and maize, the predominant effect appears to be local production capacities, which help keep prices lower.

Regarding the determinants of integration, remoteness and infrastructure are important determinants for all commodities. Specifically for rice markets, there is some evidence that self-sufficiency is associated with a lower degree of integration.

The data show that the transmission of price volatility from global markets to domestic markets is incomplete. Rather, exchange rate variations matter more than world price variations

as a determinant of domestic price volatility. After controlling for exchange rates and world prices, remote provinces appear to have a higher level of price volatility than central provinces.

Policy implications

This analysis has some important policy implications:

Infrastructure: This study confirms the importance of investment in infrastructure. It demonstrates that the constraints set by geography and remoteness to the transmission of price signals can be alleviated by improving the quality of infrastructure. This has important implications for food security, since food security is linked to the degree of integration of food markets. A high degree of integration implies that the price system works and price signals flow from one market to the other. This in turn means that in the event of a supply shortfall in one region, the price will increase there and be transmitted to other regions, which will lead to a supply response by other regions. Policies that aim at decreasing transportation costs by improving infrastructure or by eliminating bureaucratic impediments to transport will enhance integration within Indonesia and contribute to reducing price differentials between provinces.

Productivity Improvements: This study highlights the importance of measures to achieve improvements in the productivity of agriculture as a way to reduce prices for consumers while at the same time increasing incomes for farmers.

Government Intervention: This study suggests that government intervention may not be the most effective means of reducing volatility. Despite government interventions in Indonesian rice markets intended to reduce volatility, these markets exhibited higher price peaks during the 1994/01-2008/01 period than less intervened markets.[26] At the least, this study suggests that a cost-benefit analysis of the different interventionist approaches by the Government is called for. This analysis may ensure that resources are utilized most effectively.

26 Due to data availability, this analysis does not include the 2008 spike in world rice prices, which was of a magnitude not seen since the mid 1970s. Indonesia was the country in East Asia that experienced the smallest increase in prices in the first half of 2008 due to a good harvest and its export prohibition. But the intervention in the rice market was not costless, it imposed considerable costs on domestic consumers: from 2005 till the end of 2007, domestic prices were on average US$232/ton higher than international prices. After the 9-month period from March to December 2008 (during which the international price was above the domestic price), the international price of rice has kept below the domestic price.

Chapter 4

Impact of Commodity Prices on Indonesia's Economy

Abstract: *To estimate the effect that international price changes have on the structure of the Indonesian economy, aggregate economic welfare and poverty within Indonesia, data on the international prices of food, petroleum and mining commodities are combined with a general equilibrium model of the Indonesian economy. It is estimated that the combined effect of price changes between 2005 and 2008 was to reduce the incidence of poverty in Indonesia by 4.1 percent. Both the rural and urban populations benefited. The impact on the gross domestic output of all the different regions in Indonesia was positive, with the exception of commodity scarce DKI Jakarta and Banten. Increases in international agricultural commodity prices during the stated period reduced the incidence of rural poverty by 2.2 percent in the short run, leaving the rate of incidence of urban poverty virtually unchanged. Indonesia's ban on rice imports shielded domestic consumers and producers of rice from the nine-month spike from March to December 2008. However, it did so at a high cost. The rice import ban resulted in domestic rice prices that were considerably higher than international prices since 2004. This imposed considerable costs on domestic consumers. The long-run 2005-20 projected increases in energy, agricultural and mining prices are smaller than the observed 2005-08 changes and the simulated effects of these commodity price changes were correspondingly less favorable. The simulated long-run impact of an improvement in investment climate in mining is a large increase in aggregate real consumption and a corresponding reduction in poverty incidence.*

4.1 Introduction

Between 2005 and mid-2008, international food and other commodity prices increased drastically. These increased prices had potentially both positive and negative implications for the incidence of poverty, particularly in less-developed nations that remained significantly dependent on agriculture as a contributor to GDP and as a source of employment.

The degree to which commodity price increases have either a positive or negative impact depends on the degree to which a given nation is either a net importer or a net exporter of the commodity in question. Indonesia is a net importer of a number of basic food commodities. It might be expected that the increased cost of these commodities would have a negative impact on Indonesia's economy. However, it was not only food prices that increased. Mining and petroleum prices also surged. Indonesia is a net exporter of a number of these commodities, with the revenues derived from their sale contributing significantly to GDP.

It should be noted that the relationship between international prices and poverty incidence is not straightforward. For example, increases in food prices, to the extent that they are transmitted to the domestic market, may harm poor urban and rural consumers who spend a high proportion of their disposable income on food. However, on the other hand, increased commodity prices may benefit poor farmers who are net sellers of the commodities concerned.

At the simplest level of analysis, increased food prices would seem likely to increase poverty among households that are net consumers of food while reducing poverty among households that are net producers. **However, there may be more subtle, indirect effects that complicate the issue.** When farmers respond to higher product prices, their response may affect market wages. In developing countries, staple food producing sectors tend to be highly labor intensive. If the output of these sectors expands, the aggregate demand for unskilled labor may also expand significantly. In turn, this may put upward pressure on the market wage for unskilled labor. Therefore, many net consumers of these staple commodities may earn higher incomes that to some degree or other

offsets the increased cost of living. In addition, if labor markets are integrated, this upward pressure on wages may not be confined to workers directly employed in the production of the commodities in question. Table 4.1 presents data on international prices of three groups of commodities, relating to the energy, agricultural and mining sectors of the Indonesian economy, deflated in each case by the international Manufacturing Unit Value Index.

Table 4.1: Shocks: International commodity price changes, relative to MUV Index (percent change)

Commodity	International relative price change (%)	
	Short-run (2005-08) Actual data	Long-run (2005-20) Projected data
Energy sector (3 commodities)		
1. Crude oil	24.3	20.2
2. LNG	71.5	31.1
3. Petroleum products	80.4	20.2
Agricultural sector (19 commodities)		
4. Rice	109.3	17.6
5. Wheat flour	91.0	30.1
6. Other flour	18.0	18.0
7. Maize	125.5	32.6
8. Soybean	91.6	2.1
9. Soybean product	29.2	8.1
10. Other cereals	18.0	18.0
11. Other food crops	18.0	18.0
12. Sugar	15.9	30.4
13. Oil palm	123.1	26.7
14. Cacao	53.0	17.3
15. Animal and vegetable oil	94.2	13.3
16. Coffee and tea	41.5	10.5
17. Other foods	16.0	16.1
18. Tobacco	3.1	3.1
19. Rubber	71.0	7.9
20. Rubber product	40.8	7.9
21. Livestock products	2.5	0.7
22. Other agriculture	22.3	22.3
Mining sector (6 commodities)		
23. Coal	169.6	17.8
24. Copper ore	86.1	14.6
25. Nickel and bauxite ore	45.1	16.3
26. Tin ore	14.3	15.5
27. Other metals	70.5	11.1
28. Other mining	18.1	18.1

Source: World Bank staff calculations based on data from the World Bank, DECPG database**.** The long-run projections are World Bank DECPG forecasts as of 28 January 2009.
Note: MUV Index means the Manufacturing Unit Value Index.

Petroleum products: In the first column, the data are shown for the period from 2005 to 2008. While Indonesia is a net importer of petroleum products, domestic prices were controlled through public subsidies during this period. The budgetary cost of these subsidies increased markedly as

the international price increased. The Government responded by increasing the controlled prices of petroleum products and simultaneously introducing a cash transfer system to compensate poor consumers for the effect of the price increases. Thus, there was a partial transmission of the international price increases to domestic consumers, compensated to some degree or other by subsidies for the poor.

Mining commodities: Indonesia is a net exporter of several mining commodities whose prices also increased in the period in question. This generated substantial tax revenue benefits, making possible increased government expenditures that might not otherwise have been feasible.

Agricultural products: The increase in agricultural prices benefits agricultural producers but it hurts net food consumers in urban and rural areas. A key determinant is the price of rice which is the main staple in the country. Table 4.1 also shows, in the second column, projections of long-term changes in these relative prices covering the period 2005-20. These data will be drawn upon later in the chapter.

The net consequence for the poor of changes in international commodity prices is clearly very complex. This chapter attempts to deal simultaneously with all of the relationships described above, using a large general equilibrium model of the Indonesian economy, characterized by both a disaggregated set of sectors (74) and a highly disaggregated set of households (1,000).

This chapter is organized as follows. Section 4.1, this section, defines the questions explored by this chapter and describes its organization. Section 4.2 presents the model of the Indonesian economy to be used, the Wayang 2005 model, and the way the international price changes are modeled. The analysis attempts to take into account not only the 2005-08 price and forecasted 2005-20 price changes themselves, but also the major government interventions that have influenced the way these international commodity price changes impact on the poor. Section 4.3 reviews the impact of these short-run and long-run price changes on the economic structure of the Indonesian economy, economic welfare and poverty within Indonesia. Section 4.4 presents conclusions based on these results.

4.2 The Wayang 2005 general equilibrium model

Overview

This study uses an updated version of the Wayang general equilibrium model of the Indonesian economy (Warr *et al.,* 1998; Warr, 2005). The model is subsequently described as Wayang 2005 and is based on the 2005 Indonesian Input-output Tables (IO) and the 2005 Social Accounting Matrix (SAM) published by the Indonesian Central Bureau of Statistics. The main features of this model are described below. A detailed description of the model can be found in Annex III.

The Wayang model identifies ten different types of households, representing ten socio-economic groups as defined in the 2005 SAM. For the purposes of the present study, each of these 10 SAM household categories is divided into 100 sub-categories, or centile groups, of equal population size, with the sub-categories arranged by per capita expenditure on consumption. With the 10 major categories each divided into 100 subcategories, there is thus a total of 1,000 sub-categories. The use of a general equilibrium model with a highly disaggregated household sector makes it possible to conduct controlled experiments, focusing on the consequences for household incomes, expenditures, poverty and inequality that arise from different economic shocks, taken one at a time.

As well as disaggregating households, Wayang 2005 also has a disaggregated sectoral and commodity structure, with 74 production sectors. The model is based on the assumption that microeconomic behavior will be characterized by competitive profit maximization on the part of all businesses and competitive utility maximization on the part of consumers. In the simulations reported in this chapter, the markets for final outputs, intermediate goods and factors of production are all assumed to clear at prices that are determined endogenously within the model.

The nominal exchange rate between the rupiah and the US dollar can be thought of as being fixed exogenously. The role within the model of the exogenous nominal exchange rate is to determine, along with international prices, the nominal domestic price level. Given that prices adjust flexibly to clear markets, a 1.0 percent increase in the Rp/US dollar exchange rate will result in a 1.0 percent increase in all nominal domestic prices, leaving all real variables unchanged.

Policy simulations

Short-run and long-run shocks

Two sets of simulations are reported, these being short-run simulations and long-run simulations. They differ according to the shocks imposed and the closure of the model. The shocks are exogenous changes *to* international prices, which draw upon the price changes presented in Table 4.1, above.

The short-run shocks are of two kinds:

a. The actual price changes observed over the period 2005-08, expressed as total percentage change in the price of the commodity concerned relative to the Manufacturing Unit Value Index; and
b. A hypothetical 98 percent increase in mining prices intended to simulate an improvement in the environment for mining investment.[27]

The long-run shocks are also of two kinds:

a. Projections of commodity price changes over the period 2005-20; and
b. The same hypothetical 98 percent increase in mining prices intended to simulate an improvement in the environment for mining investment.

It is important to note from Table 4.1 that the average magnitude of the observed short-run price shocks is considerably larger than that of the projected long-run price shocks. Note also that the difference in the short-run and long-run model closures is that in the short-run case factor mobility across sectors is limited to mobility of labor; in the long-run case both capital and labor are

27 Mining investment in 1995 is equal to mining investment in 2007 despite the fact that the price of minerals in 2007 is 160% higher than in 1995. In 1995 there was little regulatory uncertainty, unlike in 2007. Since the mining investment in 2007 equals that in 1995, the cost of the greater uncertainty is equivalent to a fall in the price of minerals by 60% at 2007 price levels. This is equivalent to a fall in mineral prices by 98% at 2005 prices. The removal of the regulatory uncertainty is therefore proxied by an increase in mineral prices by 98% at 2005 price levels.

	Mining investment	Prices
1995	99.0	106.4
2005	73.5	162.3
2007	96.7	266.0

Note: Values in real terms (by deflating by MUV) with constant dollars.
Sources: World Bank (2008) DECPG database and PriceWaterhouse Coopers (2008).

mobile across all sectors and land is mobile across all agricultural industries.

In the short-run case, six sets of simulations are conducted to be able to distinguish the impact that the price changes in different commodities have, as well as the impact of an improvement in the environment for mining investment. The shocks are:

1. Simulation SR-1: Actual changes in international energy prices (commodity 1 to 3, only)
2. Simulation SR-2: Actual changes in international agricultural prices (commodity 4 to 22, only)
3. Simulation SR-3: Actual changes in international mining prices (commodity 23 to 28 only)
4. Simulation SR-4: Actual international price changes in all commodities (SR-1 to SR-3 together)
5. Simulation SR-5: A 98 percent increase in Mineral Product Prices (commodity 23 to 28)
6. Simulation SR-6: Simulation SR-4 plus Simulation SR-5, together.

In the long-run case, there are six simulations. The shocks are:

1. Simulation LR-1: Projected changes in international energy prices (commodity 1 to 3)
2. Simulation LR-2: Projected changes in international agricultural price (commodity 4 to 22)
3. Simulation LR-3: Projected changes in international mining price changes (commodity 23 to 28)
4. Simulation LR-4: Projected changes in international prices of all commodities (LR-1 to LR-3 together)
5. Simulation LR-5: A 98 percent increase in mineral prices (commodity 23 to 28).
6. Simulation LR-6: Simulation LR-4 plus Simulation LR-5, together.

Annex Table 3.5 and Annex Table 3.6 provide a detailed listing of these shocks for each of the six simulations in the short-run and long run cases, respectively. The short run simulations are run under two different scenarios: without cash transfers and with cash transfers to the poor. This will enable us to discern the additional impact that the cash transfers that the Government granted had on the economy and the population.

Short-run closure: No cash transfers

All major model closure assumptions are summarized in Annex Table 3.7. The current account deficit is treated as exogenous, meaning that its size does not change with the impact of the shocks. This closure is not based on the belief or the assumption that the current account would in fact be unaffected in the short run by external shocks. Rather, the purpose of the closure is to allow for the fact that an increase, for example, in a current account deficit implies increased borrowing from abroad and hence the necessity to repay these borrowed funds at some future time. However, the single-period nature of the model does not allow for this deferred repayment and its future effect on economic welfare. Hence, since the objective is to estimate the effect of the shocks on economic welfare, the assumption of exogenous current account balance is used to prevent any such uncounted effects from arising.

Our treatment of the capital stock and the stock of agricultural land: we assume limited capital mobility across sectors and no agricultural land mobility across sectors in the short run (see Theoretical Structure of the Model in the Annex III). Each of the four categories of labor is mobile among all sectors, but the total stock of labor is exogenously fixed. Government expenditure and real investment expenditures are exogenously fixed.

Our treatment of rice import volumes: they are fixed exogenously at 10 percent of its level prior to the introduction of the ban. This assumption reflects the official ban on rice imports introduced in 2004 and the observed fact that exemptions to the ban have occasionally been granted, resulting in a small quantity of rice imports. To achieve this outcome, an endogenous tariff on rice imports is introduced, the rate of which adjusts to prevent any change in the volume of imports.
Our treatment of rice exports: in recognition of the fact that increases in the international price of rice could otherwise induce exports of rice and that these exports are currently banned, the volume of rice exports is similarly held fixed, by means of an endogenously adjusting export tax. The revenue raised by the implicit tariff on rice imports, corresponding to the rents accruing to the 10 per cent quota (90 percent effective ban), are distributed in the model to the richest 1 percent of urban households.

Our treatment of petrol and petroleum products: they are exogenously fixed. In the period 2005-08, petroleum prices were controlled by the government, but were not held constant in nominal terms. Rather, there was a substantial nominal increase as a result of adjustments made by the Government. The price increases were made necessary by the exploding budgetary cost of the subsidies that the controls required, given increasing international prices. This increase in the budgetary cost of the subsidies was therefore not independent of the international price increases that are the focus of the present study. Thus, domestic prices of petroleum prices are exogenously constrained to move at their observed values, relative to the CPI, over the period 2005-08. This is achieved by means of subsidies whose magnitude increases over this period because the controlled domestic prices increased at rates below the increase in the CPI.

Short-run closure: With cash transfers

A second set of short-run results amends the above short-run distributional results to allow for the existence of a system of cash transfers connected to the international price increases. The short-run closure with cash transfers is the same as that described above, except for this amendment. As the international prices of petroleum products rose, the Government found it necessary to increase the controlled prices, but it simultaneously introduced a cash transfer system designed to compensate poor consumers for the increases in the nominal prices of petroleum products that they now faced.

The cash transfers were given on a monthly basis during two different periods:

- *First Cash Transfer:* Rp 108,235 per poor household per month over 18 months from March 2005 onwards.
- *Second Cash Transfer:* Rp 300,000 per poor household per month over 8 months from May 2008 onwards.

These cash transfers amounted to a total value of Rp 4,348,246 over the 2005-08 period to each poor household. Since all calculations are performed on a monthly basis in this chapter, the transfers are treated as being of a value of Rp 90,588 per month for each household initially below the official poverty line. If all poor households had the same number of members as the Indonesian average household size, this would translate into an average gross monthly transfer per capita to individuals belonging to households initially below the poverty line of Rp 22,534.

However, the Government had to finance these transfers. The analysis assumes that public expenditure contracted sufficiently to finance the budgetary cost of the transfers. The contraction in public expenditure is treated as being equivalent to a negative transfer to each individual Indonesian,

the total value of which was equal to the budgetary cost of the cash transfers. This implies a positive net transfer to each individual Indonesian belonging to a household initially below the poverty line of about Rp 22,534 – 3,993 = Rp 18,825 per person per month, while every other Indonesian received a negative net transfer of Rp 3,993. The detailed calculations, which allow for variations in family sizes across socio-economic groups, are summarized in (Annex Table 3.8) in Annex III.

Because of the technical difficulty of modeling transfers that are targeted to particular types of households, the calculation of these changes to the distribution of expenditures resulting from the cash transfer system was conducted outside the model as an add-on spreadsheet calculation. This assumes that although the transfers altered the distribution of incomes across households, it did not significantly alter the allocation of resources. Since it is assumed here that the transfer scheme was targeted to the poor without error, it can be correspondingly assumed that the transfer scheme successfully reduced the incidence of poverty. However, it remains to be determined to what extent.

Long-run closure

For the reasons explained above, the long-run closure also assumes that the current account must balance. At the same time, it assumes much greater flexibility in Indonesia's adjustment to the international commodity price shocks, which are also less significant than in the short-run case. In the long run, capital is assumed to be mobile among all sectors domestically, but the total stock of capital remains exogenously fixed. Agricultural land is also mobile among agricultural sectors, meaning that farmers can reallocate land for differing agricultural purposes, but the total stock of land is exogenously fixed. Imports and exports of rice remain exogenously fixed, but the controls on petroleum prices and associated subsidies and cash transfers are assumed to be absent.

4.3 Results and discussion

Short-run CGE simulations

The macroeconomic and sectoral results of the six sets of short-run simulations are summarized in Table 4.2. The level of real household consumption increases in each case, although changes in real GDP are quite small. The reason for this low rate of change is that real GDP is measured at base period prices. When international prices change, the more favorable terms of trade are not accounted for in calculating the value of national output, measured as real GDP. Although real GDP may remain unchanged, the improvement in the terms of trade means that higher levels of domestic consumption are now possible without any change in the current account balance. Real household consumption is thus a much better indicator of welfare than real GDP when the external terms of trade are the source of a shock. It is notable that the largest increase in aggregate real consumption results from the increases in mining commodity prices (Simulation SR-3). This is also the case where the largest quantitative increase in the terms of trade occurs.

Table 4.2: Short-run - macroeconomic results
(Units: percent change from base value, except variables marked (change), where the units are Rp billion at 2005 prices)

SR-1: Short-run international price increases in the energy sector (commodities 1 to 3).						
SR-2: Short-run international price increases in the agricultural sector (commodities 4 to 22).						
SR-3: Short-run international price increases in the mining sector (commodities 23 to 28).						
SR-4: Short-run international price increases in all above commodities (1 to 28) = SR-1 + SR-2 + SR-3						
SR-5: 98% increase in mining commodity prices (commodities 23 to 28)						
SR-6: Simulation SR-4 plus Simulation SR-5, together.						
	SR-1	**SR-2**	**SR-3**	**SR-4**	**SR-5**	**SR-6**
Real household consumption	0.64	2.26	7.08	9.89	5.52	15.37
Real GDP from expenditure side	-0.23	0.09	0.22	0.08	0.16	0.24
Export volume index	0.27	-1.90	-5.79	-7.21	-4.66	-11.74
Import volume index, duty-paid weights	2.61	2.27	8.10	13.08	6.18	19.31
Trade balance – foreign currency (change)	0*	0*	0*	0*	0*	0*
Current account – foreign currency (change)	0*	0*	0*	0*	0*	0*
Capital inflow – foreign currency (change)	1146	2149	1663	4911	1341	6244
Terms of trade	-0.28	3.23	12.18	14.99	9.44	24.34
Real devaluation	7.90	-4.44	-10.14	-6.50	-7.53	-13.92
Average nominal farmer wage	-0.94	24.06	15.88	38.63	12.27	50.68
Average nominal operator wage	11.05	7.14	6.75	24.72	5.93	30.53
Average nominal administrator wage	0.89	2.43	7.10	10.33	5.41	15.68
Average nominal professional wage	3.07	2.06	7.23	12.28	5.61	17.85
Return to fixed capital - agriculture	-1.95	20.68	15.94	34.30	12.26	46.34
Return to fixed capital – non-agriculture	15.11	3.60	10.80	29.40	8.46	37.80
Average capital rental	14.71	4.00	10.92	29.52	8.55	38.00
Consumer price index	1.86	7.72	7.43	16.83	5.84	22.56
GDP price index, expenditure side	2.41	6.90	10.48	19.60	8.24	27.73

Source: World Bank staff calculations.

The short-run impact of the international price increases on output differs across products. The increases in energy prices produce a moderate expansion of natural gas output (Simulation SR-1) and the increases in mining prices induce expanded output of mining sectors (Simulation SR-3). But the increase in agricultural prices produces no expansion in rice output, even though the real international price of rice roughly doubles (Simulation SR-2). Other agricultural commodity outputs do respond to the increase in their prices. The reason for the difference is that the ban on rice trade, in

particular the ban on exports, insulates the domestic rice market from the effect of the international price increases. In other words, there is no transmission of the international price change to the domestic rice market.

The reported short-run changes in employment by sector (Annex Table 3.10 in Annex III) exceed the reported changes in output. The reason is as follows. All sectors are assumed to have constant returns to scale technology. In these short-run simulations, capital stocks are fixed. This means that to achieve an expansion in output, the proportional expansion in employment must exceed the output

Table 4.3: Short-run results: regional output (GRDP)
(Units: percent change from base value of volume of regional output)

	SR-1	SR-2	SR-3	SR-4	SR-5	SR-6
NAD	42.2	9.7	10.3	61.8	8.1	69.6
Sumut	3.5	29.5	28.3	60.6	21.8	82.0
Sumbar	3.3	28.1	28.3	59.4	22.4	81.6
Riau	2.2	6.1	3.0	11.3	2.4	13.6
Jambi	2.2	17.1	12.9	32.0	10.1	41.9
Sumsel	16.0	23.8	26.9	66.2	21.3	87.2
Babel	0.1	4.0	7.1	11.1	6.2	17.2
Bengkulu	4.9	51.3	52.6	106.4	41.3	146.2
Lampung	3.3	34.5	31.9	69.4	25.0	94.1
DKI Jakarta	-2.6	-6.4	-8.5	-17.4	-6.9	-24.2
Jabar	4.7	14.3	15.0	33.5	11.5	44.6
Banten	-0.2	2.5	2.7	4.9	1.8	6.7
Jateng	26.6	20.0	21.8	67.6	17.1	84.2
DIY	5.2	20.2	32.4	57.0	25.2	81.7
Jatim	3.4	25.4	24.8	52.8	19.4	71.7
Kalbar	1.2	23.7	21.0	45.3	16.4	61.2
Kalteng	0.8	31.2	20.3	51.7	15.8	67.2
Kalsel	1.1	12.2	18.2	31.0	14.9	45.6
Kaltim	44.3	-3.0	1.8	43.2	1.8	45.0
Sulut	2.7	16.1	19.9	38.6	16.2	54.6
Gorontalo	3.0	21.6	23.6	47.4	18.4	65.3
Sulteng	2.4	41.7	31.7	75.5	24.8	100.1
Sulsel	1.1	18.3	16.0	35.2	13.0	48.1
Sultra	3.4	31.0	32.9	65.8	25.9	90.9
Bali	-1.5	6.1	4.6	8.8	3.5	12.2
NTB	0.7	6.5	18.3	25.4	15.5	40.8
NTT	1.9	19.2	19.8	40.1	15.5	55.0
Maluku	2.1	20.2	20.9	42.1	16.2	57.7
Malut	0.8	29.0	27.7	55.8	21.9	76.7
Papua	3.7	8.1	8.3	19.8	6.7	26.3

Source: World Bank staff calculations.

expansion to compensate for the fixity of capital. The same applies in reverse if output is contracting. The proportional contraction in employment must exceed the proportional contraction in output because capital stocks cannot contract.

The aggregate short run impact of the rise in commodity prices (SR-4) is an impressive regional growth across all regions except DKI Jakarta, where the gross regional domestic product (GRDP) falls by 17 and half a percentage points (Table 4.4). The rise in energy prices (SR-1) increases the GRDP in the majority of Indonesian provinces, with the exception of DKI Jakarta, Banten and Bali, where it declines. As the main oil producing region in Indonesia, the highest positive impact is recorded in East Kalimantan, followed by Nangroe Aceh Darussalam (NAD), Central Java (Jateng), and South Sumatra (Sumsel). The rise in agricultural prices result in increased GRDP in most provinces, given that most provinces are net agricultural producers. However, increased agricultural prices result in decreases in the GRDP of DKI Jakarta and East Kalimantan (Kaltim). DKI Jakarta is a net consumer of agricultural commodities and its economy is heavily dominated by the manufacturing and services sector. On the other hand, the leading sectors in East Kalimantan are the mining and crude oil sectors. Increased mining commodities prices result in increases in the GRDP of provinces which have abundant mining resources, like West Sumatra (Sumbar), Bengkulu, West Kalimantan (Kalbar), Northeast Sulawesi (Sultra), and West Nusa Tenggara (NTB).

When the prices of commodities on international markets change, domestic prices are normally affected, together with domestic economic responses to the supply and demand of goods and services. However, the response of domestic prices to international price changes is normally not one-for-one. For any given commodity, the percentage change in the domestic producer price relative to the percentage change in the international price is referred to as *a* transmission ratio. The magnitude of this ratio may vary across commodities. In the case of imported commodities, the magnitude depends on the Armington elasticity of substitution in consumption between the imported and domestically produced version of the same good and the magnitude of the domestic supply response. It may also depend on policy. If the good is subject to an import quota or ban, as in the case of rice in Indonesia, the transmission ratio may be zero or very close to it.

Annex Table 3.11 in Annex III shows the estimated transmission ratios corresponding to simulation SR-4. The transmission ratio is the ratio of the international price of the commodity concerned to the real producer price of the commodity concerned, using the producer price as the measure of the domestic price. All estimated transmission ratios lie between zero and unity. In the case of rice, the estimated ratio is close to zero, as expected. The ban on imports means that as the international price changes the real domestic producer price is virtually unaffected.

As background to estimating effects that commodity price changes have on poverty incidence, Annex Table 3.12 in Annex III shows changes in real factor returns, using the consumer price index as the deflator. These results are calculated from the macroeconomic results summarized in Table 4.2. The short-run energy price changes (SR-1) reduced the return to farmer labor and administrator labor. The energy price increases induce a real devaluation (an increase in traded goods prices relative to non-traded goods and services). The decline in administrator wages derives from this real devaluation. The real value of farmer wages and administrator wages both decline in this simulation. However, there are significantly raised returns to agricultural and non-agricultural capital. Agricultural price increases (SR-2) generate the opposite effect. Increased agricultural prices raised real returns to farmer labor, agricultural capital and land and reduced real returns to non-agricultural factors. Mining sector price increases raised real returns to agricultural factors, but also raised returns to capital in general. The estimated factor price effects of the improvement in the mining investment environment (SR-5) are qualitatively similar to these effects.

Annex Table 3.13 in Annex III presents the estimated effects of the six sets of shocks on average real consumption among each of the 10 socio-economic groups. These effects are consistent with the factor price changes summarized above. Energy price increases (SR-1) result in significantly decreased consumption in the rural household categories. Agricultural price increases (SR-2) raise real consumption significantly among rural socio-economic groups, while having only small positive or negative effects on urban households.

In understanding these results it is important to recall that because of Indonesia's rice import policy, the consumer price of rice is almost unaffected by the increase in international rice prices. Somewhat surprisingly, mining sector price increases benefit all ten socio-economic groups. Although price increases in the energy sector (SR-1) and agricultural sector (SR-2) each produce some negative outcomes on average real consumption at this 10 socio-economic group level, the combined effect of all three sets of price increases (SR-4) raises average real consumption for all 10 categories, as does the improved investment environment in mining.

The method used to estimate changes in the incidence of poverty is illustrated by Annex Figure 3.1 and Annex Figure 3.2 in Annex III. The starting point is the distribution of real expenditures across all 100 centile sub-categories within each of the 10 socio-economic groups summarized above. The data shown in Table 4.2 and discussed above are the averages of these 100 sub-categories. However, to analyze the rate of incidence of poverty, disaggregated data are essential. Annex Figure 3.1 shows the ex-ante, or initial, distribution of expenditures for the socio-economic group 'Rural 4' (farmers with more than one hectare of land), along with the simulated new distribution of expenditures that results from Simulation SR-4. These two curves thus show the cumulative distribution of expenditures per person before and after the shocks. For any level of expenditure (horizontal axis) each curve shows on the vertical axis the proportion of the population with expenditures less than or equal to that amount. For any poverty line, poverty incidence can be read as the vertical value of the intersection between that poverty line (horizontal axis) and the cumulative distribution.

The initial level of poverty incidence for this socio-economic group was 25.2 percent. Simulation SR-4 shifts the distribution to the line marked 'new without transfer'. The shift describes a change in the distribution of real expenditures, measured at 2005 prices, and poverty incidence can therefore be read using the same poverty line as before. The poverty line relates to expenditures measured in constant purchasing power units — that is, in terms of real expenditure. The rate of incidence of poverty declines to 16.3 percent, a decline of 8.9 percent of the population of that socio-economic group. According to the simulation results, the entire cumulative distribution shifted to the right, though not uniformly, implying that poverty incidence declined for any poverty line that might have been chosen. The conclusion that poverty incidence declined for this socio-economic group is therefore not dependent on the particular poverty line that was selected, although the magnitude of the decline will be affected to some extent by the choice of poverty line.

Clearly, a similar exercise can be performed for each of the other nine socio-economic groups. The results of these exercises for each of these groups for each of the six simulations are summarized in Annex Table 3.14 in Annex III. The effect of the observed increases in energy prices (simulation SR-1) is a reduction in poverty incidence for all groups except Rural 1, Rural 2 and Rural 7, while poverty incidence in the Rural 5 group remains unchanged. Annex Table 3.3 in Annex III shows that these four groups are dependent of farmer wages, but also to a surprising degree on administrator wages. This source of income derives from household members residing in urban areas and predominantly employed in the services sector. The energy price increases induce a real devaluation, as described above. The real value of farmer wages and administrator wages both decline. This, together with the

absence of any other significant offsetting effects, accounts for the effect on the rate of incidence of poverty within these groups.

In the case of Simulations SR-2 to SR-6, poverty incidence declines for essentially all socio-economic groups. The increases in the international prices of food (Simulation SR-2) reduce the rate of incidence of poverty among all rural groups and leaves urban groups virtually unaffected. Although the nominal prices of many food items increased, Annex Table 3.12 shows that real farmer wages also increased but that real operator wages remained virtually unchanged, with their nominal increase being about the same as that of the CPI. As a result, rural poverty incidence declined significantly but urban poverty incidence declined only marginally. In all other simulations, SR-3 to SR-5, poverty incidence declined among all socio-economic groups. The absolute decline in rural poverty was the largest in each case. The increase in the real return to capital, including both agricultural and non-agricultural capital, as shown in Table 4.2, along with the importance of capital ownership for all household categories, as shown in Annex Table 3.3, are central to these results.

As noted above, petroleum prices were subsidized at the consumer level throughout the period of 2005 to 2008 and only some of the increase in international petroleum prices was passed on to consumers. The government implemented a cash transfer system to compensate poor consumers for these nominal price increases. The magnitudes of these transfers were discussed above. Table 4.4 illustrates the way these transfers influenced poverty incidence. The table shows this for the same socio-economic group depicted in Figure 3.2, Rural 4, and describes the outcome of simulation SR-4T.

The calculated distribution of real expenditures shifts to the dashed line marked 'New with transfer'. It shows a kink at the level of the initial poverty incidence (25.2 percent), because all households below the poverty line received a positive net transfer and all above it received a negative net transfer in the form of an additional tax burden. Simulated poverty incidence declines markedly, to 8.2 percent. The cash transfers constituted a very significant redistribution of income, as is confirmed by Table 4.4.The combined effect of the international price changes and the cash transfers was that poverty incidence declined markedly in all socio-economic groups.

Shocks in commodity prices affect directly firms' costs by increasing their commodity input costs, but the nuances of such impact are not fully captured in a CGE model. To address this, Annex VI analyses the short-run impact on Indonesian firms of the increase in the price of commodity inputs between 2005 and 2007 outside the CGE model. Unlike in a CGE model, this analysis captures the differing impact on firms in a same industry resulting from differences in their input intensity and efficiency. The analysis shows that the impact of the increased prices of commodity inputs on firms is not negligible in terms of costs, profits, exit and employment. The spike in commodity prices hit mostly sectors that have a high commodity input intensity such as metal products, as well as those that experienced a sharp increase in the costs of their raw materials such as rubber and plastic products – even though those sectors have lower commodity input intensity. Furthermore, the analysis shows that the impact across and within industries is highly asymmetric, even at a very disaggregated industry level. This asymmetric effect is explained by the great heterogeneity in efficiency and in factor intensity within a same industry (for example, differences in energy efficiency across cement firms are a staggering 200-300 percent). This has important implications from a redistributive perspective. The increase in commodity input costs causes the most inefficient or more commodity input intensive firms to run out of business creating job losses in the short run. The impact of the inputs cost shock on firm exit is overall adverse, it is estimated to increase by 3 percentage points the number of exiting firms, impacting employment. But this effect varies substantially across industries.

Table 4.4: Short-run results - poverty incidence, with transfers

Category	Pop. Share	Initial poverty incidence	SR-1T	SR-2T	SR-3T	SR-4T	SR-5T	SR-6T
			New (simulated) poverty incidence					
Rural 1	13.46	21.2	18.2	10.1	9.0	9.2	9.2	8.0
Rural 2	17.70	23.1	15.1	10.1	9.2	8.2	10.0	7.1
Rural 3	6.62	30.1	17.0	15.1	14.0	11.2	14.2	10.0
Rural 4	4.61	25.2	12.0	14.1	11.1	8.2	12.0	7.1
Rural 5	15.77	15.1	9.0	8.0	5.1	5.0	5.2	4.0
Rural 6	4.76	20.1	8.1	8.1	7.1	5.1	7.1	4.1
Rural 7	6.89	7.2	5.1	2.1	2.0	1.2	2.1	1.0
Urban 1	15.98	15.0	8.2	10.1	7.2	6.2	8.1	5.2
Urban 2	5.37	13.0	7.1	7.1	6.0	5.2	6.1	5.0
Urban 3	8.84	5.0	2.2	2.2	2.0	2.0	2.1	1.1
Rural	70.00	20.0	12.8	9.4	7.9	7.0	8.3	6.0
Urban	30.00	11.7	6.3	7.3	5.5	4.8	6.0	4.0
National	100	16.0	9.3	7.3	5.7	4.9	6.1	3.9
			Simulated changes in poverty incidence					
Rural 1			-3.0	-11.1	-12.2	-12.0	-12.0	-13.2
Rural 2			-8.0	-13.0	-13.9	-14.9	-13.1	-16.0
Rural 3			-13.1	-15.0	-16.1	-18.9	-15.9	-20.1
Rural 4			-13.2	-11.1	-14.1	-17.0	-13.2	-18.1
Rural 5			-6.1	-7.1	-10.0	-10.1	-9.9	-11.1
Rural 6			-12.0	-12.0	-13.0	-15.0	-13.0	-16.0
Rural 7			-2.1	-5.1	-5.2	-6.0	-5.1	-6.2
Urban 1			-6.8	-4.9	-7.8	-8.8	-6.9	-9.8
Urban 2			-5.9	-5.9	-7.0	-7.8	-6.9	-8.0
Urban 3			-2.8	-2.8	-3.0	-3.0	-2.9	-3.9
Rural			-7.2	-10.6	-12.1	-13.0	-11.7	-14.0
Urban			-5.4	-4.4	-6.2	-6.9	-5.7	-7.7
National			-6.7	-8.7	-10.3	-11.1	-9.9	-12.1

Source: World Bank staff calculations.

Long-run CGE simulations

The long-run projected relative price changes shown in Annex Table 3.6 in Annex III are in almost all cases smaller than the changes actually occurring between 2005 and 2008, which are used as the basis for the short-run shocks discussed above. Indeed, whereas the short-run observed price changes involve an increase in the terms of trade in the case of each of the five sets of simulations, except the energy price shocks analyzed in SR-1 (Table 4.1), this is not the case for the long-run projected price changes. The projected increases in import prices outweigh the projected increases in export prices in three of the simulations (LR-2, LR-3 and LR-4). In particular, while the projected changes in energy prices (Simulation LR-1) imply an improvement in the terms of trade, the opposite applies to the changes in agricultural commodity prices (Simulation LR-2), as it does with LR-3 and LR-4.

Table 4.5 shows the estimated macroeconomic effects of these price changes, given the long-run closure assumptions described above. Changes in real household consumption mirror the changes in the terms of trade and capture changes in economic welfare. For the reason discussed above, real GDP is not a good indicator of economic welfare when the terms of trade are changing.

Changes in real factor returns do not mirror exactly the changes in the terms of trade, especially in simulations LR-1, LR-2 and LR-3. This finding suggests that the welfare of individual socio-economic groups, which differ in their factor ownership, may not all move together in these three simulations.

The 98 percent increase in mining prices used to simulate an improvement in the mining investment environment (Simulation LR-5) produces a large increase in aggregate real consumption (2.5 percent) and reduces poverty incidence significantly in both rural and urban areas. The profitability of mining increases and output and employment rise significantly in most mining sectors as capital moves into these sectors. A significant real appreciation is induced by this shock and real wages of farmers and returns to capital in the non-agricultural sector rise significantly. Each of these effects is magnified when the improved investment climate is combined with a projected increase in export prices as well (Simulation LR-6).

Table 4.5: Long-run macroeconomic results
(Units: percent change from base value, except variables marked (change), where the units are Rp billion at 2005 prices)

LR-1: Long-run international price increases in the energy sector (commodities 1 to 3).						
LR-2: Long-run international price increases in the agricultural sector (commodities 4 to 22).						
LR-3: Long-run international price increases in the mining sector (commodities 23 to 28).						
LR-4: Long-run international price increases in all above commodities (1 to 28) = LR-1 + LR-2 + LR-3						
LR-5: 98% increase in mining commodity prices (commodities 23 to 28)						
LR-6: Simulation LR-4 plus Simulation LR-5, together.						
	LR-1	**LR-2**	**LR-3**	**LR-4**	**LR-5**	**LR-6**
Real household consumption	0.52	-0.61	-0.02	-0.12	2.46	5.22
Real GDP (expenditure side)	-0.02	-0.05	0.00	-0.07	0.15	0.21
Export volume index	0.36	-0.27	-0.01	0.07	-0.53	-1.67
Import volume index, duty-paid weights	1.76	-1.56	-0.06	0.13	4.41	9.09
Trade balance – foreign currency (change)	0*	0*	0*	0*	0*	0*
Current account: foreign currency(change)	0*	0*	0*	0*	0*	0*
Terms of trade	0.25	-1.07	-0.06	-0.87	4.04	8.93
Real devaluation	1.22	1.09	0.09	2.39	-4.43	-9.36
Average nominal farmer wage	-0.80	-0.47	-0.08	-1.31	4.27	6.41
Average nominal operator wage	2.32	-0.73	0.20	1.80	3.60	7.08
Average nominal administrator wage	0.15	-0.55	-0.04	-0.43	3.04	5.59
Average nominal professional wage	0.83	-0.44	0.08	0.47	3.62	6.49
Return to mobile capital – agriculture	-2.39	-1.44	-0.10	-3.90	3.12	3.53
Return to mobile capital – non-agriculture	6.99	-0.43	-0.04	6.53	6.00	14.41
Average capital rental	6.77	-0.46	-0.04	6.29	5.93	14.16
Consumer price index	2.47	-0.03	0.01	2.46	3.34	6.86
GDP price index, expenditure side	2.63	-0.44	0.00	2.21	4.43	9.36

Source: World Bank staff calculations.
Note: 0* denotes a variable held fixed exogenously.

Table 4.5 indicates that real returns to farmer labor decline in all of simulations LR-1 to LR-4, along with returns to agricultural capital and land, as well as returns to most other categories of labor. Simulations LR-1 and LR-4 raise returns to non-agricultural capital. The estimated effect of

an improved investment climate for mining differs from this significantly. Returns to most categories of labor increase, together with returns to agricultural land and, especially, non-agricultural capital.

From Table 4.5, average real expenditures of the 10 socio-economic categories reflect the above factor price outcomes. The energy price increases (LR-1) harm the two poorest rural groups and are moderately beneficial for all other categories. Agricultural price increases (LR-2) reduce average real expenditures for all 10 household categories. The dramatic difference between these results and those obtained for the short-run price agricultural shocks (SR-2) relates mainly to the composition of the price shocks themselves. Whereas the short-run agricultural price changes improve Indonesia's overall terms of trade and increase aggregate real consumption (Simulation SR-2 in Table 4.2), the projected long-run agricultural price changes do the reverse (Simulation LR-2 in Table 4.5). In the short-run case, real farmer wages rise along with returns to agricultural capital and land. These real variables all decline as a result of the long-run projected price changes. An improved investment climate in mining (LR-4) raises real expenditures for all household categories.

The estimated changes in poverty incidence are summarized in Table 4.6, using the same methods and the same poverty lines discussed above for the short-run results. The aggregate rate of incidence of poverty declines in simulations LR-1 and LR-3, but the projected increases in agricultural commodity prices (Simulation LR-2) imply a small increase in the recent incidents of urban poverty and in aggregate poverty. The recent incidents of rural poverty remains constant, but the effect varies significantly among the seven rural socio-economic groups. An improvement in the investment climate for mining (Simulations LR-5 and LR-6) induces a significant reduction in the rate of incidence of poverty within every one of the ten socio-economic groups.

Our estimates of the long-run changes in the rate of incidence of poverty are smaller than the short-run estimates. The long-run and short-run simulations differ in two important respects: the shocks and the closure. The short-run shocks are larger than the long-run shocks, but the long-run closure allows greater flexibility of adjustment to changes in the terms of trade through the greater long-run mobility of capital and agricultural land. To test the importance of these two differences, the short-run shocks were imposed on the long-run closure of the model. The simulated impacts of these shocks, for example, on aggregate real consumption, were of the same sign as in the short-run case but around 50 percent larger under the long-run closure assumptions. The greater flexibility of the economy under the long-run closure assumptions meant that the positive impact of the terms of trade improvement led to larger economic gains. These results imply that the larger short-run estimates occur overwhelmingly because the short-run shocks to international prices are larger than the long-run projected price changes.

Simulated through a hypothetical 98 percent increase in mining product prices (LR-5), the long-run effects of an improvement in the mining investment climate outweigh the effects of the projected terms of trade changes (LR-6). There is a substantial expansion in mining output and employment and the incidence of poverty declines in all socio-economic groups. The rate of the decline is more than in any of the terms of trade simulations.

4.4 Conclusion

The short-run effects of the commodity price increases that occurred between 2005 and 2008 were generally positive for Indonesia's poor. It is often assumed that poor people in developing countries were harmed by the increased price of commodities in international markets over recent

Table 4.6: Long-run results on poverty incidence

Category	Pop. Share	Initial poverty incidence	LR-1	LR-2	LR-3	LR-4	LR-5	LR-6
			New (simulated) level of poverty incidence					
Rural 1	13.46	21.2	22.0	21.4	21.2	22.2	20.2	21.2
Rural 2	17.70	23.1	23.2	23.2	23.0	23.2	22.0	22.1
Rural 3	6.62	30.1	29.3	30.3	29.3	28.7	28.0	26.6
Rural 4	4.61	25.2	24.0	25.2	25.2	24.0	23.2	22.0
Rural 5	15.77	15.1	14.2	15.1	15.0	14.1	13.2	12.2
Rural 6	4.76	20.1	19.0	20.0	19.2	18.0	18.2	16.1
Rural 7	6.89	7.2	6.2	7.1	7.1	6.0	6.1	4.9
Urban 1	15.98	15.0	14.3	15.2	15.1	14.6	14.1	13.7
Urban 2	5.37	13.0	12.2	13.1	12.2	11.5	11.2	9.7
Urban 3	8.84	5.0	4.2	5.0	4.2	3.4	4.1	2.5
Rural	70.00	20.0	19.5	20.0	19.7	19.2	18.4	17.7
Urban	30.00	11.7	11.0	11.9	11.5	11.0	10.7	10.0
National	100	16.0	15.5	16.1	15.7	15.3	14.6	13.9
			Simulated changes in poverty incidence					
Rural 1			0.8	0.2	0.0	1.0	-1.0	0.0
Rural 2			0.1	0.1	-0.1	0.1	-1.1	-1.0
Rural 3			-0.9	0.2	-0.8	-1.5	-2.1	-3.6
Rural 4			-1.2	0.0	0.0	-1.2	-2.0	-3.2
Rural 5			-0.9	0.0	-0.1	-1.0	-1.9	-2.9
Rural 6			-1.1	-0.1	-0.9	-2.1	-1.9	-4.0
Rural 7			-1.0	-0.1	-0.1	-1.2	-1.1	-2.3
Urban 1			-0.7	0.2	0.1	-0.4	-0.9	-1.3
Urban 2			-0.8	0.1	-0.8	-1.5	-1.8	-3.3
Urban 3			-0.8	0.0	-0.8	-1.6	-0.9	-2.5
Rural			-0.5	0.0	-0.3	-0.8	-1.6	-2.3
Urban			-0.7	0.2	-0.2	-0.7	-1.0	-1.7
National			-0.5	0.1	-0.3	-0.7	-1.4	-2.1

Source: World Bank staff calculations.

years. However, this chapter suggests the opposite conclusion for Indonesia. The short-run effects of the commodity price increases that occurred between 2005 and 2008 were generally positive for Indonesia's poor. These effects derived from increases in agricultural real wages, operator real wages and increases in the real returns to forms of capital owned by the poor. It is true that the prices of commodities consumed by the poor increased, but these negative effects were outweighed by the above benefits they received on the income side.

It is estimated that the increases in agricultural commodity prices that occurred between 2005 and 2008 reduced rural poverty incidence in the short run by 2.2 percent, leaving urban poverty incidence virtually unchanged, implying a reduction in poverty incidence at the national level of 1.7 percent.

The reason that urban poverty incidence is roughly unchanged is that an increase in agricultural commodity prices affects the urban poor through two opposing mechanisms:

- It increases the consumer prices of the food items that they purchase; and
- It affects the structure of agricultural production in a way that influences factor prices, especially by raising returns to unskilled labor and capital items owned by the poor.

These two opposing effects offset one another almost exactly. The first effect increases urban poverty, operating on the expenditures of urban people. But in our simulations this effect does *not* operate through the price of rice, the major staple of Indonesia, because the simulations recognize that domestic rice prices were insulated from international prices by Indonesia's rice import ban. However, the effect does operate through the consumer prices of other, less important food items. By contrast, the second effect operates on the incomes of the urban poor and reduces urban poverty. In our simulations, the two opposing effects offset one another almost exactly.

While Indonesia's ban on rice imports shielded domestic consumers and producers of rice from the nine-month spike (March-December 2008), it did so at a high cost. The rice import ban itself had already increased domestic rice prices above international prices since 2004. This imposed considerable costs on domestic consumers over the four-year period prior to the international price spikes of 2008. In particular, from 2005 until the end of 2007, domestic prices were on average US$232/ton higher than international prices. Moreover, as international rice prices subsequently declined in December 2008, these lower rice prices were not passed on to domestic consumers. While the international price increases proved to be temporary, the rice import ban makes a permanent feature of high rice prices, at the permanent expense of domestic consumers.

The combined short-run effect of all commodity price increases (energy, agricultural and mining commodities) was a decline in rural poverty of 4.7 percent and a decline in urban poverty of 2.7 percent. Taken together, these figures imply a decline in the overall rate of incidence of poverty of 4.1 percent of the total population. The cash-transfer system introduced by the Government to compensate poor consumers for the partial transmission to domestic prices of increases in international petroleum prices accentuated the decline in the rate of incidence of poverty.

With the exception of the economies of DKI Jakarta and Banten, the short-run effect of all commodity price increases on the economies of the regions of Indonesia was positive. This is reflected in significant increases in regional gross domestic outputs. This result is consistent with media reports of impressive increases in consumption of goods such as motorbikes and cars in areas outside Java, due to the wealth created by high commodity prices, particularly in mining and plantations areas. In contrast, manufacturing and services in DKI Jakarta were hurt by the increased cost of commodities (energy, agricultural and mining).

The impact of the long-run projected price increases is of less significance than the impact of the short-run price changes. The long-run projected price increases are of less significance than the observed short-run changes discussed above. The simulated effects of these commodity price changes were correspondingly less favorable. The simulated effect of an improved investment climate in mining was a large increase in aggregate real consumption and a corresponding reduction in aggregate poverty incidence in both rural and urban areas.

Chapter 5

Managing Commodity Price Shocks in Indonesia

Abstract: *Indonesia is a net commodity producer and exporter. Thus, in general, high commodity prices are good for the country, resulting in increased export revenues and an increased GDP. However, at the same time, sudden increases in fuel and food prices have a serious impact on consumers, particularly on poor households. Increased commodity and fuel prices also have a negative impact on manufacturers, due to the increased cost of inputs. The policies implemented by the Government since the 1960s to mitigate the impact of price fluctuations on consumers have had mixed success. Some have had unintended consequences. In particular, prolonged fuel subsidies have benefited non-poor consumers at the expenses of other public needs such as health, education, and infrastructure. The experience both within Indonesia and abroad also shows that certain other measures are often ineffective or not cost efficient. These include quantitative controls over exports and the artificially controlled prices regulated by administrative measures. Policy instruments to manage the impact of price increases and price volatility should be designed carefully with three goals in mind: protect vulnerable consumers, maintain and create incentives for producers, and be fiscally sustainable. The best options are likely to involve the development of policy monitoring and reaction systems; improved social safety net programs; the smart use of trade policies and import regulations; improved infrastructure; improved legal systems and information networks, standards, and certifications; a reduction in trade restrictions; prudent fiscal management; and the development of price stabilization mechanisms for the benefit of smallholders.*

5.1 Introduction

Policymakers across the world have applied policies to mitigate the impact of the recent commodity price increases on the poor with mixed success. Indonesia is no exception. The recent commodity price rises led to dramatic increases in food and fuel prices in domestic markets in Indonesia, threatening poor consumers. In response, the Government resorted to a wide variety of instruments. But some of these policies aimed at reducing the impact of commodity price rises on the poor have had the opposite effect, actually exacerbating problems they were intended to solve.

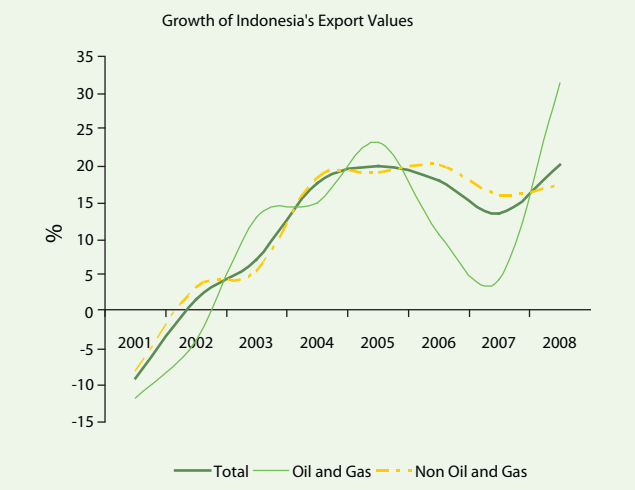
This chapter aims to help policymakers to design more efficient instruments to tackle changes in commodity prices. The chapter is structured as follows: Section 5.1, this section, defines the questions explored by this chapter and describes its organization. Section 5.2 examines the impact of high commodity prices and volatility on exporters, consumers, producers and the government. Section 5.3 looks at the Indonesian experience in coping with commodity price shocks. Section 5.4 examines various recent international policy responses to commodity price increases and volatility. Section 5.5 presents policy recommendations with particular reference to the needs of Indonesian policymakers.

5.2 Impact of high commodity prices and volatility: Exporters, consumers, producers and the government

Increased export revenues and increased GDP

Indonesia is a net commodity producer and exporter. Indonesia is the largest producer and second largest exporter of crude palm oil, and one of the largest producers of crude rubber. It is also one of the largest producers of spices, and is becoming an increasingly important world supplier of cocoa, tea, and specialty coffee. Indonesia is an important exporter of farmed fish and shrimp to markets spanning from the Middle East to Japan and the US. The country also exports minerals such as coal, copper, and tin and has rich and largely untapped resources of minerals, gas, and oil.

Figure 5.1: Exports increased with commodity boom



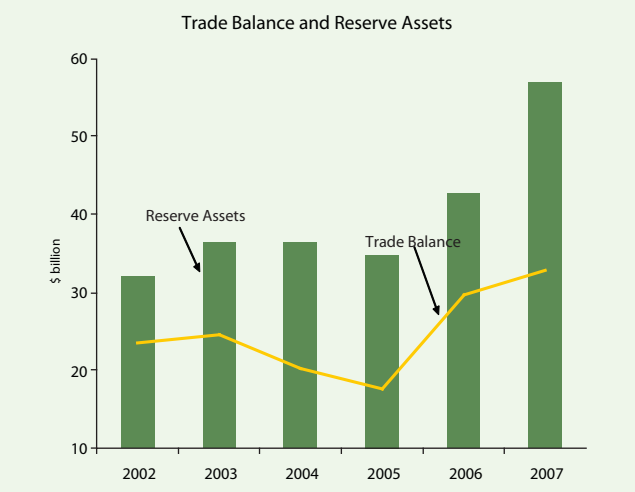
Source: BPS, World Bank staff calculations.

In general, high global commodity prices are therefore good news for Indonesia. The boom in commodity prices over recent years has had a significant positive impact on export revenues. Specifically, the total value of exports grew by 16 percent per year in the period between 2004 and 2008. This is the highest and the most sustained expansion of exports experienced by Indonesia since the East Asian crisis (Figure 5.1). These export revenues have helped to create a surplus in the trade balance and have enabled Indonesia to secure its foreign reserves (Figure 5.2).

Although the volume and value of imported commodities is also significant, the total value of exports outweighs these by a significant margin. It is estimated that high commodity prices lifted Indonesia's total income by an average of 1.2 percent of GDP per year between 2004 and 2007.[28] In absolute terms, no other country in East Asia benefited as much from high commodity prices.

28 Estimated change in net exports of commodities with respect to GDP, reported in East Asia & Pacific Update, November 2007.

Figure 5.2: Indonesia almost doubled its foreign reserve assets



Source: Bank Indonesia.

The biggest proportion of export revenues was generated from the export of raw materials such as minerals and agricultural products. In 2007, the value of exports of mineral products, including oil and gas, amounted to US$20.4 billion. In the same year, the value of exports of agricultural products amounted to US$16.7 billion.

In 2008, exports of crude palm oil constituted about 9 percent of the total value of Indonesia's non-oil and gas exports. The value of exports of mineral products, particularly coal and tin, has increased substantially over recent years, representing 9 percent of the total value of Indonesia's non-oil and gas exports in 2008. Despite high growth and promising potential, the value of exports of cocoa, coffee, shrimp, and other commodities is too small to make a significant impact on export figures. Nonetheless, these products are important sources of income for small farmers.

Consumers: Higher food and fuel prices on domestic markets

While the increased price of commodities on global markets has had a significant positive impact on Indonesia's export revenues and GDP, it has also created difficulties for Indonesian consumers. In particular, the increase in the value of agricultural commodities has translated into increases in food prices on domestic markets and a high rate of inflation. Food prices increased consistently between 2006 and 2008 at a significantly higher rate than that of core inflation (Figure 5.3).

The impact of increased food prices, particularly increased rice prices, is particularly heavy on poor households, which spend a major portion of income on food. As Table 5.1 demonstrates, poor households in Indonesia spend about two-thirds of their income in food. At least 20 percent on average is spent on rice.

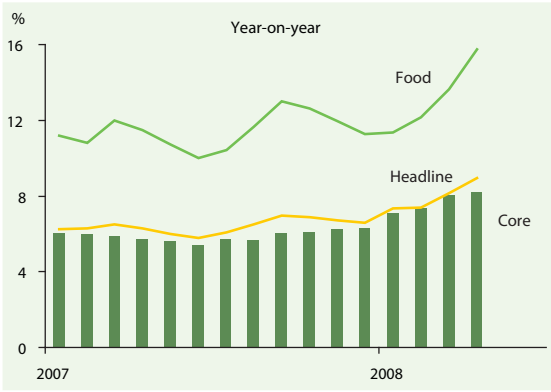
While many poor households in Indonesia are directly involved in commodity production, this does not mean that they have necessarily benefited from the increase in commodity prices. Many poor commodity producers in Indonesia are net commodity consumers, particularly in the case of small-scale rice farmers. This makes these farmers vulnerable to sharp increases in commodity prices. An increase in the relative rice price by 10 percent has the effect of placing an additional two million people below the poverty line (Figure 5.4).

Table 5.1: Share of food and non-food expenditures to total expenditures (%)

	Poor	All Households
Total food	**66.7**	**49.3**
Rice	**22.4**	**9.7**
Cooking oil	**2.4**	**1.4**
Sugar	**2.4**	**1.4**
Soy bean	**2.1**	**1.3**
Chili	1.5	0.9
Noodle	1.3	1.1
Corn	1.3	0.3
Egg	1.2	1.1
Onions	1.2	0.7
Meat	0.8	1.8
Spices	0.7	0.4
Milk	0.6	1.7
Flour	0.2	0.2
Other Food	28.7	27.4
Total non-food	**33.3**	**50.7**
Housing and maintenance	7.6	10.7
Kerosene	2.4	1.8
Transportation	2.6	6.7
Postal and telecom	0.3	2.7
Health	1.9	2.9
Education	1.9	3.2

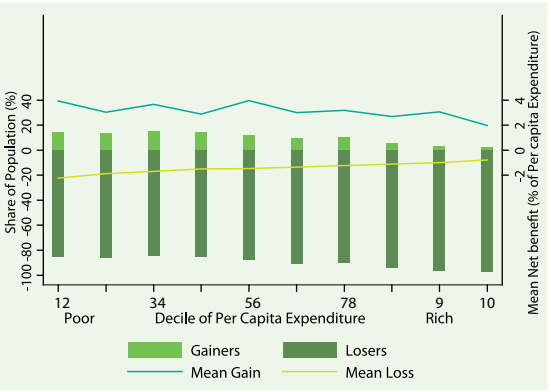
Source: Susenas 2007.

Figure 5.3: Inflation rates, 2007-08



Source: BPS, CEIC, World Bank staff calculations.

Figure 5.4: Effect of a 10 percent increase in rice price by income deciles



Source: World Bank staff calculations from 2007 Susenas.

Poorer households in Indonesia are also significantly dependent on kerosene as a source of energy. Price pressures force poor households to spend less on health and education services, which are important for their future well-being. Therefore, rising commodity prices can increase not only the absolute poverty headcount but also increase the depth of poverty.

Manufacturers: Increased inputs and energy costs

Manufacturers have also faced difficulties due to the increased price of commodities. Most significantly, high fuel prices have affected manufacturers' operations through increased transport costs and, to a lesser extent, increased energy costs. The simulation in the Annex to Chapter 6 shows that a 10 percent increase in fuel costs increases transport costs by 1 percent.

Higher transport and operating costs can put the most inefficient firms in a sector out of business, inflicting job losses. The price of electricity is fixed by the Government, but due to the unreliability of power supplies, a significant number of firms also depend on their own fuel-powered generators for power. Thus, increased fuel costs will have a significant impact on firms' operating costs. Higher transport and operating costs will put the most inefficient firms in a sector out of business, resulting in job losses. The simulation shows that if 10 percent of inefficient firms in each manufacturing industry are put out of business, this could lead to an 8 percent fall in the total number of manufacturing jobs.

Macroeconomic impacts: Strains on public finances

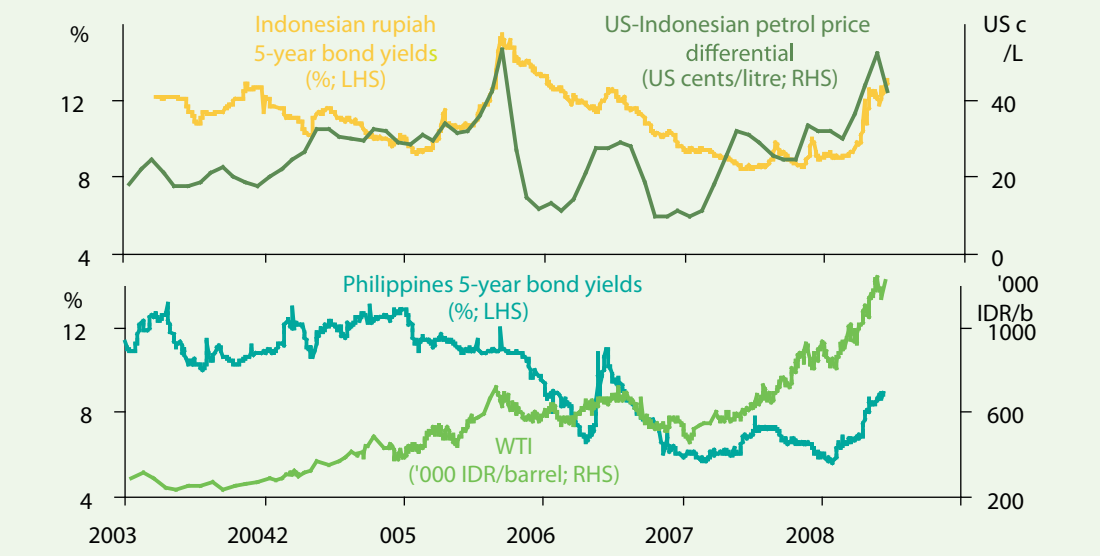
While higher commodity prices can have a significant positive impact on a commodity-exporting country's trade balance, they can also result in 'Dutch disease'. On the one hand, while higher commodity prices can benefit a commodity-exporting country's trade balance, they can also result in currency appreciation and the crowding out of the tradable sector, a phenomenon commonly known as 'Dutch disease'.

Commodity-exporting countries are vulnerable to price shocks during booms and busts. Commodity-exporting countries are particularly vulnerable to price shocks during booms and busts because sudden, dramatic fluctuations in prices of commodities can have a significant impact on the Government's revenues and ability to spend. During the recent oil boom, for instance, many governments in oil exporting countries increased their spending levels and expanded their level of intervention in the economy. The subsequent fall in prices put these governments in a very difficult budgetary position.

Increased commodity prices, particularly high fuel and crude prices, may also place severe strains on public finances in commodity-exporting countries. In such countries, governments may be under heavy political pressure to subsidize the cost of fuel and food to mitigate the impact of the increases on poor households. Increased commodity prices will increase the cost of such subsidies. For example, as a net energy and food exporter, the Indonesian budget could benefit from high price commodities. However, due to the cost of fuel subsidies, the net effect on the Government's budget is negative. During the recent fuel price spike, the cost of these subsidies amounted to about 20 percent of the total government budget.

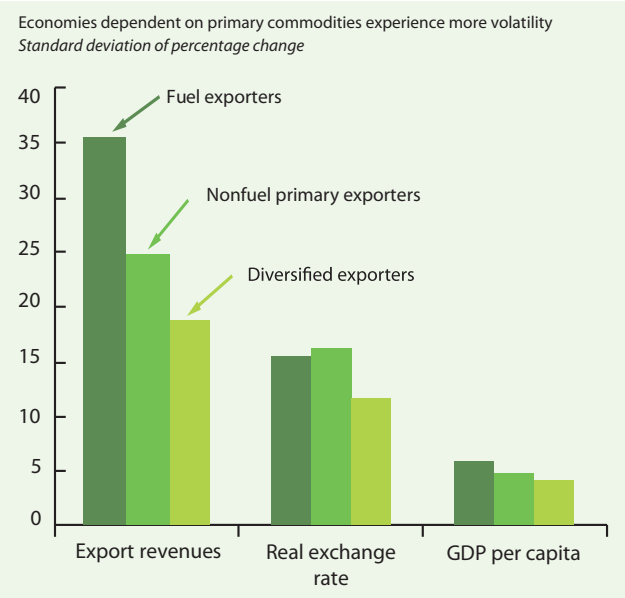
The cost of the Government's debt is strongly correlated to the size of energy subsidies and their financing needs. Debt markets charge a premium when subsidies are expanding. Government bond yields that move in tandem with oil prices are not unique to Indonesia (Figure 5.6). But the movements in Indonesia's yields appear to be particularly pronounced, and to take longer than average to return to normal levels after an oil price rally. Furthermore, Indonesia's bond deals are also highly sensitive to how the Government manages domestic regulated fuel prices. As the gap widens between Indonesian fuel prices and international fuel prices, Indonesia's bond yields increase markedly.

Figure 5.6: Indonesian Government bond yields appear to track the cost of subsidies



Source: CEIC, US Department of Energy, World Bank staff calculations.

Figure 5.7: The impact of severe shocks on economic progress



Source: Global Economic Prospects (2008).
Note: Volatility is defined as the standard deviation of percentage changes over time (annual data). Commodity concentration measured in 1980. Excludes countries with population less than one million.

The inherent price volatility of commodities has significant microeconomic and macroeconomic implications for nations like Indonesia whose economies are heavily reliant on the export of such commodities. This volatility creates difficulties for small farmers living at subsistence levels. It also increases the risk for commodity producers by discouraging investment. It can also raise the level of precautionary savings in the economy (Deaton, 1992), as consumers save more to protect themselves from future increases in prices and producers save more to protect themselves from future falls in prices.

At a macroeconomic level, the high degree of volatility in commodity prices results in a higher level of volatility in GDP, exchange rates, and export revenues. This is particularly true for economies heavily dependent on the export of primary commodities (Figure 5.7). It can also have an adverse impact on their governments' ability to formulate effective long-term economic policies and can result in negative financial and monetary disequilibrium.

5.3 Coping with commodity price shocks: The Indonesian experience

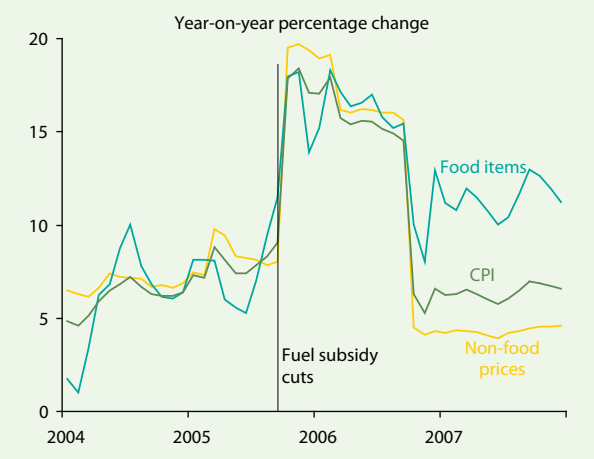
Historically, the Government has made the stabilization of the prices of basic food commodities on domestic markets an integral part of its economic policy. These policies have been implemented for two main reasons:

- To mitigate against the impact of price fluctuations on consumers, particularly the poor; and
- To complement policies directed at developing the agriculture sector and achieving food security.

To achieve these aims Indonesia has implemented since the 1960s a range of policies to stabilize the prices of those commodities with high shares in the consumption basket and those commodities crucial for the economy. In the period from 1969 to 1998, the Government empowered the National Logistics Agency (Bulog), to implement measures to ensure the availability and stabilize the price of food staples such as rice, sugar, soybean, cooking oil and meat. The mechanisms to achieve this end have included public intervention in procurement, stock management and food distribution. Similarly, the Government empowered the state oil company Pertamina to manage oil production and to take full control of the price and the distribution of subsidized fuels.

The global food crisis in the early 1970s prompted a powerful policy response from the Government. The crisis was caused by a thin and unstable global trade of food. The Government reacted by investing heavily in irrigation and by promoting the introduction of new rice technologies to increase the levels of rice production. It also empowered Bulog to ensure proper price incentives for rice farmers by maintaining the domestic rice price at desired levels through stocks accumulation and market operations. Since the 1997-98 East Asian financial crisis, the role of Bulog has changed considerably, with its transformation into a profit-orientated state-owned company.

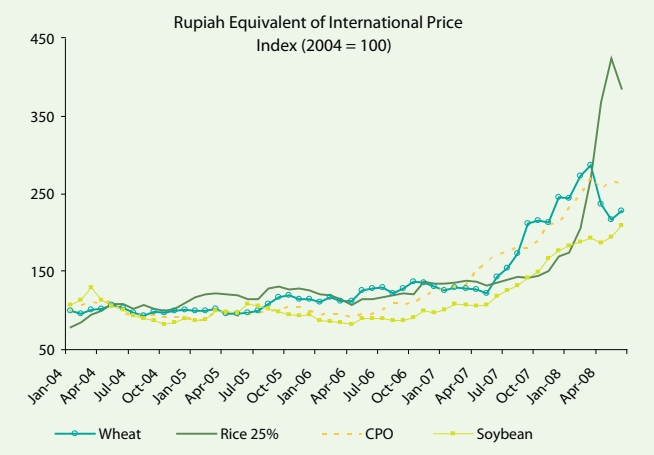
Figure 5.8: Food outpaces general inflation



Source: BPS, World Bank staff calculations.

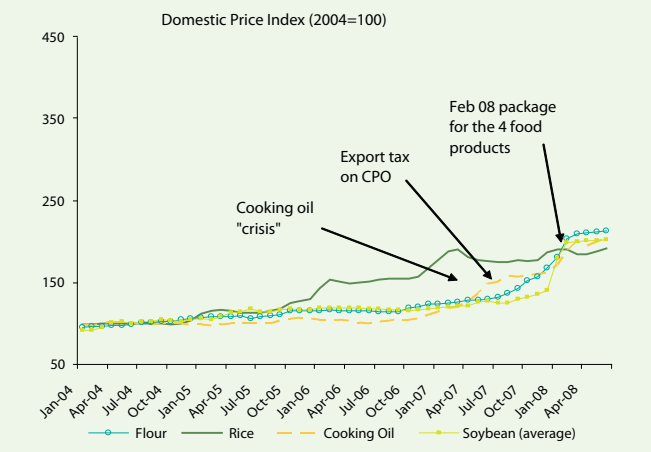
The Government created a fuel monopoly to achieve the stabilization of fuel prices. Through Pertamina, the Government instituted a monopoly on the fuel trade as a means to achieve the stabilization of fuel prices in Indonesia. The Government allocated fuel subsidies in its annual budget and channeled them through Pertamina. For decades the Government used Pertamina to ensure fuels was allocated to all regions and sold at the same price. Pertamina maintained control over retail distribution of fuel and lubricants and over licensing of petrol stations across Indonesia. After the East Asian financial crisis, the Government liberalized the distribution of fuel and petroleum products, inviting private investment in the distribution network in particular. In 2005, the Government instituted another major policy reform with cuts in fuel subsidies.

Figure 5.9: Rising international prices of food



Source: DECPG, World Bank staff calculations.

Figure 5.10: Except for rice, prices in Indonesia were affected by increases in international prices



Source: BPS, Ministry of Trade, World Bank staff calculations.

From 2005 to 2008: High inflation and increased commodity prices

From 2005 to 2008, the Indonesian economy experienced a period of high inflation. This was initially caused by the 2005 fuel subsidy cuts, although its effect was subdued during 2006. In 2006 and 2007, rice prices remained consistently higher than world prices due to the existing import and export restrictions. In 2007, food inflation was fueled by the rise in the price of cooking oil, flour, and soybean (Figure 5.8, Figure 5.9 and Figure 5.10).

The increase in commodity prices posed a challenge for Indonesia. Since the East Asian financial crisis, the country had relied increasingly on private trade and enjoyed relatively stable prices for most food commodities. In February 2008, in response to the spike in food prices, the Government acted swiftly to confront rising food prices through a mix of instruments. These instruments are described below and summarized in Table 5.3.

Wheat

Wheat is a key input for the food industry. The food industry, which consists of thousands of small enterprises catering to various income segments, consumes a large amount of wheat flour. Wheat constitutes 49 percent of intermediate inputs in the macaroni and noodle industries and 35 percent of intermediate inputs in the bakery and biscuit industries.[29] The vast majority of the wheat used in the food industry is imported. Prior to the East Asian financial crisis, the Government controlled the import of wheat through state-owned enterprises. Since the East Asian financial crisis, the trade has been liberalized. In 2007, Indonesia imported 4.6 million tons of wheat, which amounts to a total of 9 percent of the total volume of world trade.

29 Indonesia Input-Output Table 2000.

Table 5.2: Indonesia's recent experience

Policy package to stabilize prices and protect the poor from rising food prices, announced by the Coordinating Ministry for Economic Affairs in February 2008
Flour • Removed the 5 percent import tariff for wheat flour, implemented the PPN-DTP (government-borne value added tax) for wheat flour, postponed the fortification requirement for wheat flour stated in SNI (Indonesian National Standard); • Food diversification including development and the use of flour made from other tubers; • Facilitated SMEs in food industry to convert energy source from kerosene to cheaper liquid petroleum gas (LPG).
Soybean • Removed the 10 percent import tariff for soybean and put soybean imports in the Customs' "green lane" to speed up import clearance; • Sold soybean at subsidized price for SMEs producing *tofu* and *tempe* for 6 months (subsidy Rp 1,000/kg); • Continued the development of large soybean estates to improve domestic production.
Cooking Oil • Continued implementing export tax for CPO; • Implemented PPT-DTP (government-borne value added tax) for bottled/packed cooking oil; • Sold packed non-brand cooking oil at subsidized price to low income communities and SMEs for six months (subsidy Rp 2,500/liter).
Rice • Increased subsidized rice up to 15 kg/poor household/month for nine consecutive months. Poor households were eligible to purchase rice at Rp 1,600/kg (around 16 cents/kg); • Reduced import tariff of rice to Rp 450/kg; • Increased rice production through distribution of higher quality seeds.

Source: www.ekon.go.id

In mid-2007 and early 2008, the price of wheat on global markets increased sharply. The Government responded quickly to these price increases with a series of measures.[30] Among other measures, the Government eliminated the import tariff on wheat and the value-added tax on wheat flour. It temporarily suspended the requirement for flour fortification to further reduce costs and speed up the distribution time to retailers. To a large degree, these measures succeeded in their aim of stabilizing the retail price of flour.

Soybean

Soybean is an important source of protein for poor Indonesians. Soybean constitutes 14 percent of total input costs in the manufacturing of *tempe* and *kecap* (sweet soy sauce), two popular food products in Indonesia.[31] The share of soybean and soybean products (*tempe, tahu*, and *kecap)* in household per-capita expenditure is around 2 percent in the 1st and 2nd per capita expenditure deciles.

The price of soybean in domestic markets increased dramatically in the period following January 2007. Reflecting increases in prices on global markets, the domestic price of soybean increased by 54 percent in the period from January 2007 to January 2008. Soybean prices are closely aligned with international prices. Their correlation is 0.7, which indicates a strong pass-through of international price shocks for this commodity (Table 5.4).

30 See USDA Wheat Outlook: http://usda.mannlib.cornell.edu/usda/ers/WHS//2000s/2007/WHS-12-13-2007.pdf

31 Indonesia Input-Output Table 2000.

Table 5.3: International and domestic prices of soybean

	International price of soybean (Rp/Kg)	Retail price of imported soybean (Rp/Kg)	Retail price of local soybean (Rp/Kg)
Jan 07	2,221	4,884	5,113
Dec 07	3,739	5,824	5,871
Jan 08	4,181	*7,500*	*7,500*
Growth rate Jan 07- Dec 07 (%)	68	19	15
Growth rate Jan 07- Jan 08 (%)	88	54	47

Source: International price of soybean from World Bank DECPG, Retail price Jan 07 and Dec 07 from Ministry of Trade and Jan 08 retail price from *The Jakarta Post (*in italics in the table*)*.

The increase in the price of soybean led to demonstrations by producers of soybean-based food products. These producers claimed they were being hurt by the increase cost of inputs, as they could not pass these costs on to consumers due to the high elasticity price of demand. In response, the Government introduced a set of temporary measures that were effective in helping consumers to cope with the spike in prices. To respond to the complaints of the producers, the Government formulated a package that included the elimination of import tariffs on soybean and a temporary exemption on value-added taxes on processed soybean products.

The Government also approved a system of direct subsidies to small-scale producers of soybean-based foods. However, the Government did not implement the system, as it realized it was an inefficient and unnecessary measure, as small-scale producers of soybean-based foods had passed on the cost of the increased input to their final product. However, the announcement of the system of subsidies had a number of detrimental effects. In particular, it raised expectations from other sectors that government subsidies for producers could be applied as a response to the increased prices. Meat producers and fishers soon also demanded subsidies from the Government.

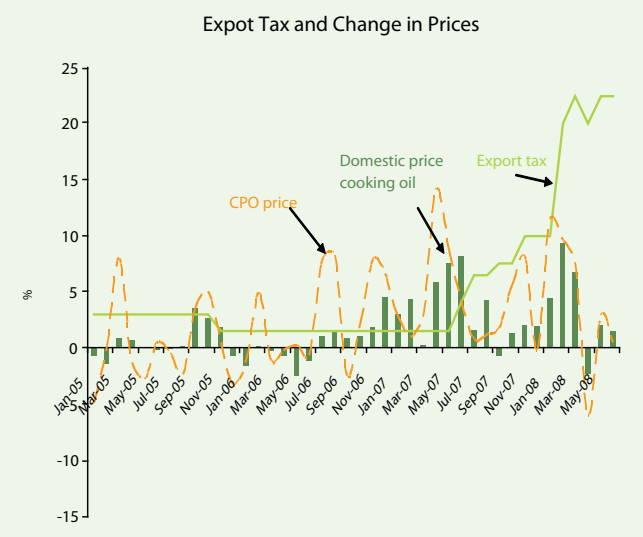
Cooking oil

Indonesia is the largest producer of palm oil in the world and this oil is also the most widely consumed oil in the domestic market. In 2007, Indonesia produced about 16.8 million tons of crude palm oil (CPO), of which 12 million tons were utilized by domestic refineries, with the remainder being exported. Most of the CPO consumed domestically is processed into palm cooking oil. On average, Indonesian households spend 1.4 percent of their income on cooking oil. Cooking oil is also an important input for small entrepreneurs with food stalls and restaurants.

The price of palm cooking oil in domestic markets correlates closely to the price of CPO on global markets, despite the fact that Indonesia is a major producer of CPO. In April 2007, the price of CPO on global markets increased by 15 percent in a month. Subsequently, the price of cooking oil in Indonesia increased by 23 percent over the next three months.

The Government attempted to implement two different mechanisms to stabilize the domestic price of cooking oil. First, the Government attempted to restrict the export of CPO by requiring refineries to set aside a certain share of CPO for the domestic market. This requirement was termed 'domestic market obligations', or DMO. This approach was difficult to enforce and entailed high supervision costs, and it did not succeed in its aim of stabilizing the price of cooking oil on domestic markets.

Figure 5.11: Domestic price of cooking oil was stabilized following increase in export tax of CPO



Source: DECPG, BPS, Ministry of Finance, World Bank staff calculations.

With the failure of this measure, the Government decided to increase the export tax on CPO from 1.5 percent to 6.5 percent in June 2007. An export tax was easier to implement than the system of domestic market obligations. It also had the added advantage of creating revenue for the Government, which could be used to compensate poor oil palm farmers and poor cooking oil consumers.

The measures implemented by the Government to stabilize the price of cooking oil on domestic markets had a number of drawbacks. First, these measures benefited consumers at the expense of refiners and farmers. Second, since Indonesia is one of the largest exporters of CPO to global markets, this measure could ultimately cause an increase in the price of CPO on these markets. Thus, it could exacerbate the fundamental problems that required the measure to be implemented in the first place.

The implementation of the export tax did not have an immediate impact on the stabilization of the domestic prices of cooking oil. The export tax was imposed on the major input (CPO) for the production of cooking oil. However, it took a period of time for export tax on CPO to have an impact on the domestic price of cooking oil, as producers of this cooking oil sold their inventories based on previously established CPO prices (Figure 5.11). In February 2008, the Government announced a progressive schedule for the export tax prior to the actual implementation of the tax. This led to further CPO and cooking oil price increases, as producers had a strong incentive to increase their levels of exports before the implementation of the CPO tax. The lesson learned was the importance of applying measures immediately rather than announcing them beforehand.

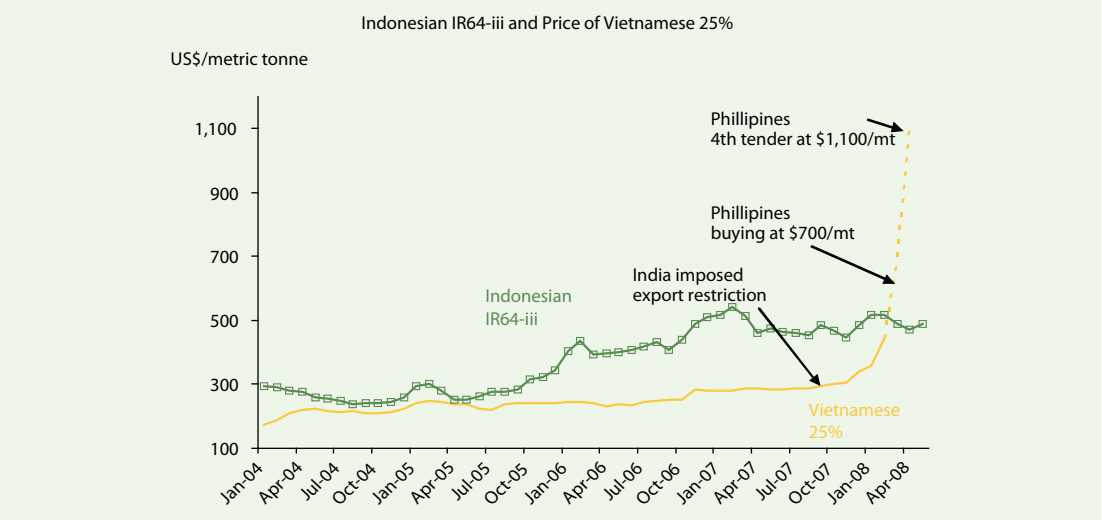
The depreciation of the rupiah with respect to the US dollar also acted as a strong incentive for CPO producers to increase their levels of exports. Thus, it reduced the effectiveness of the CPO export tax as a measure to achieve the stabilization of domestic prices of cooking oil.

Rice

Rice is the main food staple in Indonesia. The production of rice involves the employment of a significant proportion of the population. Given the importance of the staple both to consumers and those involved in its production, the stabilization of domestic markets for this commodity has been a high political priority for Indonesian governments since independence. Over the past decade, the Government has adopted a range of different measures to achieve the stabilization of rice prices. For a brief period, in 1999 to 2004, rice markets were liberalized. However, in 2004, the Government reversed this trend by banning the import and export of rice.

The restrictions on imports and exports of rice meant that Indonesia was largely unaffected by the four-month spike in rice prices that occurred in 2008. The Government's restrictions on imports and exports of rice prevented international price shocks from being fully transmitted

Figure 5.12: Trade restrictions triggered panic in global rice market



Source : USDA, FAO, PIBC, World Bank staff calculations.

Table 5.4: Increasing rice self-sufficiency can be more costly than relying on imports

	Cost of rice consumption				
	Production	Consumption	Import	Import strategy	Self-sufficiency
	(million of metric tons)			($US billions)	
China	123.2	133.8	10.6	28.8	43.2
Indonesia	33.8	36.1	2.3	7.8	11.6
Nigeria	2.2	3.7	1.6	0.8	1.2
Iran, Islamic Rep.	1.6	2.9	1.3	0.6	0.9
Iraq	0.1	1.1	1.0	0.2	0.4
European Union	1.7	2.6	0.9	0.6	0.8
Philippines	8.7	9.6	0.9	2.1	3.1
Bangladesh	25.3	26.0	0.8	5.6	8.4
Senegal	0.1	0.9	0.7	0.2	0.3
Cote d'Ivoire	0.5	1.2	0.7	0.3	0.4
Total	197.2	217.9	20.7	46.8	70.3

Source: World Bank 2009a.

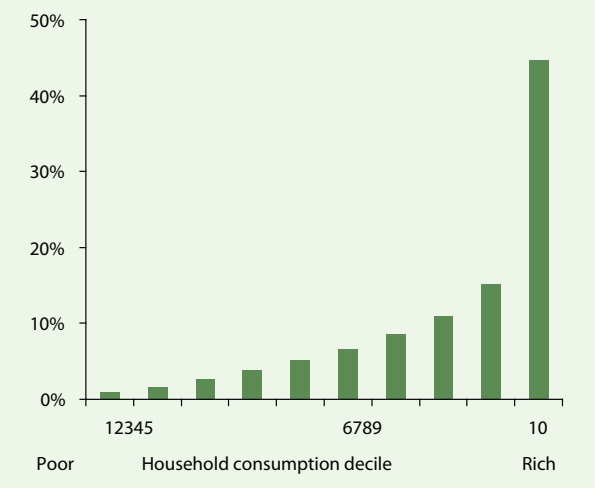
to domestic markets after export restrictions were set by India and Vietnam in 2008. In May 2008, the average price of Vietnamese rice reached a monthly pick of US$863/ton. At the same period, in Indonesia, the price of rice in domestic markets was hovering around US$616/ton (Figure 5.12). The restrictions spared Indonesian consumers from a price shock that would have caused great harm to the poor over that four-month period.

However, overall and in the long term, these restrictions have been detrimental to Indonesian consumers. In particular, from 2005 till the end of 2007, domestic prices were on average US$232/ton higher than international prices. Similarly, a recent World Bank (2009a) simulation estimated that if import restrictions had been introduced to achieve self-sufficiency in 2000-05 to boost domestic prices and induce additional production this would have cost consumers an extra US$3.8 billion.[32] (Table 5.5.)

32 This simulation is performed based on the assumption that to increase domestic rice output by 10 percent, a country would have to increase domestic prices by as much as 50 percent.

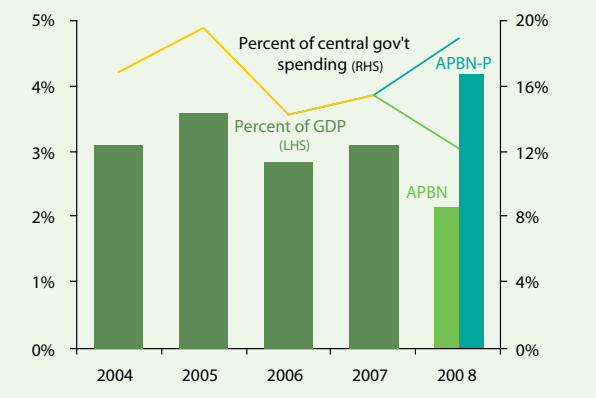
The Government temporarily scaled up its rice transfer program to protect the poor from rising commodity prices. It implemented this by providing 15 kg of subsidized rice per month to poor households for 9 months starting in February 2008.

Figure 5.13: Fuel subsidies benefit the rich more than the poor



Source: World Bank staff calculations using Susenas 2007 data.

Figure 5.14: Energy subsidies are becoming unsustainable



Source: World Bank staff calculations based on data from BPS and Ministry of Finance.

Fuel

Indonesia has the lowest fuel prices in the Asia Pacific region. [33] Indonesia is one of the few countries in the region where the Government still directly sets fuel prices. Prices are heavily subsidized. These subsidies are highly regressive, benefiting the rich to a far greater degree than the poor.

The rise in the price of crude oil price in recent years significantly increased the cost of fuel subsidies. The spike in oil prices in 2005 forced the Government to review the subsidy of fuel products. The Government made large cuts in the number of energy products subsidized and sharply increased prices of many energy products. In some cases, these increases were by more than 100 percent. However, it maintained a price subsidy for kerosene for household consumption, for low-octane automotive fuel and diesel, and for LPG for household use. It also continued to subsidize the state-owned electricity company.

The new price and subsidy scheme remained inefficient and poorly targeted. The fuel price was increased by decree, but no mechanisms to link further changes in world prices to the domestic price of fuel were introduced. As a consequence, the state budget remained vulnerable to further oil price increases. Subsidies remained regressive. About two-thirds of spending on fuel subsidies still benefited the top 20 percent of the population, while the bottom decile only received 1 percent of the direct benefits (Figure 5.13).[34]

33 For a detailed analysis of energy subsidies see Agustina et al. (2008) and the World Bank (2007b)..

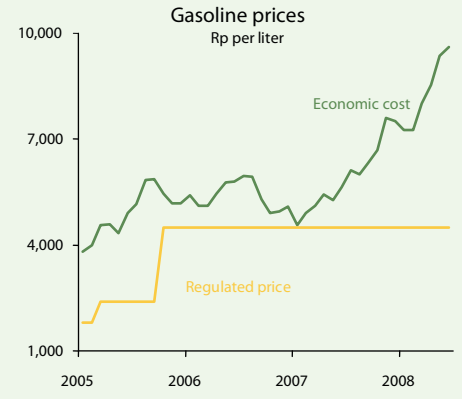
34 The Government realized this and estimated that out of the US$8 billion fuel subsidy that was initially proposed in 2008 state budget, US$5.6 billion would benefit the rich. Meanwhile, in that state budget, the Government only allocated US$7.4 billion for anti-poverty program. http://www.depsos.go.id/unduh/wawancana%20MENSOS%20vs%20RAMAKO.pdf

The 2007 spike in fuel prices put renewed pressure on the state budget. The cost of subsidies in 2008 was projected to reach US$25 billion. This exceeds the levels prior to the price adjustment in 2005. Given that the Government receives about 80 percent of the value of oil production and around 70 percent of the value of gas production, each US$10 increase in world crude prices increased government revenue by around 25 percent. However, the same increase in crude oil prices increased the cost of government subsidies of energy products by at least 81 percent, or more than US$4.4 billion. Adding in the about 30 percent higher oil-related transfers by the central Government to provincial and district governments, the 2007 increase in international oil prices from US$60 to US$90/barrel increased Indonesia's central government deficit by at least two-thirds, from 1.5 percent to around 2.15 percent of GDP (Figure 5.12). In 2008, the Government was forced to review once again its fuel subsidy program.

To relieve some of the pressure on its budget and to reassure financial markets, the Government decided to reduce fuel subsidies and use the savings to implement a very large targeted cash transfer program. After the international price of crude oil rose beyond the US$110 per barrel threshold, the Government raised regulated fuel prices by an average of 28.7 percent in late May of 2008. However, the price rise was still smaller than the increase in world fuel prices since the start of 2008. The Government continues to set fuel prices well below their economic costs (Figure 5.13) and well below price levels in the region (Figure 5.14). As a consequence, about one-fifth of the Government's spending, or about 4.5 percent of GDP, would still have to be spent on energy subsidies. However, the action freed resources that enabled the Government to re-launch an unconditional targeted cash transfer to offset rising food costs for 19 million households.

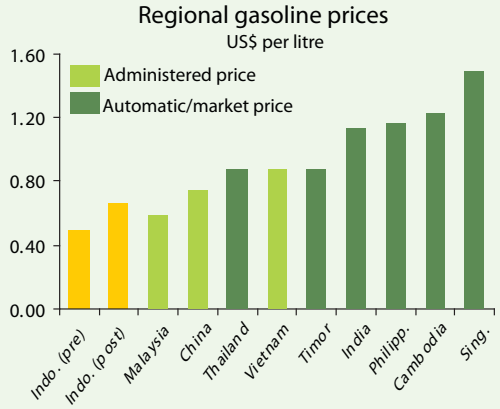
Indonesia's subsidy schemes result in the transmission of international price increases to the domestic economy in abrupt steps. Indonesia still maintains fixed prices for most fuels and for electricity. It restricts the imports of selected foods, particularly rice. Prices are allowed to change only rarely, resulting in spikes of inflation and reduced growth in the years of price adjustment. For instance, the move in 2005 to increase most fuel prices by more than 100 percent 'shocked' the economy for one year and generated an unusual pattern in Indonesia's inflation, which reached 13.1 percent in 2006. This forced the central bank to increase interest rates, which contributed to a decline in growth to 5.5 percent.

Figure 5.15: The fuel price is set below its economic cost



Source: World Bank staff calculations.

Figure 5.16: Fuel prices in Indonesia are among the lowest in the region



Source: MoF, World Bank.
Note: Pre-Indonesia refers to price prior to May 2008 and post Indonesia refers to the price after that month.

5.4 Recent international policy responses to commodity price increases and volatility

Most countries have had to face social and economic problems associated with rising food prices. Around the world, over the past decade, the price of commodities in general and food commodities in particular has been rising. Rising food and fuel prices have been reflected in higher rates of inflation. The trend towards increased prices has had a direct impact on the populations of most countries. Nearly all countries, including both developed and developing economies, have had to face social and economic problems associated with rising food prices. Responses from 56 World Bank country teams to a survey in early 2008 showed that 39 countries felt that rising prices were a major socio-political issue. In 18 countries there were incidents of social unrest or protests, and in 33 there were fears of future unrest (Figure 5.17). This situation forced many governments to implement measures to limit the impact of the price shock. For instance, Malaysia briefly rationed cooking oil and China taxed food exports when inflation reached an 11-year high.

Governments have a limited number of policy instruments with which to respond to increased food prices. These policy instruments may be intended to achieve a number of specific goals or to address a number of specific issues, including: (i) household food insecurity; (ii) improving the availability of basic foodstuffs in the short term; (iii) coping with macro-economic implications; and (iv) improving the long-term supply of basic foodstuffs and reducing volatility.

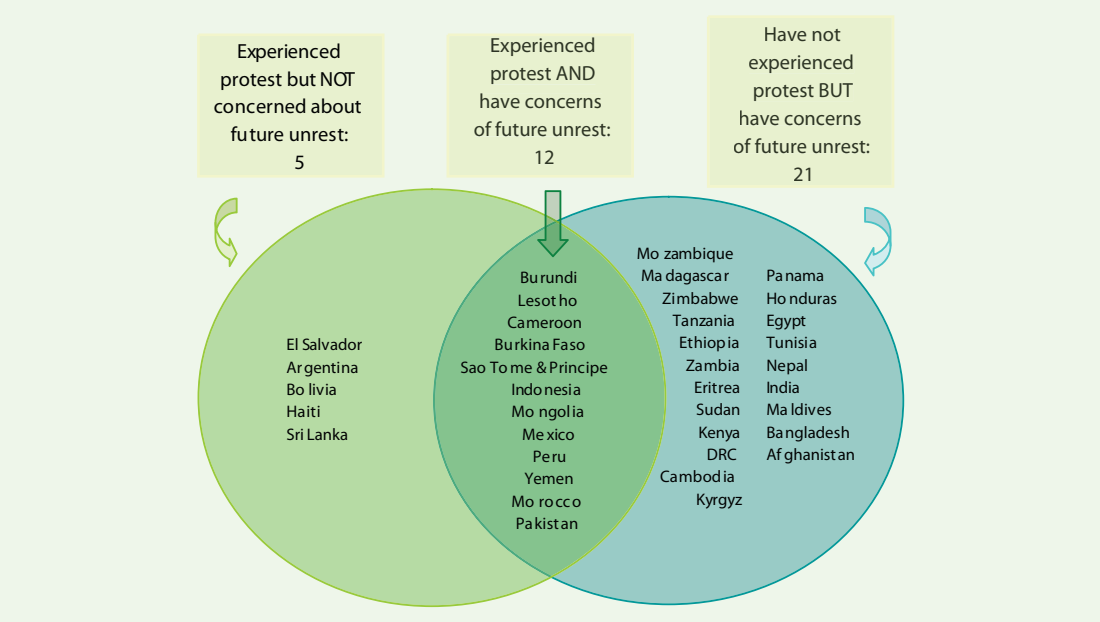
There are three main options for improving household food insecurity. The best options for managing household food insecurity include cash transfer programs (Ethiopia, Brazil); the implementation of feeding programs for vulnerable groups (for example, those conducted in Burkina Faso, Honduras, Morocco); and self-targeted public works programs (Mozambique, Cambodia). Price controls have been demonstrated to be a far less efficient policy option. Despite this, 23 out of 56 countries surveyed had implemented some form of price controls in selected products and markets. A particularly bad policy option is to force producers to sell at below cost (Mongolia and Zimbabwe), as it exacerbates the problems that the policy is supposed to tackle.

The best option to improve the availability of basic foodstuffs in the short term is to reduce grain import tariffs. In fact, many of the countries that had high import tariffs on food grains until the price surge responded by reducing them significantly. Less effective instruments include direct state intervention in the grain trade to depress prices (Yemen); import subsidies for specific grains (Saudi Arabia); and grain export restrictions (India, Argentina, Croatia, Pakistan, Vietnam, Russia, Ukraine). The export restrictions in a number of countries have led to sharp price volatility in other markets (as with the case of India and Vietnam's export bans on rice, which sparked a rice-price bubble).

External borrowing and grants can help manage the macro-economic implications of the policy instruments. Measures to address the fiscal imbalances due to the cost of new policies and the drop in revenues from trade taxes can include external borrowing and grants. Other options to contain inflation more generally include monetary tightening, fiscal tightening and other policies intended to facilitate an appreciation in the exchange rate.

There are several options for improving the long-term supply of basic foodstuffs and reducing volatility. Appropriate policy options to reduce price volatility by improving supply include shifting food trading and procurement to the private sector; developing market-based risk management instruments (Malawi, South Africa); promoting investment in agricultural support services (Brazil, Malaysia, Thailand); and investing in rural infrastructure and trade facilitation.

Figure 5.17: Country experiences and concerns of social unrest



Source: Data based on responses from 56 country teams of the World Bank. World Bank staff calculations.

The next paragraphs review in greater detail these policy options.

Measures to ensure household food security

Cash transfers: When administered appropriately, cash transfers can increase food consumption by improving the wealth of the target group. Such programs have been implemented recently in countries such as Mexico, Sri Lanka, Ethiopia, Brazil, Mozambique, South Africa and China. These programs are relatively easy to administer. They may be particularly effective in reaching their goal when the share of poor in the overall market is small and when affected groups are easily identifiable.

However, under certain circumstances cash transfers can have negative effects. First, by promoting consumption, they exacerbate price increases when the target group represents a considerable share of consumers. Second, they may become financially unsustainable if the target group is too big or if the support is not provided for a limited period only. Third, they can act as a disincentive against securing other means of income.

Targeted feeding programs: Such programs may be an effective and cost-efficient means of raising the food consumption of targeted groups such as poor consumers and children. Countries as diverse as the US, Eritrea, Mozambique, South Africa, China, Brazil, Bhutan, Maldives, and Pakistan have implemented subsidized food programs targeting poor consumers. Typically, these programs are implemented through partner institutions that reduce the bureaucratic cost of identifying beneficiaries and implementing the program. School-feeding programs have been used to effectively target children and to promote education in a number of developing countries.

Grain transfers: Grain transfers to the poor may also be effective as a means of ensuring household food security for the poor. However, these programs can be costly and can lead to inefficiencies such as the re-sale of food aid by recipients. Countries such as Bangladesh, Mozambique,

Cambodia, Ethiopia, Brazil, and Egypt have implemented direct grain transfers to the poor. These programs are most effective when large public stockpiles of grain exist or when food aid is available. Public stocks were in the past broadly available in much of South Asia and parts of Africa. However, the establishment and maintenance of public stocks has recently fallen out of favor due to their high management costs and the inability of most public administrations to time their use efficiently.

Thus, grain transfer systems have three main disadvantages. First, grain transfer programs are likely to cost more than other measures. Second, grain transfer programs may require complex administrative procedures. Third, grain transfer programs depend on food aid commitments by third parties: hence, they are vulnerable to the non-materialization of these commitments.

Selective grain/bread subsidies: These subsidies can be effective as a means of increasing the food consumption of target groups. They do not tend to create major market distortions. However, they tend to have high administrative costs, so they are now less used than in the past. They are still seen in Egypt, Morocco, Tunisia, Algeria, Jordan and Indonesia.

To be effective, these programs require the following conditions: an efficient administration able to identify the target groups; a relatively low share of poor beneficiaries; and institutional ability to operate 'low price' shops serving the target groups; a system to monitor effective rationing; and a negative or low price elasticity. The implementation of these subsidies may be hampered by undesired rent effects that result in opportunities for corruption. They may also be hampered by the high costs of implementation.

Administrative price controls: Such controls may discourage production and tend to be an inefficient means of creating food security for poor households. Countries such as China, Kazakhstan, Kyrgyzstan, Cameroon, Russia, Venezuela, Mauritius, Zimbabwe, and Mongolia place administrative price controls on certain 'strategic' staples. Administrative price controls tend to be inefficient for two main reasons. First, such controls lower prices for all consumers, regardless of need. This can result in excessive consumption or inefficient usage of the stapling in question. Second, such price controls discourage domestic production and trade, often resulting in supply shortages.

Forcible state procurement: The forcible procurement of staples by state agencies at below market prices for distribution to targeted groups is almost inevitably a bad policy option. Forcing producers to sell at below market prices affects economic freedom and individual liberties and must often be conducted through the use of repressive and coercive measures. By destroying incentives to produce, it often results in food shortages and empty markets. The implementation of such a system is infrequent, although it has been practiced recently by Zimbabwe and Mongolia.

Measures to ensure short-term grain supply

Reduced import duties: A reduction in import duties reduces the impact of increased prices on global markets in domestic markets. It can be instituted by administrative decree and be operational in a very short span of time. A reduction in import duties allows governments to absorb the spike in international prices up to the level of the initial import tax.

However, reduced import duties result in a reduction in government revenue. This option requires an analysis of its expected impact on the government budget, as import taxes are an important source of revenue for low-income countries. A shortfall in revenue may need to be financed in financial markets or by international agencies and donors. This mechanism has been implemented by many countries recently, including Morocco, Nigeria and Turkey.

Relaxed regulations and blind eye policies: Some countries choose to relax import regulations or relax the control over their implementation. This reduces domestic prices, but often at the expense of increased smuggling and reduced regulatory transparency. It creates rents and opportunities for corruption that may be difficult to eliminate later.

Export restrictions: In the very short term, restrictions on exports may be effective as a means of ensuring grain supplies in domestic markets. Restrictions may take the form of export bans, export taxes and domestic market obligations (Argentina, Croatia, India, Kazakhstan, Pakistan, Russia, Serbia, Ukraine, and Vietnam). While these instruments may reduce the domestic price of grain in the short run, they greatly disadvantage local producers. In addition they require effective institutions to monitor trade and implement regulations.

The costs of these restrictions are significant. First, if big export countries impose restrictions, they can exacerbate price increases on global markets and increase price volatility (for example, see Chapter 3, which discusses the recent rice price bubble). Second, they create an incentive for countries to invest in buffer stocks and to increase production, resulting in smaller export markets in the future. Third, they reduce incentives for domestic producers to invest and benefit from higher world prices.

Subsidies on the import of specific grains: The implementation of a system of subsidies to importers of specific grains requires effective institutions. Saudi Arabia is a grain importer that implements such a system of subsidies. This instrument may be effective when grain imports constitute a small share of trade; when subsidies can be kept variable depending on global market volatility; and when effective institutions exist to monitor trade and implement regulations quickly.

The establishment of public agencies to compete with private importers: Countries such as Bangladesh, Turkey and Yemen have established importing state agencies to compete with the private sector with the aim to push prices down. This is often an inefficient instrument that risks displacing the private sector at a considerable cost for the public budget (Box 5.1).

Box 5.1: Costs of public price stabilization by public marketing agencies

Cross-country experiences show that public-marketing agencies are inefficient and place strains on government budgets. Operational costs of those agencies tend to be higher than those of the private sector and their profitability is diminishing fast. At the same time, the operations of public-marketing agencies have been subject to political capture. The cost of the Indian Government's subsidies for buffer stocking as increased from US$160 million in 1992 to an estimated US$1.6 billion in 2002. In the Philippines, average annual losses due to interventions were estimated to be more than US$414 million in the period 1996–98.

Source: Rashid et.al (2006).

Measures to deal with macroeconomic implications

Prudent fiscal policies and controlled spending: Commodity producing countries often indulge in excessive spending when rises in commodity prices increase government revenues. Often, this spending benefits non-productive sectors of the economy and cannot be easily cut afterwards.

Stabilization funds: Stabilization funds involve the setting aside of revenue derived from the export of commodities during boom periods for use by governments when prices are lower. These funds have two main purposes. First, they smooth the impact of commodity price volatility on government revenues. Second, when denominated in foreign currency and invested abroad, they help contain national currency appreciation.

In Chile, the Copper Stabilization Fund was created to set aside a portion of the state's profit from mining operations for use in times when prices dropped. Similarly, Norway created the Norwegian State Petroleum Fund in 1996 to facilitate spending despite volatile revenues and to accumulate funds to cope with projected expenditure due to an aging population. The fund is invested abroad and domestic spending from the fund is restricted to that needed to fund the non-oil budget deficit. It is therefore spent through the budget process.

Improving the long-term supply of basic foodstuffs and reducing volatility

Market-based risk-management instruments: Market instruments can be an effective instrument to reduce price volatility and are becoming the instrument of choice. These instruments can take a number of different forms. For example, Malawi is experimenting with index-based weather insurance. South Africa has developed a regional futures market for key staples.

Market-based instruments are likely to be most effective in middle-income and high-income countries, where the financial markets are sophisticated enough and the private sector has the size and capabilities to enter into contracts. Nevertheless, as the case of Malawi shows, innovative mechanisms are now being developed to make these instruments available even to small holders in low-income countries.

Private procurement: As part of the increased reliance on private-sector mechanisms, there has been a shift in favor from public to private procurement mechanisms. Imports by the private sector have become a price stabilizing mechanism, eliminating the need for large government stocks and resulting in considerable fiscal savings for the Government. This kind of measure works best in combination with a coherent set of supporting policies, such as the elimination of restrictions on private stocks and the elimination of restrictions to access foreign exchange. It also requires an adequate market infrastructure.

Allowing higher commodity prices to be transmitted to domestic markets increases public and private investment in agricultural support services. In recent years, as a result of the loosening of price controls, countries such as Brazil, Malaysia and Thailand have seen a growth in investment aimed at increasing cereals productivity. Countries aiming to promote investment in the agriculture sector need to develop policies and create a favorable investment climate.

Subsidies to promote agricultural production: Many governments still rely on such subsidies to promote agricultural production. In Malawi, where the use of fertilizers is low, the Government has subsidized them to promote their use and thereby to increase productivity. However, subsidies have to be used cautiously. They are often expensive and may limit the Government's ability to allocate resources to other priority investments in agriculture. They may also crowd out private input supply. To work well, subsidies need to be part of a comprehensive strategy to improve agriculture productivity. To avoid wastage, they need to be transparent, well targeted, and not permanent in nature.

The elimination of protection policies: Increases in agricultural commodity prices create a window of opportunity to reform price protection policies, as the impact of the elimination

of such policies on producers will be limited, at least in the short term, while new policies are being socialized. Price protection policies in countries such as in many OECD members and India are very expensive for government budgets. They have an impact on incentives and production in world markets. Reforms are likely to be more feasible when there is confidence among producers that prices will remain high. They are also likely to be more successful when the elimination of protection is accompanied by increased investment in other producer support mechanisms, such as extension and research systems.

Strategic grain reserves: The development and maintenance of such reserves as a means to stabilize food prices is falling into disfavor. The effectiveness of strategic buffer stocks to stabilize food prices has been historically less than satisfactory. Buffer stocks have undermined private markets and have resulted in greater price and supply instability in regions such as Africa. Many countries that previously maintained such reserves are now shifting to a system of financial reserves for emergencies. This approach works best when the funds are managed by an agency with complete independence from political processes and with clear, well-defined objectives. The agencies responsible for the management of such funds must develop a set of clear, transparent rules that determine the conditions under which they will intervene in markets. They must have financial liquidity to be able to react in a timely fashion in case of an emergency that justifies their intervention.

5.5 Policy recommendations for Indonesia

This section presents the policy instruments available to policymakers to deal with spikes in commodity prices. Based on the previous analysis, this section presents the policy instruments available to policymakers in Indonesia to deal with spikes in commodity prices. A set of general policy prescriptions for countries to tackle high commodity prices is presented in Box 5.2. A set of more specific recommendations for Indonesia follows below.

Indonesia needs to establish an approach to public stabilization that is more predictable, better targeted, less costly and more effective. The recent crisis in food prices has shown how critical it is for the Government to have a framework for action. A well-established framework would provide the ground rules for the Government to methodically monitor the evolution of prices, to assess their impact in the economy, to assess available policy options through a cost-benefit analysis, and to properly implement and monitor the adopted measures.

The Government should develop a framework for action that defines the operational procedures to assess and to react to price shocks. This should involve four major components:

a. An effective price-monitoring system;
b. An assessment of the impact of changes in commodity prices in the economy;
c. An assessment of available policy options based on cost-benefit analysis; and
d. A monitoring system to track the implementation of policy responses and assess its impact so that changes can be made.

Box 5.2: Policy recommendations for countries to tackle high commodity prices

Short-term instruments

Transfers to poor households: Policymakers could use well-targeted cash and in-kind transfer measures to limit the impact on poverty of price spikes in basic products. A quickly implementable cash program in the short term would expand existing cash transfer programs and provide limited subsidies to well-targeted beneficiaries. In-kind programs include food distribution programs such as feeding programs and food-for -work programs.

Public price stabilization: Governments can mitigate the rise in prices by absorbing part of the cost by reducing import tariffs and eliminating import quotas. In cases where governments manage and have available food stocks, they can decrease domestic prices by drawing down available stocks.

Transition towards market stabilization measures: Policymakers can make use of instruments that decrease transaction costs, encourage supply and reduce prices. Such instruments include the reduction or removal of red tape transporting goods across regions and limited intervention using variable tariffs.

Medium-term instruments

Transfers to poor households: The design and implementation of appropriate and well-targeted cash transfer programs require a considerable amount of resources and time. As a consequence, when cash transfer programs cannot build on existing initiatives, they can only be a medium-term response to a price crisis.

Public price stabilization: In the medium term, policymakers can contribute to the stabilization of prices by supporting programs that promote the supply side and contribute to lower costs for producers. Initiatives of this kind include programs to improve farm productivity, to improve village infrastructure and to improve food logistic networks.

Transition towards market stabilization measures: At the same time, policymakers should encourage the development of market-based instruments that can act as price stabilizers. Measures of this kind include: the promotion of investments by the private sector in storage and warehouse receipt systems; the development of a domestic markets for forward contracts; the development of futures market and of index-based weather insurance. The public sector can support the development of these instruments by fostering an appropriate regulatory environment, and by providing direct support to overcome market failures at an initial stage. To do so, the Government should partner with the private sector and with international development organizations.

Policies to avoid

Universal subsidies: Universal subsidies should be avoided as they can become too expensive for the public budget and as they fuel inflation without contributing to an expansion in supply.

Prolonged public price stabilization: The temptation to set prices by administrative decree should be avoided. This option is ineffective as a means to stabilize prices and results in the development of parallel black markets. At the same time, it wastes critical resources that could be allocated elsewhere to monitor the implementation of the measures and prosecute those who do not act in accordance with the regulations.

Import quotas and import bans: While these measures are sometimes used to support domestic producers and to protect them from lower prices on global markets, in the long term they are inefficient. They promote the development of an uncompetitive domestic sector and put the burden of it on domestic consumers who will be forced to pay higher prices for those products.

Price-monitoring system

In order to understand the magnitude of domestic price fluctuations and to take appropriate measures to manage these fluctuations, it is vital to have a good system of data collection and analysis. In order to improve its statistical capacity, systems must be developed to facilitate better data-sharing between ministries, standardization of databases, and improvements in data quality. Price information, particularly the prices of food commodities on domestic markets, should also be made available to the general public through the media, as it was done in the past, to facilitate market integration and to promote greater price stabilization across the country.

Impact on the economy of changes in commodity prices

In order to be able to design appropriate policy responses, policymakers need to have a clear understanding of the impact of prices on the economy and on the population. Policymakers need to be able to determine the impact of increased prices, whether positive or negative, on different segments of the population. In rural areas in Indonesia, the majority of households are net food buyers, with only a minority of wealthier households consisting of net food sellers. The poor are overwhelmingly net food purchasers. They suffer disproportionately from increased food prices. Among producers, the impacts of low food prices are at least partially offset by prices and output being negatively correlated.

It is not always appropriate to implement stabilization measures. Stabilization makes sense if the price increases are due to temporary shocks. However, they are harder to justify if the price increases are due to structural factors. When structural increases occur, stabilization measures made need to be implemented indefinitely, which could prove extremely costly.

At the same time, it is vital that the government establish clearly defined criteria that determine when stabilization measures will be implemented. If these criteria are clearly defined, governments will be better able to manage pressures from lobby groups and citizens. In practical terms, however, it is often difficult to distinguish when price changes are due to a short-term shock and when they are due to a longer-term structural change. Often, the distinction only becomes apparent with the benefit of hindsight. For this reason, it is best to have a target or trigger price that automatically adjusts towards the international market price at any particular time, rather than a permanently fixed target.

Cost-benefit analysis of available policy options

It is necessary to determine which policy interventions are feasible and make sense from an economic point of view. Thus, policymakers need to have the appropriate instruments to conduct good cost-benefit analysis to determine which prices of which commodities they should be involved in stabilizing and in defining the target population of eventual support schemes.

Having the tools by which to make good cost-benefit analysis also reduces the uncertainty that ad-hoc interventions bring to the market. This promotes a greater role for the private sector in stocking and price stabilization. The selection of beneficiaries can be based on economic criteria (targeting individuals that are particularly vulnerable to price volatility) or political criteria (stabilization is performed to transfer income from one group to another or to the Government).

When programs to achieve the stabilization of prices are prematurely announced, prior to their implementation, this often results in actions that have negative results and mitigate against the intended impact of the policy. For example, when the Government prematurely announced its intention to increase the palm oil tax, producers rushed to increase their exports prior to the implementation of this tax. Thus, government agencies must avoid fuelling speculation by announcing the details of such plans, unless prior socialization is an integral part of the programming question.

Policy monitoring and reaction system

Policies and programs intended to achieve the stabilization of prices should be retained only if they are effective. Not only is it essential to conduct a thorough analysis of options and expected costs and benefits before the implementation of such programs, it is vital to implement a system to monitor their impact after they have been implemented. Policies should be implemented in such a manner that it is possible to review and reverse or revise them if they are found not to have the desired effects.

In the past, Indonesia relied entirely on public price stabilization mechanism. Indonesia would benefit from allowing market-based price stabilization to operate while continuing to develop infrastructure for targeted intervention to protect the poor. Instead of attempting to control equilibrium market prices, Indonesia could rely more on market-based instruments to stabilize prices and implement measures to soften the impact on those most affected by price changes. Targeted cash transfers and limited in-kind distribution programs create few market distortions and do not reduce incentives for food producers.

A comprehensive program involving both targeted intervention to protect the poor and market-based price stabilization mechanisms could involve the following elements:

Improved social safety net programs: Indonesia could most effectively help the poorest households deal with high commodity prices by strengthening its social safety net program. Targeted cash transfers to vulnerable groups are the best way to support the poor to cope with high increases in commodity prices. The most efficient instrument to help poor households to cope with these increases is to improve the targeting of cash and in-kind transfer programs. These cash and in-kind transfer programs should be combined with existing public programs that provide grants for communities for education and health purposes.

Smart use of trade policies and import regulations: **Indonesia should examine its trade policies and import regulations to ensure that these are consistent with the achievement of price stabilization**. If well planned and implemented, reductions in import duties and a relaxation of import regulations can help importers to cope with spikes in the prices of imported products.

Improved infrastructure: Improved infrastructure would help stabilize prices across regions. The poor condition of infrastructure such as ports, roads, distribution network, storage facilities, and transport vehicles enhances price volatility between markets in different provinces. In Indonesia, transport and logistics costs represent a considerably higher sum than the 9 percent benchmark of OECD countries. Improvements in customs facilitation, logistics performance, and grain storage efficiency can have significant benefits for consumers, while at the same time generating a favorable

supply response. Market instruments such as private storage and warehouse receipt require significant physical investment and regulatory infrastructure. A policy that provides incentives for investment in private storaging across the regions could help private trade respond quickly to stabilize prices across regions.

Improved legal systems and information networks, standards, and certifications: **In addition, the Government should continue to improve legal systems and an infrastructure of information networks, standards, and certifications**. Such systems and infrastructure are an essential prerequisite for warehouse receipts, weather-based insurances and similar instruments that can reduce investment risk. The development of instruments to help small producers of commodities to mitigate risk, such as warehouse receipts and agriculture insurance, requires clear regulation and credible enforcement mechanism. The Government must strengthen the capacity of regulatory institutions such as the Commodity Futures Trading Regulatory Agency or (Bappebti) and coordinate all relevant agencies, including the Ministry of Agriculture, the Ministry of SME, the Ministry of Trade, the Ministry of State-Owned Enterprises, and Bank Indonesia. Private investment in these instruments requires credit enhancement and a reliable public information system to support their activities.

Reduce or eliminate trade restrictions: The existing restrictions on the trade in rice have not decreased price volatility. Indeed, they have resulted in domestic prices that are on average considerably higher than world prices. This system hurts consumers and prevents producers from becoming internationally competitive. Indonesia should consider abolishing these restrictions and replacing them with more effective measures to support producers and consumers. Such measures include direct support to rice producers through improvements of infrastructure, irrigation and extension services and temporary cash transfers for the poor at times of rice price spikes.

Linking fuel subsidies to international prices: Indonesia could consider abolishing fuel subsidies as they are not pro-poor. If Indonesia continues to provide fuel subsidies, it would be in its best interest to link the level of the subsidy to international prices of crude oil. In terms of costs and benefits, fuel subsidies as they are currently implemented are not the most effective or efficient means of assisting poor producers or poor households. The ballooning cost of fuel subsidies prevents the Government from investing oil and gas revenues in social programs and infrastructure projects that would lift Indonesia's long-term growth potential. Maintaining huge fuel subsidies also creates uncertainty about the size of the Government's budget deficit and financing needs, which increases the price Indonesia has to pay to raise external financing in the international financial markets. Linking fuel subsidies to the international price of crude oil and setting a maximum limit could reduce the negative impact of successive oil price increases on the Government's budget and reduce the cost of its debt.

Prudent fiscal management: Indonesia must continue to implement a policy of prudent fiscal management in order to minimize shocks in macroeconomic parameters caused by the fluctuating price of its export commodities. In particular, even when commodity prices are high, central and regional governments must be prepared for subsequent declines in prices and ensure that spending does not increase above sustainable levels in hard-to-reverse areas such as public wages. Rather, and income flux in boom times should be saved to enable expenditure during times of lower prices. Alternatively, this income flux should be channeled to support future growth in non-commodity sectors through investments in education, health, and infrastructure. To ensure that commodity boom benefits are fully captured, Indonesia must strengthen the transparency of the awards of contracts and concessions and of public finances at the national and regional level.

Development of a 'risk management' perspective: In order to cope with volatility in market prices, national and regional governments need to include information about prices and volatility in their fiscal planning and budgetary process. At the same time, governments should pursue diversification strategies to reduce vulnerability to commodity price shocks.

Price stabilization instruments for smallholders: The effects of high price volatility on poor farmers with small holdings can be devastating. Direct government intervention to protect poor farmers is costly and most often fails to produce the results required. Typical instruments such as carrying buffer stocks are difficult to manage and costly. The benefits of subsidies are often easily captured by parties other than the intended beneficiaries.

Smallholders in developing countries have little access to market instruments. More recently, new and innovative formulas are allowing the extension of the benefits of market instruments to small farmers. This is achieved by pooling risk from many small producers and hedging them in international markets. One example is the advent of index-based weather insurance. These schemes provide for a new means of underwriting, and transferring weather risk to the market. Such measures are currently being scaled up through private initiatives in India and elsewhere. Indonesia could work in partnership with international financial institutions and the private sector to identify feasible instruments and institutional arrangements in this area.

Chapter 6

Indonesia's Growth and Exports Trends: Macro and Sectoral Perspective

Abstract: *This chapter reviews Indonesia's economic growth and export trends to determine the sectoral composition that would allow Indonesia to achieve high, broad-based growth in the context of high global commodity prices. The most striking feature of Indonesian growth in the past four decades is that it has not been labor intensive. Hence, while it is more likely that the future engines of output growth will be the manufacturing and service sectors, the evolution of the agricultural sector, where most of the labor force is employed, remains crucial in the short run. Tapping into the potential of the mining sector at a time of high commodity prices can generate the necessary resources to revamp the agricultural sector and help it move towards the production of higher value-added crops. In the long run, for high growth rates to be achieved, investing to promote skills, innovation and preparing workers to move into and participate in the modern sectors of the economy should be a priority. Another priority should be facilitating the development of a more conducive business environment and attracting foreign direct investment (FDI).*

6.1 Introduction

This chapter analyzes Indonesia's long-term economic dynamics from macro and trade perspectives. It is structured as follows. Section 6.1, this section, defines the questions explored by this paper and describes its organization. Section 6.2 examines Indonesia's long-term macro economic trends to determine the main driving engines of growth. Section 6.3 describes sub-national growth trends, identifying growth imbalances between regions in the 2000s. Section 6.4 reviews the long-term trends affecting Indonesia's exports and their relationship with growth. It then focuses on the performance of export orientated sectors during the past decade. Section 6.5 reviews the main causes of Indonesia's relatively poor performance in terms of achieving a diversification of its exports. Section 6.6 examines the implications of the findings of the previous sections for trade development strategy.

6.2 Indonesia's growth: Long-term macro trends and engines of growth

Over the past four decades, Indonesia has achieved sustained growth in GDP, with the important exception of the period following the 1997 crisis. After the crisis, in the period from 2000 to 2007, the average annual rate of growth in GDP per capita was 3.7 percent. This is lower than in the period prior to the crisis: in the period from 1985 to 1996, the average rate was 5.3 percent. Despite the lower growth rate, there has been a steady recovery in the nation's economy since the crisis (Figure 6.1 and Figure 6.2). Nevertheless, with the current global financial crisis, it remains to be seen whether Indonesia can continue to maintain sustained growth.

Over the years, Indonesia has experienced a structural transformation, with a steady decline in the proportion of growth driven by the primary sector. Rather, the steady growth in GDP per capita has been largely driven by a sustained expansion of the manufacturing and services sectors. During the period from 1970 to 2006, the primary sector was relatively stagnant, while the services and manufacturing sectors expanded steadily (Figure 6.3). However, since the 1997 crisis, the rate of growth of the manufacturing sector has declined, while the services sector has continued to expand.

Figure 6.1: Indonesia's GDP per capita

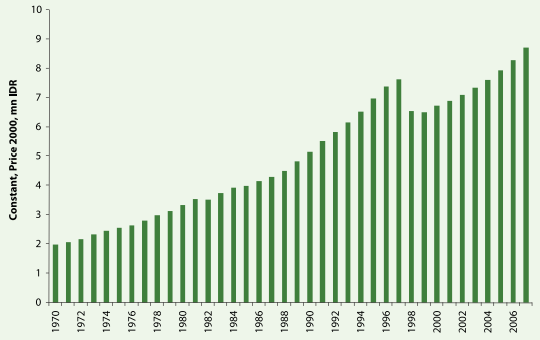
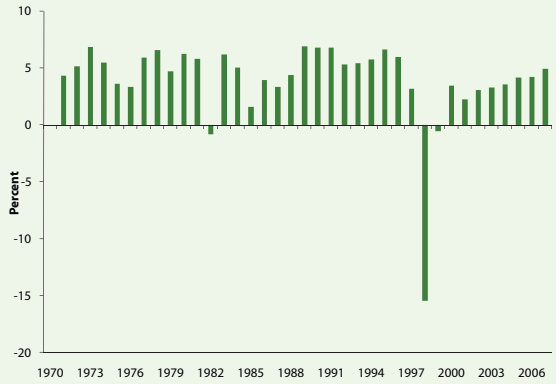
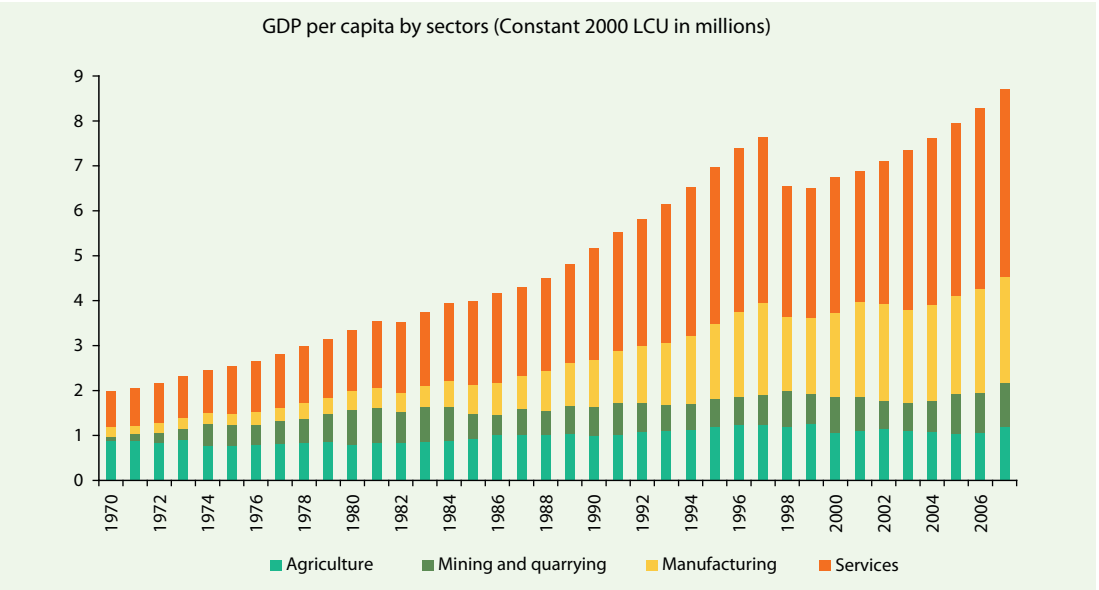


Figure 6.2: Indonesia's annual GDP per capita growth



Source: World Development Indicators.

Figure 6.3: Indonesia's growth in the past quarter century has come primarily from manufacturing and services



Source: World Bank staff calculations based on data from World Development Indicators.

The engines of Indonesia's output growth over the past three and a half decades have been manufacturing and services, not primary production. A growth decomposition exercise shows that the contribution of agriculture to the growth in GDP in the period from 1970 to 2007 was minimal. The contribution of agriculture to growth was significant only during the 1980s, while the contribution of mining and gas to growth was minimal, except during the spike in oil prices in the 1970s, when Indonesia benefited from massive windfall oil revenues (Figure 6.4). However, during the boom in commodity prices during this decade, the contribution of mining to GDP per capita growth remained small.

In contrast, the contributions of the manufacturing and services sector to the rate of growth in GDP have continued to be significant over the years. The services sector expanded dramatically in the 1980s, when it was stimulated by the rapid expansion of private and commercials services and the shift away from state-led economic development. Indeed, in the second half of the 1980s, Indonesia initiated a number of deregulation packages that were intended to facilitate the development of the market economy by boosting competition and unleashing market dynamism. In the subsequent years up until 1997, manufacturing took the lead as the engine of output growth. This growth was driven by the global demand for Indonesia's labor intensive products and by strong domestic demand. After the crisis, however, the decline in the importance of the manufacturing sector's contribution to growth in GDP has been the result of both supply-side constraints and a business investment climate that has not supported this sector's expansion.

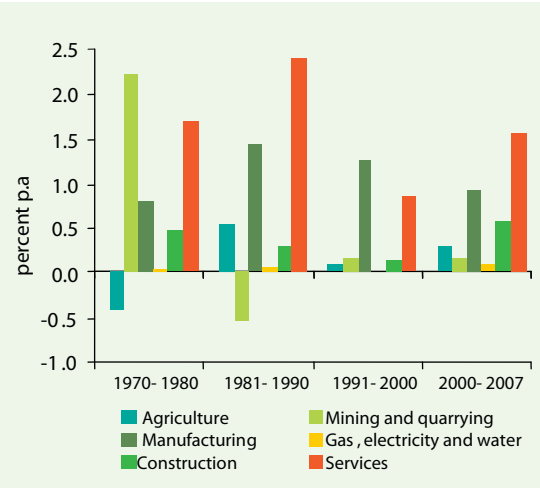
While the primary sector in Indonesia remains extremely labor intensive, it has not been the main driver of growth in labor income growth.[35] Rather, the services sector has always been the most significant driver of growth in labor income, although the contributions of the primary and manufacturing sectors have not been insignificant (Figure 6.5). Since the significance of the primary sector's role in job creation has always been closely related to the sector's growth performance, it has driven growth in labor income to a greater degree than the manufacturing sector during the periods of sustained development in agricultural output growth, mainly in the 1980s and 2000s. By contrast, growth in the manufacturing sector's output has not been associated with a higher rate of growth in labor income. Given this, facilitating growth in the output of the agricultural sector and implementing measures to increase the rate of absorption of labor in the more dynamic manufacturing sector are both vital to increasing labor income and thereby reducing poverty.

The agricultural sector made its most significant contribution to growth in labor income during the boom in productivity in the 1980s and in the post-East Asian crisis period. The period when the agricultural sector made its most significant contribution to growth in labor income was during the boom in agricultural productivity during the 1980s and in the post-Asian crisis period, when the manufacturing sector experienced a slow rate of growth and the price of agricultural commodities increased. In the 1980s, during the so-called 'Green Revolution', the increase in productivity was largely the result of a high level of government investment in agricultural infrastructure and services. By contrast, during the 2000s, the significance of the agricultural sector was not due to a rapid expansion in output driven by rapid technological change and investment. Rather, during these years, the agricultural sector's contribution to labor income growth mostly resulted from the influx of labor from other sectors that were experiencing a contraction in output and a lower rate of growth, most notably the manufacturing and trade sectors.

Over the past four decades, the capital labor-ratio has improved steadily. In the period following the 1997 crisis, in the 2000s, long-term patterns were reversed, with the labor intensity of the agricultural sector increasing, that of the services sector declining, and the rate of growth in the level of labor intensity of the manufacturing sector declining in comparison to the rate in the previous decade during the 1990s. However, the increase in the proportion of labor employed in the manufacturing and services sector in the period from the 1970s to the 2000s shows that there has been a long-term decline in the significance of the agriculture sector in terms of the proportion of labor it absorbs (Figure 6.6). Over the long term, it appears that the manufacturing and services sectors ability to absorb labor has improved. A shift in patterns of employment towards the sectors that represent the principal engines of growth implies that growth has had some positive effect on levels of employment, but this effect has remained below what would have been optimal.

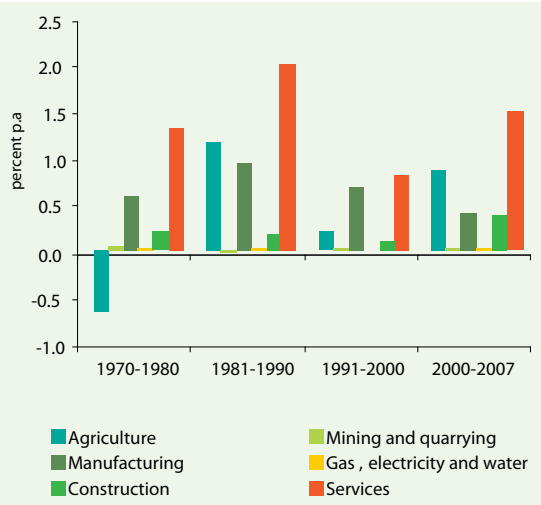
35 Labor Income Growth is defined as output growth weighted by labor intensity in the respective sector.

Figure 6.4: Contribution to GDP growth by sector-- weighted by sector's share in value-added



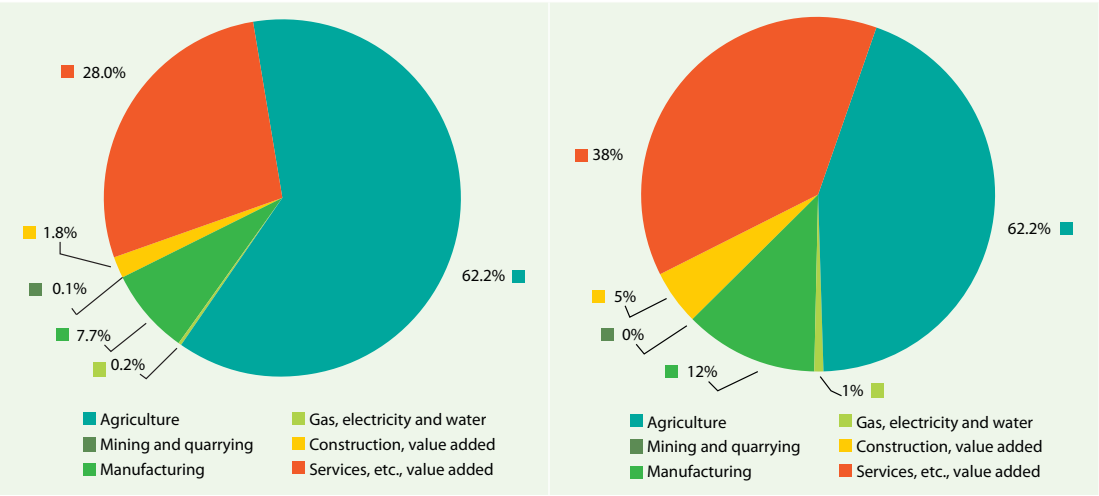
Source: World Development Indicators and World Bank staff calculations.

Figure 6.5: Contribution to labor income growth by sector (weighted by sector's labor intensity)



Source: World Bank staff calculations.

Figure 6.6: Labor intensity by sector



Source: World Bank staff calculations.

The striking feature of Indonesia's economic growth is that it has not been highly labor intensive. In other words, the growth in output of the most dynamic sectors has not generated a correspondingly high level of growth in labor income. Over the decades, there has been an increase in levels of labor productivity that has raised wage levels in the two most dynamic sectors, the manufacturing and services sectors. This increase in wages has attracted labor away from agriculture as the wage equalization effect across sectors kicked in. However, given the rates of increase in productivity and wage levels, these sectors have not absorbed labor to a level in proportion with their output growth. In other words, labor income growth has been lower than output growth, which

Figure 6.7: GDP per capita growth and labor intensity premium

Source: World Bank staff calculations based on data from World Development Indicators.

has resulted in a negative labor intensity premium.[36] As the manufacturing and services sectors have been the most significant drivers of economic growth over the decades and as these sectors are characterized by a negative labor intensity premium, Indonesia's overall growth is characterized by a negative labor intensity premium.[37]

Figure 6.7 shows how GDP per capita has been accompanied by a negative labor intensity premium in each one of four defined periods. This negative growth in labor intensity has had a corresponding negative effect on the potentially positive impact of growth in employment and reduced the impact of this growth on poverty reduction.[38]

There are various possible explanations for the failure of the manufacturing and services sector to create sufficient employment. First, a number of distorting factors favor lagging sectors. For example, liberalization and deregulation in 1980s and 1990s enhanced the competitiveness of traded goods sectors, but did not have much positive impact on non-traded goods sectors. In fact, while traded good sectors have been required to compete with external markets, the non-traded goods sectors[39] have not been similarly affected, mainly due to various protection schemes and a distorting industrial policy that favors politically connected interest business groups. Furthermore, particularly during the late 1980s and early 1990s, there was strong political pressure for the government to promote high technology capital-intensive manufacturing industries. As a result, a number of policies aimed at protecting and subsidizing those sectors were implemented.

Second, a number of factors have had a negative impact on labor mobility across regions and sectors. The dynamic sectors are heavily concentrated in a small region of Java. This has created

36 Labor intensity premium is defined as the difference between the sector's labor income and output growth.

37 Total Labor Intensity Premium Growth is defined as the sum of labor income growth minus output growth in each sector, or the total of each sector's labor intensity premium. A positive Total Labor Intensity Premium refers to labor intensive growth, as the output growth generates higher labor income growth.

38 Our analysis follows Loayza and Raddatz (2007), who use the following equation to decompose poverty change as a function of total growth (first term) with a premium if growth is labor intensive (second term).

39 Non-traded good sectors are mostly domestic services, e.g. construction, telecom, transportation, etc.

problems of infrastructure congestion that have eventually hampered the expansion of these sectors. In recent years, infrastructure bottlenecks have been identified as major obstacles in the path of improving the competitiveness of sectors in the most concentrated manufacturing regions of Greater Jakarta and West Java. In terms of labor mobility across sectors, it appears there are limitations in terms of labor force skills and education which hamper the movement of labor into more skilled intensive and dynamic sectors.

Third, slow output growth in manufacturing has hampered this sector from absorbing labor. In the period from 1999 to 2003, following the crisis, the slow rate of output growth of the manufacturing sector has hampered the capacity of this sector to absorb labor.

Fourth, wage increases resulting from administrative regulations governing the services sector have been responsible for hindering this sector from generating labor intensive growth (World Bank, 2010a). The wage increase in the services sector during the period from 1999 to 2003, driven by the rise in real minimum wages, has compounded problems related to the excessive regulation of the labor market and hampered the capacity of the services sector to generate sustained labor intensive growth.

Despite these obstacles, over the past four decades, GDP per capita's premium for labor intensity has been gradually improving. Figure 6.7 suggests that output growth in the manufacturing and services sectors has increasingly generated jobs and income. At the same time, output growth in the agricultural sector has maintained support for labor income in that sector. As a result, there has been an improvement in growth of the labor intensity premium over these four decades.

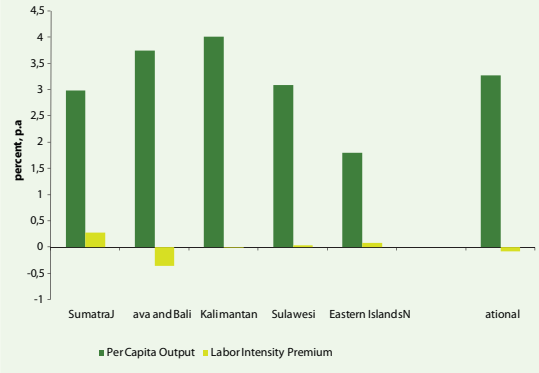
In general, at the national level, Indonesia's past patterns of economic growth provide insights into the most likely drivers of future growth. At the same time, they also provide warnings of the risks of following a similar growth pattern in the coming years. The agricultural sector's contribution to growth, even during the Green Revolution, was modest. It is thus more likely that future growth will be driven by the manufacturing and services sector. Nevertheless, for future growth to be more labor intensive and inclusive than in the past, these sectors need to be able to absorb more low skilled labor and to generate growth in rates of employment. This could be achieved in a number of ways, from improving the existing skills of workers to facilitating greater mobility towards more dynamic sectors by improving labor regulations and other means. In the meantime, to sustain labor income growth during this transition, greater improvements will be needed also in the agricultural sector. Finally, the experience of the 1970s also suggests that if mining were to experience another boom, this would be reflected in an overall output growth but would have minimal impact on labor incomes, due to its low level of labor intensity.

6.3 Sub-national growth

This section describes sub-national growth trends, identifying growth imbalances between regions in the 2000s. After the massive decentralization programs of 2001, it has become particularly vital to understand sub-national growth trends, as policies influencing growth in Indonesia are increasingly defined at the sub-national level.

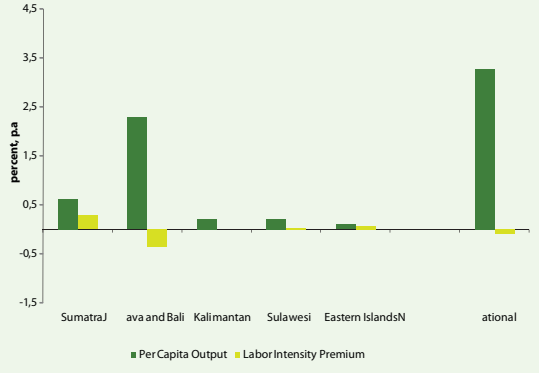
At the sub-national level, there has been remarkable growth in the most densely populated regions of Indonesia since the end of crisis of the late 1990s. The growth in output per capita in Java, Bali and Kalimantan has been above the national level (Figure 6.8 and Figure 6.9). Adjusted for population, the regional growth of Java and Bali stand out as the largest contributor to national

Figure 6.8: Regional growth per capita and labor intensity premium, 2001-05 --simple rates



Source: World Bank staff calculations.

Figure 6.9: Regional growth per capita and labor intensity premium, 2001-05--population 2001-adjusted rate



Source: World Bank staff calculations.

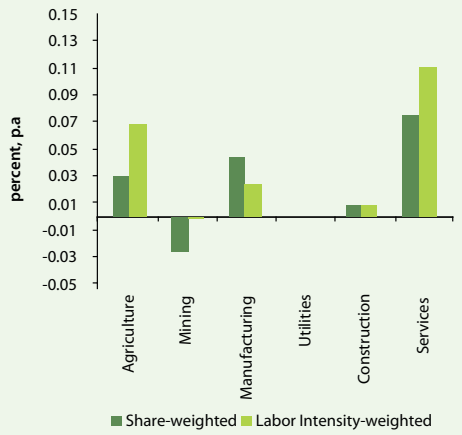
growth, generating almost two-thirds of the growth in national output. As a result of this growth, unmatched by that in other regions, particularly in eastern Indonesia, imbalances in rates of regional growth have persisted to the present.

In contrast to Java and Bali, all other regions have had growth that carries a premium for labor intensity (Figure 6.8 and Figure 6.9). However, since Java and Bali dominate the national economy, the negative rate of growth in labor premium in these regions has resulted in corresponding negative rates of growth at the national level. Furthermore, as activities related to the services and manufacturing sectors are also concentrated in these regions, this suggests that the failure of the manufacturing and services sectors to optimally absorb labor from the agriculture sector, which is likely to be close to its maximum capacity and productivity in Java and Bali, is largely responsible for the national's negative labor premium growth.

A decomposition of the growth per capita by region shows that output growth across sectors is more balanced in more populated regions. Figures 6.10 to 6.14 show a decomposition of growth in output by sector in different regions. These figures confirm that the economies of Java, Bali and Sumatra have experienced a strong pattern of structural transformation characterized by a decline in the importance of the primary sectors. In these regions, the services sector is characterized by the highest rate of growth in output, followed by the manufacturing and agricultural sectors. In addition, Java, Bali and Sumatra have been by far the largest contributors to each sector's national growth, except in the mining sectors.

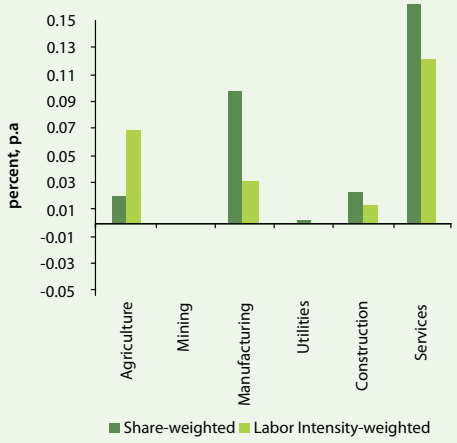
As the largest contributor to national growth, the output growth in Java and Bali has generated positive labor income. Nonetheless, this positive labor income growth has lagged behind with respect to the output growth, except in the agricultural sector. Growth decomposition by sector in Java and Bali shows that the lag of labor income growth is particularly apparent in the manufacturing and services sectors. On the other hand, it appears that in Java and Bali, agriculture's labor income growth is significantly higher than output growth. This is a noteworthy fact, given that the highest proportion of the population is still employed in this sector.

Figure 6.10 : Sumatra growth per capita 2001-05 -- population 2001 adjusted rates



Source: World Bank staff calculations.

Figure 6.11: Java Bali growth per capita 2001-05 -- population 2001 adjusted rates

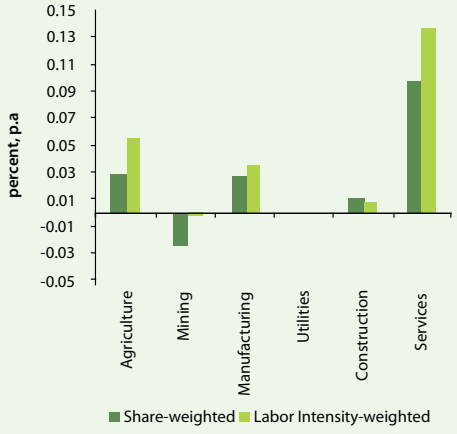


Source: World Bank staff calculations.

Figure 6.12: Kalimantan growth per capita 2001-05 --population 2001 adjusted rates

Source: World Bank staff calculations.

Figure 6.13: Sulawesi growth per capita 2001-05--population 2001-adjusted rates



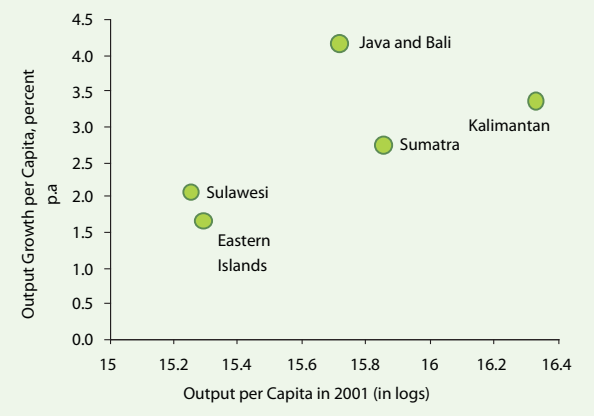
Source: World Bank staff calculations.

Figure 6.14: Eastern growth per capita 2001-05---- population 2001-adjusted rates

Source: World Bank staff calculations.

In addition, there is a pattern of growth specialization across regions. While the services sector has always recorded the highest rate of growth in all regions, regional growth figures by sector show different leading sectors in each region. This indicates a high degree of regional specialization, with growth in the economies of Java and Bali being driven to a far more significant degree by the manufacturing sectors; the economy of Kalimantan being driven mainly by the mining sectors, particularly by activities related to oil, gas and mining in East Kalimantan; and the economy of Sumatra by the agricultural sector, particularly by the palm oil sector, with palm oil being Indonesia's most dynamic non-food agricultural commodity.

Figure 6.15: Growth and output's initial levels per region, 2001-05



Source: World Bank staff calculations.

At the regional level, there is no evidence for absolute convergence. In the period from 2001 to 2005, rich regions tended to grow faster than poorer regions. However, this growth was fuelled by varying drivers of growth (Figure 6.15). In Java and Bali, growth has been driven mostly by the manufacturing and services sectors. By contrast, in Sumatra and Kalimantan, growth has been driven more by external factors, particularly the increase in the market value of export oriented commodities such as palm oil, oil and natural gas. Growth driven by such external factors may not be sustainable, as while global commodity prices have on average risen significantly over the past decade, it is far from certain that these patterns will continue into the future. This is demonstrated, for example, by the significant drop in global demand for energy as a result of the recent global economic recession. In addition, the absence of inter-regional convergence may exclude the poorer provinces in Sulawesi and the eastern islands from benefiting from overall national growth. Thus, it may result in an increase in the regional imbalances over the time.

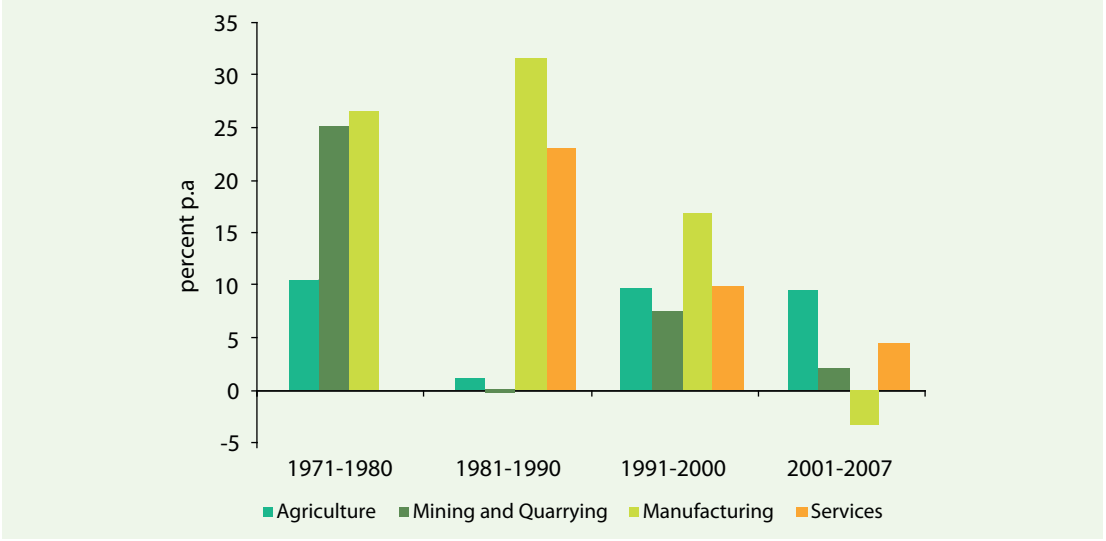
In sum, economic growth in Indonesia has been characterized by the persistence of significant regional imbalances. By far, Java and Bali, have produced the largest share of growth given their large population and dynamic sectors performance; but the labor income growth in these dynamic sectors has lagged behind output growth. Furthermore, since infrastructure congestion and over-concentration of manufacturing and services activities in Java might prevent the output growth from generating the needed labor income, it is important to develop and diversify geographical location of dynamic sectors outside Java. As Indonesia's decentralization and regional autonomy implementation in 2001 implies that a large part of growth policy will be made at the regional level, it is crucial to ensure that sub-national policy-making supports the promotion of dynamic sectors in the regions.

6.4 Export performance and its drivers

International trade is a key driver of Indonesian economic growth. This section reviews the long-term trends affecting Indonesia's exports and their relationship with growth. It then focuses on the performance of export orientated sectors during the last decade.

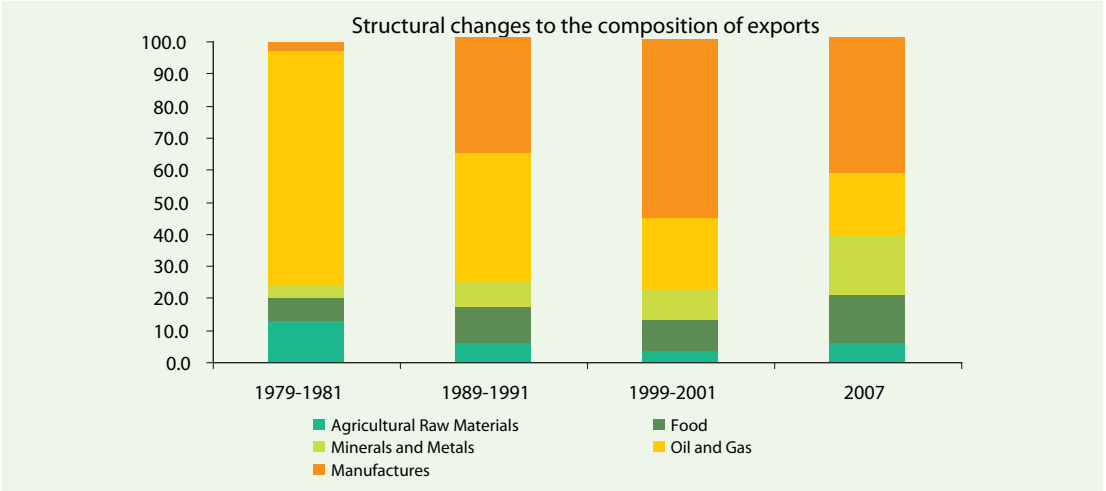
From the mid-1970s to the mid-1990s, Indonesia very successfully diversified its export structure, moving away from a concentration on primary commodities towards manufacturing and services. However, this trend has changed since the 1997-98 East Asian crisis. As shown in Figure 6.16, the dramatic international oil price increases during the 1970s fuelled a mining and oil boom that boosted exports, providing Indonesia with a massive windfall revenue. As the oil boom receded, Indonesia successfully diversified its exports towards non-oil commodities. As a result, starting in the 1980s but even more significantly in the 1990s, the manufacturing sector dominated exports (Figure 6.17). However, since the East Asian crisis, manufacturing exports have experienced a sharp decline in growth, while mining and agriculture have regained some of their status as drivers of export growth.

Figure 6.16: Export growth by sector



Source: World Bank staff calculations using Comtrade.

Figure 6.17: Exports composition – long term changes



Source: World Bank staff calculations using Comtrade.
Note: Agricultural raw materials comprise SITC section 2 (crude materials except fuels) excluding divisions 22, 27 (crude fertilizers and minerals excluding coal, petroleum, and precious stones), and 28 (metalliferous ores and scrap).

Since the 1997-98 East Asian crisis, the performance of Indonesia's manufacturing sector in global markets has been disappointing, both in absolute terms and relative to GDP. Figure 6.18 shows the total volume of manufacturing exports, indexed at 2000, for various East Asian countries. This figure clearly demonstrates how Indonesia has been lagging behind its regional competitors. Similarly, Figure 6.19 shows that the proportion of GDP generated by manufacturing exports is among the worst in East Asia.

Figure 6.18: Manufacturing export growth

Source: World Bank staff calculations using Comtrade.

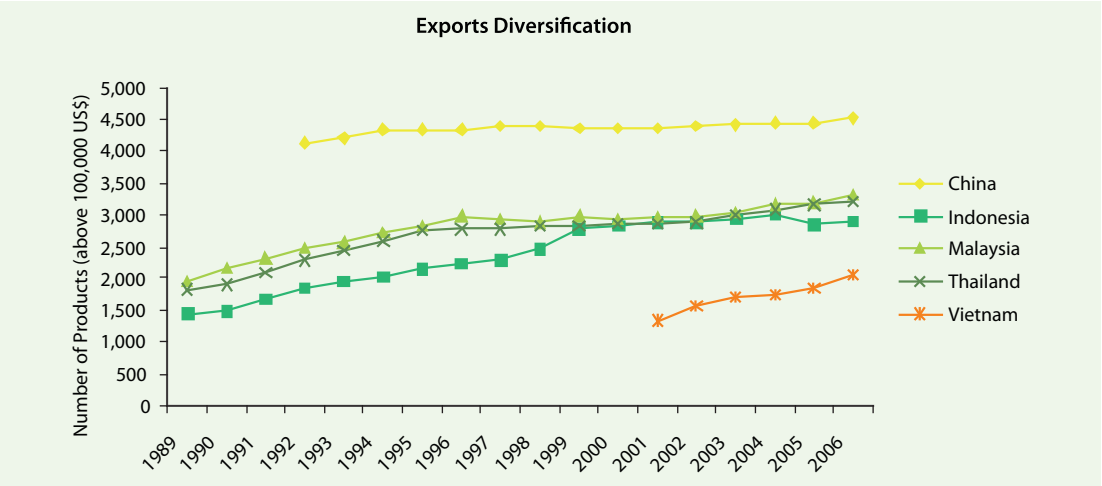
Figure 6.19: Manufacturing export intensity growth

Source: World Bank staff calculations using Comtrade.

A similarly disappointing picture emerges if we focus on overall export diversification. Figure 6.20 shows that Indonesia's performance in terms of diversification of its exports[40] during the 1990s was in line with that of other countries in the region. After the 1997-98 East Asian crisis, the process of export diversification slowed down substantially. Since then, the gap between Indonesia and the

40 Export diversification is here proxied by the number of products exported taking into account only those products for which export flows are above US$ 100,000.

Figure 6.20: Number of exported products – Only trade flows larger than US$100,000



Source: World Bank staff calculations using Comtrade.

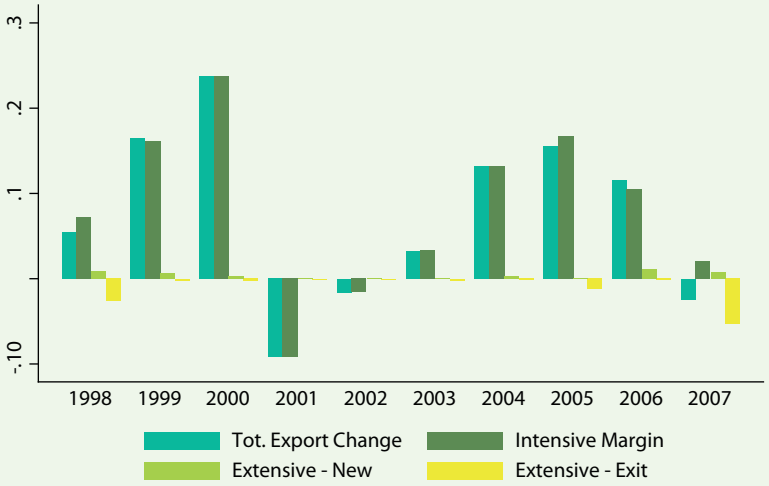
number of other East Asian countries has increased. Confirming this, the growth in the number of products exported from Indonesia during the period from 2001 to 2006 was a mere 0.4 percent, compared with the figures for Thailand and Malaysia, which were above 12 percent.

Since the late 1990s, growth in Indonesia's exports has been mainly driven by the expansion in the volume of trade of established exports, rather than through the introduction of new manufactured goods. During the period from 1998 to 2007, the expansion of 'intensive margin' products (existing products) dominated over the expansion of 'extensive margin' (new products) in accounting for total export growth, as shown in Figure 6.21.[41] Furthermore, a key part of this 'intensive margin growth has been driven by price increases rather than increases in exported volumes. For instance, four-fifths of the growth in Indonesia's commodity exports in the period from 2005 to 2007 is the result of price increases rather than the result of an increased volume of exports. Indonesia's limited progress in diversifying its exports since 1997 is demonstrated by Table 6.1. This table shows that new and undeveloped products that did not make a significant contribution to the total value of exports 10 years ago remain insignificant today.

The lack of diversification in the range of Indonesia's export products is disappointing, particularly considering that many other countries in the region and other countries having a similar export basket in the past have managed to achieve diversification much more successfully. Of course, diversification is not an end in itself. It is conceivable that the value of exports per capita could increase merely by exporting a greater volume of the same product. However, recent research by Hausmann et al. (2007) suggests that the growth potential of a particular export basket depends on its composition and specifically on its degree of "sophistication" (Figure 6.22). In other words, they argue that the particular products exported by a country have strong implications for its patterns of growth. In line with this argument, a comparison of Indonesia with its neighbors shows that while the implicit productivity level of its export basket has increased over the last 15 years, it is still lower than that of any of its neighbors, except Vietnam (Figure 6.23). Similarly, a comparison

41 "Intensive margin" can be defined as the volume of existing exported products. "Extensive margin" can be defined as the number of exported products. Expanding the intensive margin implies expanding the volume of currently exported products, while expanding the extensive margin implies increasing the number of exported products (i.e. introducing new exported products).

Figure 6.21: Old stuff still dominates export growth



Source: Data from BPS and World Bank staff calculations.

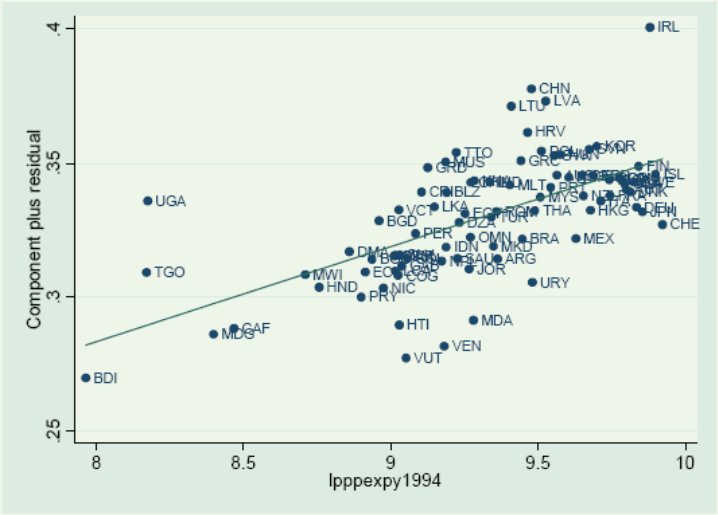
Table 6.1: Export 'discovery' has been minimal

Product discovery in Indonesian exports	Products that were 'small' in 1997 (bottom decile)	Products 'discovered' between 1997 and 2001	
Year	**Share over tot. exports (%)**	**Share over tot. exports (%)**	**Share over mfg. exports (%)**
1997	0.00		
2001	0.29	1.17	1.65
2007	1.29	3.12	6.05

Source: World Bank staff calculations by using trade data from BPS.
Note: 'Small' products are products that were in the bottom decile in terms of their share in Indonesia's total exports in 1997 (they amounted only to US$403,118 in 1997). 'Discovered products' are those products that experienced an increase in their share over total Indonesian exports from close to zero in 1997 to some positive fraction in 2001.

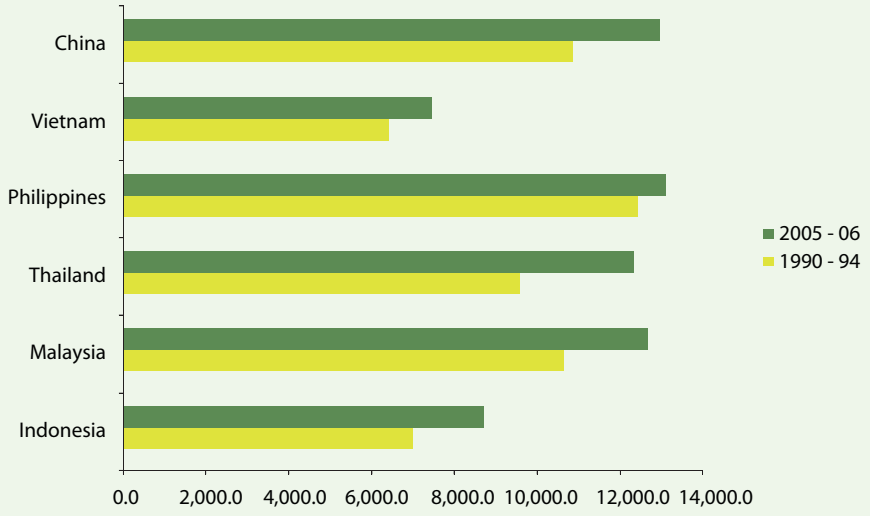
between Indonesia and other countries with a comparable export basket in 1980 demonstrates a disappointing performance. In fact, while the growth in sophistication of Indonesia's export basket has been better than that of Ecuador, Colombia and Bolivia, it has also been much worse than that of Malaysia, Thailand and Mexico (Figure 6.24).

Figure 6.22: Relationship between export and subsequent growth



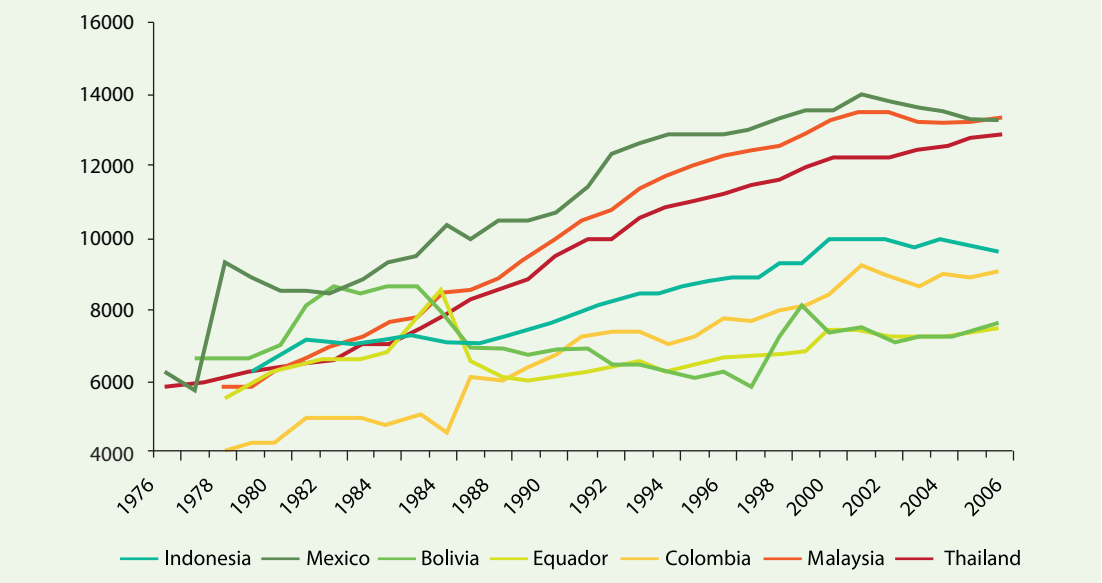
Source: Hausmann *et al*. (2007).
Note: The horizontal axis reports the "degree of sophistication" of a country's exports basket in 1994 (EXPY), while on the vertical axis the subsequent growth over the following 10 years is reported. The export sophistication index (EXPY) is equal to the sum of a country's exports shares of each exported product weighted by the income of those countries exporting that same product (for a more detailed explanation of the EXPY variable refer to Hausmann et al 2007).

Figure 6.23: EXPY or income earning of export baskets



Source: World Bank staff calculations using Comtrade.
Note: This figure reports the export sophistication (EXPY) of various East Asian countries over two time periods.

Figure 6.24: Comparing the evolution of exports sophistication – Indonesia vs. countries that exported similar products in the 1980s



Source: World Bank staff calculations using Comtrade.
Note: The six comparator countries were selected as they had similar export sophistication (EXPY) as Indonesia in 1980.

6.5 Drivers of growth in Indonesia's export performance since 1998

This section reviews the main causes of Indonesia's relatively poor performance in terms of achieving a diversification of its exports. The main external factor is the emergence of China as a new leading exporter of highly labor-intensive assembled manufactures. The main internal factors are Indonesia's natural abundance of resources and inadequate policies to encourage and foster the accumulation of knowledge and production capabilities. In other words, it has a poor investment climate and lacks what is often called a 'national innovation system'.

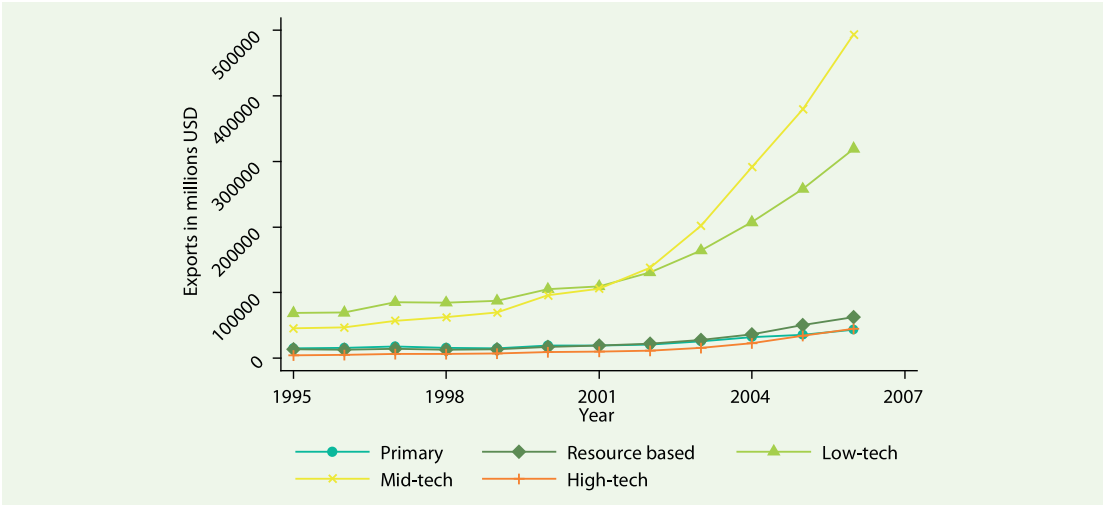
The emergence of labor intensive Chinese exports, initially confined to low-tech and later including mid-tech exports, has strongly influenced the level of exports of other East Asian countries. Since the mid-1990s, China's integration with the global economy and subsequent expansion has been one of the most influential developments affecting trade structures in many developing countries, particularly those of its East Asian neighbors. For most of the 1990s Chinese exports[42] were confined to low-tech and light manufactures.[43] This changed from 2000 onwards, with the increasing importance of medium-tech manufactures[44] (Figure 6.25).

42 The classification of exported goods is based on Lall (2000), which is also used by UNCTAD (2002).

43 These include textile, garments and footwear, as well as pottery, cutlery, toys, etc.

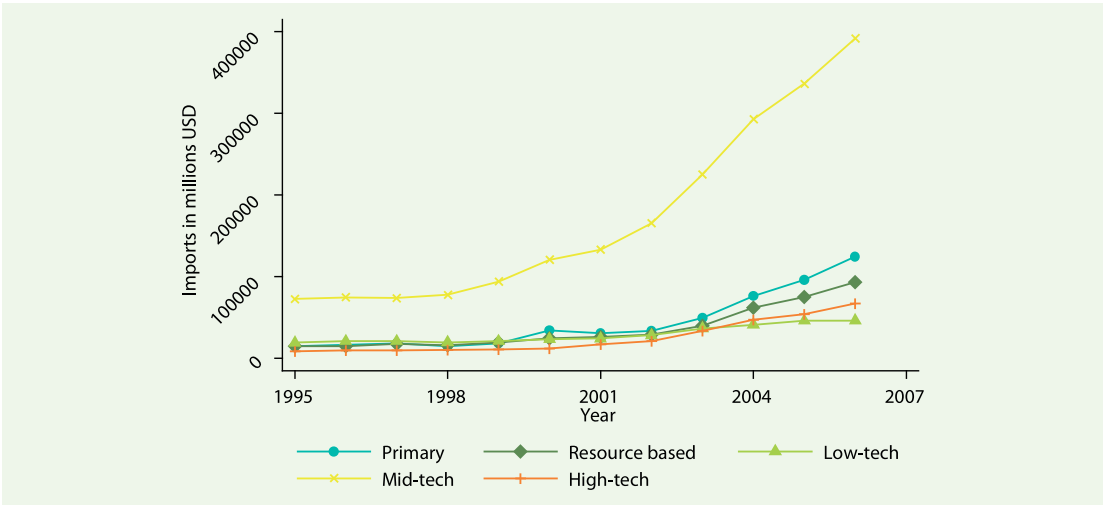
44 These include automotive, electrical and electronic goods.

Figure 6.25: Chinese exports – recent past



Source: World Bank staff calculations using Comtrade.

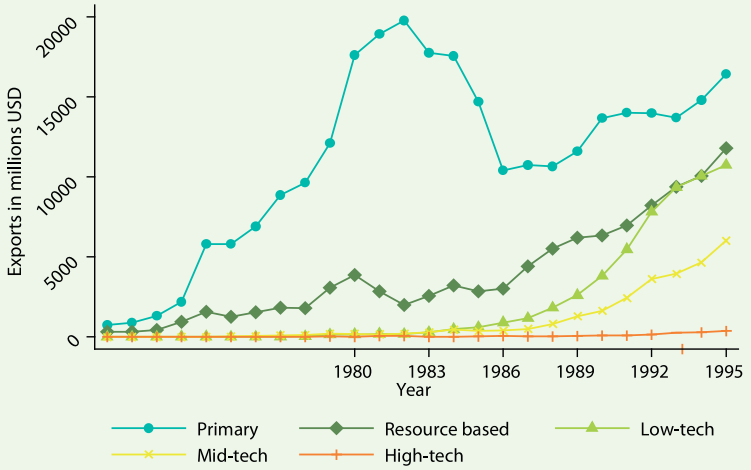
Figure 6.26: Chinese imports – recent past



Source: World Bank staff calculations using Comtrade.

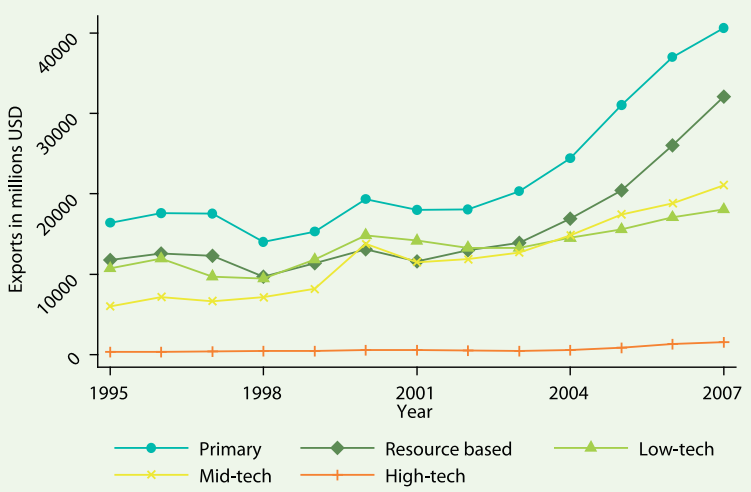
At the same time, the emergence of China triggered a competition and demand effect, which explains why different sectors and different countries have been affected to varying degrees. The effects of these trends are certainly felt world-wide, but China's Asian neighbors are likely to be particularly affected, given their export structures. There are two types of effects that take place. First, the competition effect is driven by the expansion in China's exports. This effect is strongest in those sectors where there is direct competition with Chinese exports, particularly labor-intensive assembled manufactured goods. Second, a demand effect is driven by China's growing demand for imports. This effect is strongest for three groups of products: (a) primary commodities, including energy and minerals such as copper; (b) intermediate inputs and components to be assembled later in China; and (c) capital goods (Figure 6.26).

Figure 6.27: Indonesian exports – remote past



Source: World Bank staff calculations using Comtrade.

Figure 6.28: Indonesian exports – recent past



Source: World Bank staff calculations using Comtrade.

In the 1980s and 1990s, Indonesia successfully diversified from primary commodities into labor goods. However, these products were those most negatively affected by the emergence of China as a major exporter. At the same time, the value of primary products was positively affected by the demand effect**.** As discussed before and demonstrated in Figure 6.27, in the period from the 1980s to the mid-1990s, Indonesia transformed itself from an exporter of mostly primary and natural resource based goods into an important exporter of low-tech manufactured goods. However, the 1997-98 East Asian crisis resulted in an important structural break in this trend (Figure 6.28). This was further aggravated by the competition effect due to the emergence of China, which negatively affected the labor-intensive low-tech manufactures. At the same time, while labor intensive low-tech products show a relatively downward trend, the opposite effect occurred with Indonesian exports of primary products and natural resource based goods, largely as a result of the increased demand created by China's emergence.

The emergence of China has pushed its East-Asian neighbors into different patterns of international specialization, either in primary products or in more skills intensive manufactures of parts and components. The emergence of China as a major exporter of assembled manufactured goods posed a dilemma for East-Asian countries whose exports consisted largely of low-skills and labor intensive goods. These countries were left with the option of switching from labor intensive assembly of manufactured goods into producing parts and components (or capital goods in the case of more advanced countries) or moving towards primary commodity and natural resource based products.

While Malaysia and Thailand moved into higher skills intensive manufacturing of intermediate parts and components, Indonesia concentrated on primary commodities. The examination of

Figure 6.29: Primary commodity exports – comparing Indonesia with Malaysia and Thailand

Source: World Bank staff calculations using Comtrade.

Figure 6.30: Mid-tech exports – comparing Indonesia with Malaysia and Thailand

Source: World Bank staff calculations using Comtrade.

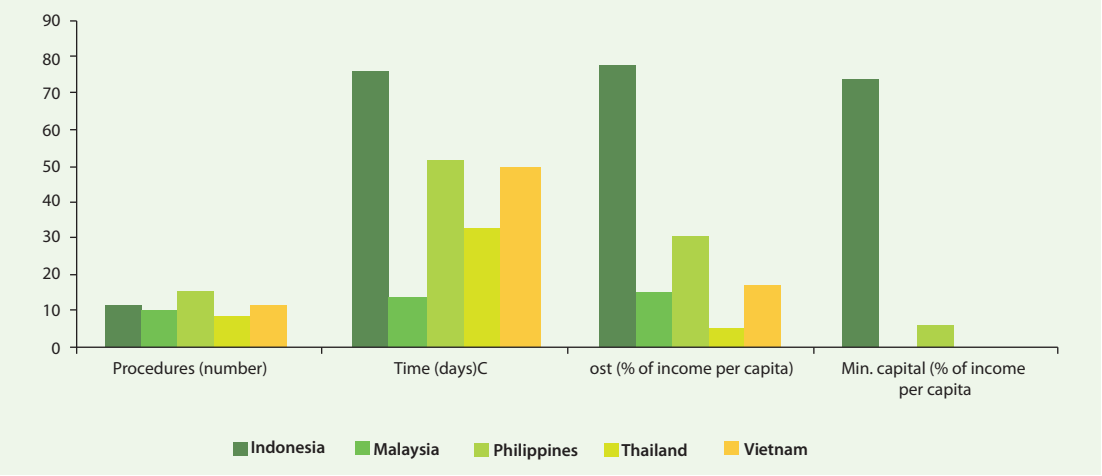
the different experiences of Indonesia, Thailand and Malaysia yields important insights regarding the possible drivers of their respective performances in terms of exports, despite the fact that these three countries were similarly affected by the 'China shock' and had previously followed a similar path in moving away from natural resources into labor intensive low-tech goods.

Natural endowments as well as policy choices explain the divergent paths followed by Indonesia and its neighbors, Malaysia and Thailand. The main reason behind these divergent paths is the result of a combination of 'natural' comparative advantages, based on relative endowments, and "created" comparative advantages, based on policies to attract FDI and to strengthen domestic capabilities through the development of a national system of innovation. Indonesia's comparative advantage in labor intensive low-tech manufacturing goods has been eroded as a result of competition with labor-abundant China, which emerged as a new center of assembling manufacturing goods, and with countries such as Malaysia and, to a lesser extent, Thailand, that have moved towards specialization in the production of more sophisticated (mid-tech) parts and components that are subsequently assembled in China (Figure 6.29 and Figure 6.30)

Moving from low- to mid-tech exports requires developing an appropriate set of skills, knowledge and institutions. However, Indonesia has been unable to successfully implement policies to facilitate the development of these. Squeezed out of low-tech labor intensive goods, Indonesia was unable to promote policies that supported moving into more skill-intensive manufactures of intermediate parts and components and machinery tools. This was due to its weakness in terms of investment climate and policies to promote accumulation of knowledge, skills and more advanced production capabilities**.**

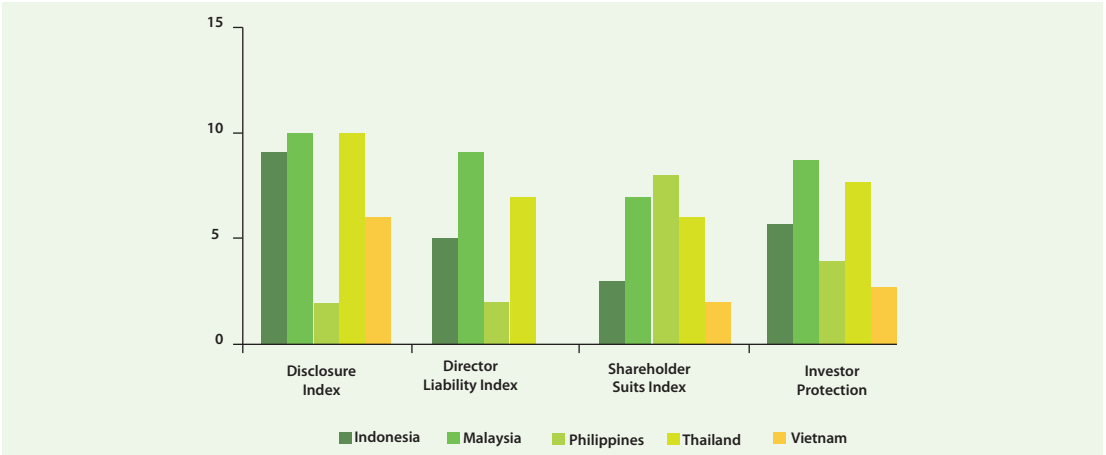
Compared with its neighbors, Indonesia has a much less conducive investment climate. This discourages business creation and attraction of FDI. Compared with Malaysia and Thailand, Indonesia's business climate does not favor the attraction of FDI. Figure 6.31 shows how Indonesia performs significantly worse than either Thailand or Malaysia in any measure of the difficulty to establish and register a business. Similarly, Figure 6.32 shows that Indonesia also performs worse than either Thailand or Malaysia in terms of investment protection.

Figure 6.31: Doing business indicators



Source: World Bank (2008) and World Bank (2009b).

Figure 6.32: Investors protection indicators

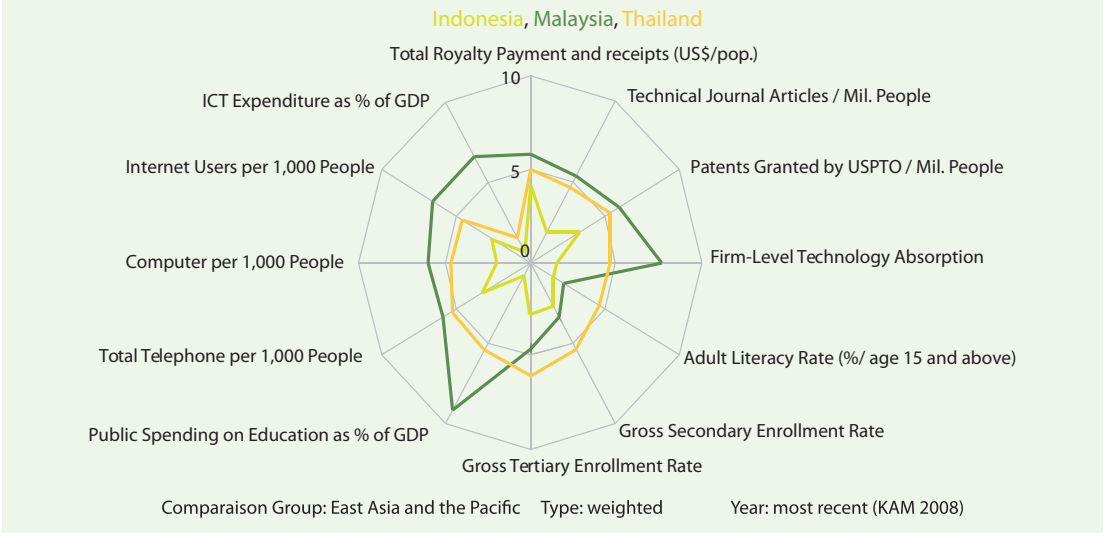


Source: World Bank (2008) and World Bank (2009b).

A key determinant of Indonesia's failure to achieve diversification or increased sophistication in terms of its export basket is the lack of adequate policies to promote and strengthen its knowledge and innovation systems. Comparing the various dimensions of Indonesia's knowledge and innovation system with those of Thailand and Malaysia, it can be clearly seen that Indonesia is behind in most of these dimensions. Indonesia's under-performance is particularly striking when it is compared with Malaysia, a country that shares with Indonesia a strong natural resource endowment (Figure 6.33).

In conclusion, it has been shown that Indonesia's disappointing performance in exports has been the result of both external causes, mainly the emergence of China as a major economic force, and internal causes, mainly the lack of policies and endowments over the past ten years. In the aftermath of the East Asian crisis, the emergence of China as a global player has resulted in

Figure 6.33: Indicators of innovation, technology and knowledge

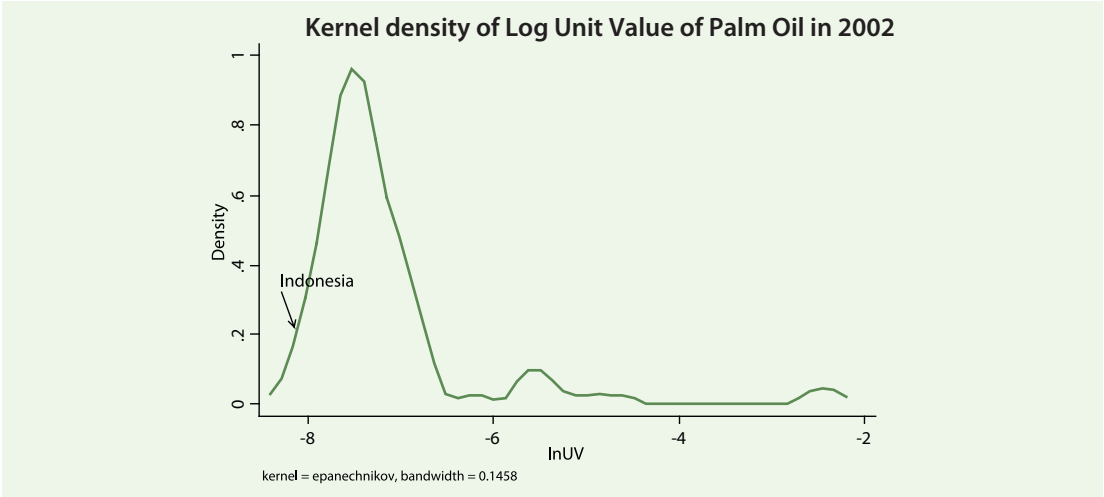


Source: www.worldbank.org/kam.
Note: Indonesia is in yellow, Malaysia in green and Thailand in orange.

an increased level of competition with countries exporting labor-intensive goods and an increased demand for primary goods, parts, components and intermediate machinery (the latter characterized by a higher skill intensity). All of this strongly affected Indonesian export patterns. At the same time, Indonesia substantially under-invested in its education and innovation system while also doing little to foster a conducive investment climate, particularly compared with its neighbors, Malaysia and Thailand. These policies, coupled with the fact that Indonesia has large endowments of natural resources and primary commodities, determined the patterns of exports growth since the late 1990s. These patterns were reinforced by increasing commodity prices.

Furthermore, limited skills and weak productive capacities affect not only patterns of specialization across sectors but also appear to negatively influence within sector specialization patterns, with Indonesia producing relatively low quality products. The problems generated by weak skills and productive capacities are apparent not only in the cross-sectoral patterns of specialization, but also in terms of the patterns of specialization within narrowly defined HS6 digits products. In fact, even within primary commodities and natural resource based products, there are important differences in terms of unit values, reflecting quality as well as other attributes valued on international markets. Figure 6.34 shows how the unit value of palm oil, a key primary commodity produced by Indonesia, varies between different exporting countries. The arrow identifies the position of Indonesia over this 'quality ladder' and shows Indonesia below the average. More specifically, Table 6.2 shows the unit value premium of specific competitors: this premium varies between 12 percent for Malaysia up to 26 percent for Costa Rica.[45]

Figure 6.34 : Unit values of palm oil exports



Source: World Bank staff calculations using Comtrade.

The recent surge in commodity prices has negative implications, in that it exacerbates these patterns of specialization and could lead Indonesia to a greater concentration of its exports and production, which could result in a range of negative side effects. If we look at longer-term trends, we observe that during the period from 1980 to 2004 Indonesia substantially diversified its exports. However, in the period from 2005 to 2006, this trend reversed and the country experienced an increase in the degree of concentration of its exports (Table 6.3). There are already some early

45 The case of palm oil is not the only one as a similar pattern emerges for various commodities with the unit values of Indonesian exports being substantially lower than the average unit value of other competitors across the world: nickel, rubber, palm nuts and kernels, cocoa.

indications that Indonesia is suffering from an excessive concentration in its drivers of export growth. Last year, four commodities accounted for half of the total value of non-oil export growth. Moving towards a greater level of export diversification is important in order for Indonesia to reduce its vulnerability to commodity price shocks. It is also important as a means of promoting growth in

Table 6.2: Unit value premiums in 2002 for exported palm-oil with respect to Indonesia 2002

Malaysia	12%
Costa Rica	26%
Thailand	14%

Source: World Bank staff calculations using Comtrade.
Note: The unit value is obtained dividing the total value of palm oil exports by its total reported quantity in the year 2002 - this is therefore an average unit value for the overall exports of palm oil in 2002. The premium reported in the table is relative to the average unit value calculated for the Indonesian exports of palm oil in the same year.

Table 6.3: Measures of diversification and technology intensity of Indonesia and regional competitors

	Indonesia			Malaysia			Thailand		
	1980-84	2000-4	2005-6	1980-84	2000-4	2005-6	1980-84	2000-4	2005-6
Concentration index	0.617	0.157	0.178	0.323	0.210	0.192	0.233	0.127	0.125
Product share in exports (%)									
3-largest	85.468	21.382	25.374	46.698	29.072	25.723	33.210	16.175	15.354
5-largest	94.160	27.387	34.422	62.046	36.428	35.314	44.355	21.570	21.203
10-largest	102.690	37.728	44.090	78.350	49.755	49.295	61.826	31.076	30.986
Primary Products	0.614	0.134	0.156	0.276	0.055	0.076	0.185	0.045	0.048
Resource Based	0.060	0.061	0.073	0.155	0.041	0.038	0.069	0.027	0.027
Low Technology Manufacture	0.003	0.038	0.030	0.006	0.019	0.020	0.053	0.030	0.026
Medium Technology Manufacture	0.003	0.027	0.024	0.009	0.035	0.037	0.047	0.043	0.056
High Technology Manufacture	0.004	0.030	0.022	0.064	0.195	0.167	0.002	0.103	0.094
	Philippines			**Vietnam**			**China**		
	1980-84	**2000-4**	**2005-6**	**1980-84**	**2000-4**	**2005-6**	**1980-84**	**2000-4**	**2005-6**
Concentration index	0.214	0.386	0.283	0.332	0.284	0.266		0.103	0.113
Product share in exports (%)									
3-largest	30.845	51.864	42.875	47.536	43.170	38.465		11.144	12.255
5-largest	39.450	59.084	55.147	57.890	49.260	45.428		16.647	18.982
10-largest	53.404	68.223	66.139	73.763	59.957	57.365		25.440	29.316
Primary Products	0.030	0.006	0.006	0.324	0.219	0.215	-	0.007	0.005
Resource Based	0.181	0.017	0.027	0.035	0.015	0.014	-	0.012	0.012
Low Technology Manufacture	0.095	0.022	0.019	0.058	0.178	0.153	-	0.062	0.049
Medium Technology Manufacture	0.015	0.035	0.042	0.004	0.020	0.020	-	0.034	0.037
High Technology Manufacture	0.030	0.383	0.277	0.003	0.008	0.016	-	0.073	0.093

Source: World Bank staff calculations using Comtrade.

employment and thereby reducing poverty. Diversification can be achieved through promoting resource-based processing and promoting greater and more sophisticated manufacture exports, as these show a substantially lower degree of concentration than commodity sectors (Table 6.3**)**.

6.6 Implications for trade development strategy

While the exploitation of Indonesia's natural resource endowments will continue to be important to drive economic growth, there are various implicit risks from specializing in a few commodities. In 2008 the three largest exports of Indonesia accounted for 25 percent of its total exports. In fact, while natural resource abundance is not necessarily a curse, lack of diversification in Indonesia's export structure and its reliance on low value commodities may hamper future growth prospects for a number of reasons.[46] First, it is unlikely, as was the case in the past, that the exploitation of natural resources, in particular minerals, can facilitate the growth in employment that is required in Indonesia, given its demographic dynamics. Indonesia's own growth experience shows that even during the expansion in agricultural productivity in the early eighties, manufactures and services continued to play an important role as contributors to labor income growth.

The unpredictable price patterns of commodities can result in costly boom and bust cycles. Indonesia is, even if a large producer of primary commodities, still a price taker. The recent swings in the price of commodities have highlighted once more the high degree of unpredictability in commodity prices. Previous studies have shown that countries whose exports are concentrated around a limited number of commodities are particularly exposed to the risks of these price swings and their adverse macroeconomic impacts (World Bank, 2009a).

Even in terms of the commodities that currently form the majority of its exports, it is important that Indonesia improves its position in the quality ladder. It has been shown that there are important differences even within narrowly defined commodities in terms of quality and value-added, measured by unit values. The policy message is that Indonesia should try to escape the trap of producing low quality/low value added products. At this stage, even within its comparative advantage products (natural resource based), Indonesia seems to have vertically specialized in lower than average quality goods. This is likely to be a consequence of its policies regarding skills upgrading, educational and training infrastructure and its non-conducive business climate. In this perspective, the Government has important policy leverages to influence each one of these areas.

Export promotion has an important role to play in supporting export diversification. The need for export promotion stems from the uncertainty faced by exporters and the 'public good' nature of information about export markets and the capacities required to satisfy foreign requirements (Hausmann and Rodrik, 2003). As discussed by Iacovone and Javorcik (2008a), a diversification of exports requires overcoming important fixed costs, conducting adequate preparation and overcoming a non-negligible degree of uncertainty. Based on a set of case studies, Iacovone and Javorcik (2008c) argue that successful export promotion can lower the costs of entering export markets. It can achieve this goal through four types of activities: image building; export support services; market research; and policy advocacy. However, it is important to emphasize that, as not every firm can become a successful exporter, good targeting is vital to provide effective and cost-efficient export promotion services. The case studies and international experience strongly indicate that focusing export promotion efforts on specific sectors is better than trying to promote exports in general. For instance, participation in specialized fairs and exhibitions generates more potential

46 This message echoes the conclusions of De Ferranti et al. (2002) and Lederman and Maloney (2007) analyzing the challenges of resource rich economies in Latin America.

export relationships for the firms involved than attendance at general events. In light of the above, a three-pronged strategy to promote Indonesian exports is proposed:

a. **Level one: "Starting to climb up the quality/value added ladder": Optimize the potential rents from natural resource endowments by moving up the vertical differentiation ladder through investment in appropriate knowledge and engineering skills**. A key finding of De Ferranti *et al.* (2002) in an analysis of Latin America's natural resource rich countries is that it is crucial to invest and implement policies that build 'new endowments', such as knowledge, good institutions and public infrastructure. For example, the target should be to move from exporting low-quality palm-oil to exporting higher quality palm oil and sub-products that have a greater knowledge content;

b. **Level two: "Business climate…but not alone": During the period from the mid-1970s through to the 1980s, Indonesia reinvested a significant proportion of the rents derived from its oil sales to improve infrastructure; increase agricultural productivity; and diversify away from oil**. Indonesia today could follow an analogous strategy and re-invest the rents it derives from abundant but nonrenewable natural resources to improve its "knowledge and skills infrastructure". At the same time, Indonesia would need to facilitate the development of a more conducive investment climate and to implement policies to attract FDI. This could represent, at least in the short-term, a potential shortcut to acquire the skills and knowledge that Indonesia needs to promote its exports and re-insert itself into the global value chains that require skills-intensive parts and components. Attracting FDI and investing in education, R&D incentives, good institutions and infrastructure are vital for generating incentives for producers to move up the value ladder and for stimulating private entrepreneurs in their search for viable business opportunities. This will ultimately lead to diversification (De Ferranti *et al.*, 2002). The analysis of various natural resource rich countries in Latin America shows that the "curse" of natural resources is not merely the result of the existence of rich natural-resource endowments as such, but is caused by two key drivers. The first of these is the existence of a deficient national 'innovative' or 'learning' capacity that facilitates the adoption and creation of new technology. The second is multiple barriers to technological adoption usually associated with regulations and artificially created monopolies (Maloney, 2007). Both of these factors are relevant for Indonesia and its trade development strategy.

c. **Level three: "Targeted export promotion": At a micro-level, it would be in Indonesia's best interest to scale-up in terms of quality, rather than merely quantity, its assistance to exporters.** Export promotion has been shown to be potentially very beneficial in terms of returns over invested public funds (Lederman, Olorreaga and Payton, 2006) and could potentially help lower the costs of entering export markets and thereby promote diversification (Iacovone and Javorcik, 2008b). However, export promotion needs to be well targeted and appropriately designed.

6.7 Conclusion

This chapter has analyzed Indonesia's long-term economic dynamics from a macro and trade perspective. The four principal lessons from this analysis are as follows:

a. **The most striking feature of Indonesian growth in the past four decades is that it has not been labor intensive.** Hence, while it is likely that the future engines of output growth will be the manufacturing and service sectors, the evolution of the agricultural sector, where most

of the population is still employed, remains crucial in the short run. In the long run, preparing workers to move and participate in the modern sectors of the economy should be a priority;

b. **The sub-national growth patterns suggest that there is room to improve labor and capital mobility in order to increase labor participation in the dynamic sectors of manufacturing and services, particularly outside Java.** This could be achieved by promoting public infrastructure and by implementing other policies intended to improve productivity in the regions;

c. **Manufacturing exports have historically been an engine of growth and diversification. However, since the late 1990s, this pattern has reversed.** Manufacturing export performance since the East Asian crisis has been disappointing, with manufactured exports declining as a proportion of GDP since 2000; and

d. **The declining performance of the manufacturing sector appears to be the result of a complex set of interacting causes.**

- The principal external cause has been the emergence of China as a producer of labor intensive assembled manufactured products;
- The principal internal cause has been Indonesia's lack of success in promoting the skills and capabilities needed to move up the value/quality ladder. The causes for this are two:
  - The poor investment climate makes it hard to attract FDI and knowledge from abroad;
  - Domestic investments to develop a "national innovation system" have been at a much lower level in Indonesia compared with its direct East Asian competitors, particularly Thailand and Malaysia; and
- At the same time, given its large endowments of abundant natural resources, Indonesia has found it much easier to shift its relative specialization towards natural resources and commodities and away from manufacturing goods.

The main policy implications for the Government are as follows:

a. To promote growth in employment, it is important to ensure that dynamic sectors attract sufficient labor by eliminating distortions, increasing labor mobility, and improving labor skills.

b. To promote the diversification of the economy, the country should invest in "renewable resources" such as knowledge and skills that are necessary to promote the diversification and upgrading of exports. High commodity prices should provide the necessary resources for these investments.

c. Indonesia needs to develop a dual strategy involving short-term and long-term components. In the short term, it needs to exploit its natural resources and labor endowments to stimulate a job-intensive growth. In the long term, it needs to promote the accumulation of skills and human capital to avoid becoming overly dependent on a few commodities and low value-added/low-quality goods.

d. This dual strategy is likely to require the development of a more conducive business climate to promote domestic and foreign investment, investment in the "knowledge and skills infrastructure" (a national system of innovation), and targeted export promotion services to encourage diversification and upgrading.

Chapter 7

Making the Most of High Commodity Prices for Indonesia's Development

Abstract: *High commodity prices and their positive outlook have caused a rethink of the role that commodities could play in the development of natural-resource-abundant countries such as Indonesia. This chapter assesses the economic importance of commodities for Indonesia and reviews the development challenges and opportunities that greater commodity production would bring about. To maximize the development potential of high commodity prices the Government would need to: (i) facilitate the supply response of the commodity sector through improvements in the regulatory environment, (ii) use the resource windfall to relieve infrastructure bottlenecks and promote the development of a knowledge economy to increase competitiveness of its domestic and export sectors, and (iii) take measures to mitigate the impact of commodity price volatility.*

7.1 Introduction

Commodities represent an important part of Indonesia's production and exports and should play an important part in its economic development. While economists have traditionally been somewhat skeptical regarding commodity-driven growth in developing countries, the recent trend towards increased prices has at least encouraged them to re-evaluate this position.

Over the past decade, commodity prices have risen dramatically. In particular, in 2000-08, the price of commodities grew at an extraordinary pace, with the price of energy, minerals, and metals increasing by more than 250 percent in real terms between 2003 and mid-2008 alone.[47] Over the same period, food prices increased by around 100 percent. While prices retreated in 2008, with the onset of the financial crisis and the reduced demand for commodities as inputs for manufacturing processes around the world, they have since recovered to well above 2000 levels. In real terms, in early 2010, compared with 2000 levels, food prices were 60 percent higher, oil was 116 percent higher, and metals and minerals were 150 percent higher.

Higher commodity prices is a significant departure from previous decades. The trend towards increased commodity prices over the past decade represents a significant departure from the trends in the previous decades since the mid-1960s, during which period these prices tended to decline or remained stagnant, except for a brief period during the oil crisis in the mid-1970s. While commodity prices have traditionally tended to fluctuate wildly and are characterized by boom and bust cycles, the trend towards increased prices appears to reflect a structural break driven by demand from fast growing developing countries such as China. With this increased demand, it is likely that commodity prices will, on average, remain high.

As a net commodity-exporting nation, rising commodity prices over the past decade have benefited the Indonesian economy. However, the Government failed to take full advantage of these price increases to maximize the positive impact on development, with the Government using its commodity windfall to a large extent on unproductive spending**.** In addition, the non-conducive business climate limited the supply response to high prices.

To some extent, the lack of resolve in taking full advantage of the increased price of commodities reflects prejudice against commodity-driven economic development and a preference for manufacturing-driven development. There has been a long debate on the desirability of commodity led development among economists and planners. Among other challenges, it has been said that it can be characterized by a greater exposure to price volatility, governance issues, 'Dutch

47 Prices are measured relative to the Manufacturing Unit Value of World Exports index (MUV) measured in constant 2000 US dollars.

disease' effects and a lower level of employment generation. According to some arguments, in order to create sufficient job opportunities for the growing workforce, Indonesia should focus its policies on encouraging the development of a labor-intensive manufacturing sector.

However, there is also a strong argument to say that the commodity sector creates development opportunities particularly when prices are high through windfall revenues. Some argue that the commodity-producing off-Java islands of Indonesia have unrealized potential to produce revenues that could be utilized in productive investments that would diminish regional disparities.

This chapter attempts to address the following questions: How dependent is Indonesia on commodity exports? What are the challenges and opportunities created by a higher specialization in commodities? How has the boom in commodity prices impacted Indonesia's economy? What is the outlook for commodity prices? How can Indonesia best manage revenues derived from the commodities sector for its development? Should it remain focused on developing its manufacturing sector or should it encourage increased commodity production?

In order to address these questions, this chapter is structured as follows: Section 7.1, this section, defines the questions explored by this chapter and describes its organization. Section 7.2 assesses the importance of commodities to Indonesia's economy. Section 7.3 reviews the challenges and opportunities that come with a more intense focus on commodity production. Section 7.4 examines the impact of the increased price of commodities on Indonesia's economy and looks at the manner in which the Government utilized the commodity revenue windfall. Section 7.5 presents the outlook for commodity prices. Section 7.6 provides policy recommendations for harnessing high commodity prices to enhance economic development in Indonesia and for implementing policies to mitigate the impact of price volatility so that Indonesia can have its cake and eat it too. Section 7.7 presents a general conclusion to the chapter.

7.2 The importance of commodities in Indonesia's economy

Indonesia is a natural resource rich economy. Even relative to its large population, the country has a large endowment of mineral resources: in per capita terms, its reserves of tin, copper, coal and nickel (Table 7.1) are the third largest in the world. In fact, this may be an underestimation: Indonesia has been less explored for minerals, and oil and gas than most other natural-resource-abundant countries and it is likely that it has many undiscovered resources.

With its large population, Indonesia has a massive under-utilized labor force. Some might argue that this means that the country should focus on the development of a labor-intensive manufacturing industry, rather than on agricultural commodities. However, this overlooks an important point. While the overall population of the country is high, there are distinct differences in demographic patterns between the country's most populous island, Java, and the other islands. A large proportion of the population (60 percent) is concentrated on Java, which covers only 8 percent of Indonesia's total land area. With 130 million inhabitants, Java is one of the most populous islands in the world[48] and, with 1,026 people per km^2 it is also one of the most densely-populated parts of the world.[49] By contrast, off-Java islands have relatively low population densities and are relatively rich in natural resources, including available agricultural land, forests, minerals, and oil and gas reserves.

48 Calder, Joshua (January 2007). "Most Populous Islands". http://www.worldislandinfo.com/POPULATV2.htm

49 World Development Indicators.

There is limited mobility of labor between the different islands, as reflected in the significant wage differences. Also, with high inter-island transport costs, the integration of domestic markets in the different islands is far from complete. Thus, from a comparative advantage perspective, the islands can be treated as separate economic entities. While Java has a strong comparative advantage in labor intensive manufactures, off Java has a strong comparative advantage in agriculture, forestry, mining and oil and gas. These comparative advantages are reflected in the distinctly different production patterns in Java and the non-Java islands.

Table 7.1: Ranking of countries according to mineral reserves per adult

	Tin reserves per adult			Copper reserves per adult	
Indonesia	586.7		Chile	13,732,486.0	
Malaysia	182.0		Australia	1,747,715.6	
Australia	145.6		**Indonesia**	241,598.9	
China	108.9		China	28,315.7	
World	65.8		World	115,752.7	
	Coal reserves per adult			**Nickel reserves per adult**	
Australia	18.9		Australia	13,908.9	
South Africa	9.0		Russia	3,143.0	
Indonesia	1.0		**Indonesia**	1,000.9	
China	0.3		China	86.0	
World	0.6		World	373.8	

Source: World Bank staff calculations using population data from World Development Indicators and mineral data from Mineral Commodity Summaries 2007, US Geological Survey.
Note: Adults are defined as population in the working age range (15-64 years old). Reserves are the part of the reserve base which could be economically extracted or produced at the time of determination. Values are expressed in metric ton per million adults.

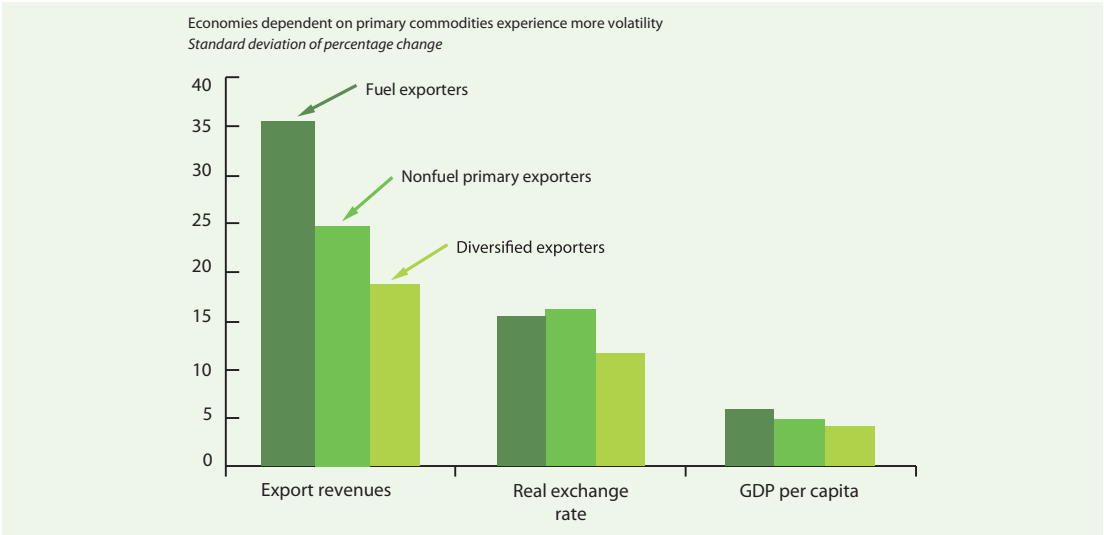
Commodities play an important role in Indonesia's economy. In 2007, the commodities sector contributed to 25 percent of GDP and generated 61 percent of the nation's export revenues.[50] Publicly listed companies in the mining and agricultural sectors accounted for 15 percent of total market capitalization in January 2009. The plantation, forestry, mining, and oil and gas sectors contributed to 22 percent of total government revenues in 2008. They are also a source of wealth, with eight of the top ten richest Indonesians in 2008 being commodity producers.

Given the important role of the commodity sectors to the Indonesian economy, fluctuations in international commodity prices have a significant direct and indirect impact on the country's economy. The direct impact takes place mainly through the effect that changes in the value of commodity exports have on the economy. The indirect impact takes place through the effect that subsequent changes in domestic commodity prices have on the economy. The latter effect is also significant, domestic commodity prices are greatly and quickly affected by international commodity price shocks because Indonesian commodity markets are fully integrated with international commodity markets[51] (see Chapter 3).

50 World Bank and Comtrade 2007 data.

51 The econometric analysis in Chapter 3 shows that domestic food markets for maize, rice, soybean, sugar and cooking oil are integrated with world markets. Although there are some divergences when comparing world and domestic price monthly changes, they move closely together when looked at over a longer period of time. The five commodity markets respond to world prices at different speeds but, on average, over a period of about one year, a one-percent increase in world prices leads to a one-percent increase in domestic prices. The speed of transmission of a shock in the international price to the domestic economy also varies by province, with those that import the product and those that are centrally located adjusting faster to the price shock. Thus the impact of international price shocks on the economy takes place not

Figure 7.1: The impact of severe shocks on economic progress



Source: World Bank (2008).
Note: Volatility is defined as the standard deviation of percentage changes over time (annual data). Commodity concentration measured in 1980. Excludes countries with populations of less than one million.

7.3 Commodity based development: Challenges and opportunities

There are three main challenges to commodity based development, as follows:

a. the inherent price volatility of commodities;
b. the impact on governance issues due to contributions to government revenues; and
c. the negative impact on the manufacturing sector ('Dutch disease').

Price volatility of commodities: Countries heavily dependent on the export of commodities tend to experience a relatively high level of volatility in terms of export revenues, exchange rates and GDP volatility due to their sensitivity to commodity price volatility (Figure 7.1). At the microeconomic level, the volatility of commodity prices increases risk, reducing firms' investment and increasing the vulnerability of poor households. The impact on poor households varies according to the commodities with which they are involved. Volatility in food prices affects food producers and processors, as well as net food consumers. Volatility in energy prices hurts mostly energy intensive firms and consumers overall. Volatility in minerals and metals affects mostly mineral and metal producers and workers in the sector, both in terms of wages and job prospects, but has a negligible direct impact on consumers.

Impact on governance issues: In general, the commodities sector makes a relatively high direct contribution to government revenues through rents and royalties. These rents and royalties receive less scrutiny than taxes and thus are more likely to be used for political or patronage purposes, weakening a country's governance.

only through changes in prices and volumes of exports and imports, but also through changes in domestic production caused by changes in domestic prices. The results of the study also imply that the economic impact is not homogenous across the country because of the differing degree of integration between provinces. The speed and magnitude of the price change in remote provinces will be generally slower and smaller than in other regions.

The link between the exploitation of natural resources and a decline in the manufacturing sector: In 1977, *The Economist* coined the expression 'Dutch disease' to describe the decline of the manufacturing sector in the Netherlands after the discovery of a large natural gas field in 1959, which led to the world's largest public-private partnership between two extracting companies and the Government in 1963. The syndrome also affected oil-rich countries in the 1970s, which saw the value of their oil exports rise as a result of the spike in oil prices. In another example, at the end of the 1970s, Colombia experienced an increase in the value of its coffee exports. During this period, its traditional export sector declined (Ebrahim-Zadeh, 2003).

The expression 'Dutch disease' refers to a phenomenon by which an increase in revenues from natural resources increases wealth in the economy driving up the real exchange rate and drawing away factors of production from the non-resource tradable sector to the resource tradable sector and the non-tradable sector. The end result is that the non-resource tradable sector becomes less competitive and shrinks as the non-tradable and resource-tradable sectors expand. While this phenomenon is most often associated with the discovery of natural resources, it can also be caused by any development that leads to a large inflow of foreign currency, such as a sharp increase in natural resource prices, donor assistance, and foreign direct investment (Ebrahim-Zadeh, 2003).

A boom in resource-based exports may cause the non-resource tradable sector to become less competitive for two reasons, these being:

a. the 'spending effect' resulting from increased wealth (Ebrahim-Zadeh, 2003); and

b. the 'resource movement effect' resulting from factors of production being drawn to the resource based sector.

Spending effect: The resource-based export boom draws in foreign currency leading to an appreciation of the exchange rate. Initially, the resource-based export boom raises resource-based firms' incomes and government revenues, either directly if state companies operate in the sector, or indirectly, through taxes. This wealth effect causes an increase in domestic consumption, which may cause a real appreciation of the exchange rate for one of two reasons:

a. If the nominal exchange rate is fixed by the central bank, the conversion of part of the foreign currency into local currency to buy domestic non-traded goods will increase the country's money supply, which, together with the increase in domestic consumption, will drive up inflation, causing the real exchange rate to appreciate; and

b. If the exchange rate is flexible, the increased supply of foreign currency may drive up the value of the domestic currency, causing a rise in the nominal exchange rate. In turn, this leads to an appreciation in the real exchange rate.

The appreciation in the real exchange rate weakens the competitiveness of the country's exports, leading the non-resource tradable sector to shrink.

Resource movement effect: Factors of production are drawn to the expanding sectors causing the non-resource tradable sector to shrink. Factors of production (capital and labor) are drawn to the production of the resource-based sector and the non-tradable goods sector to meet the increase in domestic demand for non-tradable goods. This causes the production of the non-resource tradable sector to shrink.

The resulting impact of the two effects on the economy is a specialization in non-tradables and resource-based products. This may increase inequity in the country, as wealth will be generated by a relatively small number of firms that are not labor-intensive and operate only in areas where commodities are actually derived. As a result, income distribution will become more concentrated.

Dutch disease can cripple a country's long-term prosperity in four ways:

a. If the natural resources are depleted or if there is a downturn in commodity prices, the manufacturing industries will not recover as easily or as quickly as they declined. Domestic businesses become technologically backward because technological growth is slower in the booming sector and the non-tradable sector than the non-booming tradable sector (Van Wijnbergen, 1984). This technological backwardness causes the country's competitiveness in non-booming tradable goods to decline further (Krugman, 1987);

b. The country's volatile real exchange rate may reduce the level of investment by businesses as the real exchange rate volatility creates uncertainty (Gylfason *et al.,* 1999);

c. The greater income inequality associated with dependence on the commodities sector can exacerbate governance issues and make conflicts (between regions for example) more prevalent; and

d. Dutch disease can also lead to corruption and protectionist policies for affected lagging sector industries, increasing inefficiencies.

Several other criticisms of excessive dependence on the export of commodities have been made, although not all of these stand up to analysis:

a. The trend for prices of commodities to decline relative to prices of manufactures: Recent research and price trends appear to contradict this. A more recent analysis of the Prebish-Singer hypothesis[52] of declining commodity prices relative to manufacturing concludes that from the beginning of the century to 1973 there was no declining trend in relative commodity prices (Cuddington, Ludema and Jayasuriya, 2001). Furthermore, for most of the current decade, commodity prices have increased at a pace unseen over the previous 30 years. This break appears to be structural and to have been caused by two factors, the first being the stronger link between agricultural prices and energy prices due to the emergence of biofuels and the second being the stronger link between commodity prices (particularly oil and metals) and the evolution of the global economy as a result of developing countries' increasing importance in global trade.

b. The low level of contribution of the commodities sector to technological progress and growth: This argument was first put forward by Prebish (1959), Singer (1950) and Kaldor (1967) and was later reinforced by the econometric work of Sachs and Warner (1995 and 2001) and associates. They all argued that natural resources are an economic curse rather than a blessing because they do not contribute to technological progress and growth. However, more recent econometric work led by De Ferranti *et al.* (2002) and Lederman and Maloney (2007) questions the poor performance of resource abundant countries in this regard, with the authors arguing that the criticism of natural resource-based development is flawed and that natural resource rich countries should play to their strengths.

52 Raul Prebisch (1959) and Hans Singer (1950).

These authors claim that the exploitation of natural resources does not preclude the development of manufacturing or other activities. Countries such as New Zealand, Australia and Canada became rich mainly through agriculture, but have successfully achieved the development of other sectors.

In addition, these authors note that natural-resources-based activities can lead growth for long periods of time. They refer to the analysis of Martin and Mitra (2001) showing that growth in TFP in agriculture from 1967 to 1992 was 50 percent greater than in manufactures, though the industrialized countries experienced rates substantially higher than those of less developed countries. As they note, several natural resource success stories, such as Denmark and Sweden, continue to show the highest total factor productivity (TFP) growth rates in the agriculture sector.

They also question the view that manufacturing is intrinsically more beneficial than other sectors. De Ferranti *et al.* (2002) and Lederman and Maloney (2007) also question the view that manufacturing is intrinsically more beneficial than other sectors in terms of facilitating the development of backward and forward linkages, technological innovation, and other potential externalities. They argue that what is important is not what you produce, but how you produce it. In other words, it is the ability to produce and commercialize knowledge that is important. Thus, their key policy recommendation is to embed knowledge into natural resource production so that it spurs technological progress and growth.

7.4 Indonesia and increased commodity prices: Impacts and missed opportunities

The commodities sector can generate windfall revenues. It is increasingly recognized that the commodities sector can generate windfall revenues that can help finance much needed infrastructure and human capital investments. In turn, these can result in increased overall productivity, helping promote greater technological content and value added in commodity production.

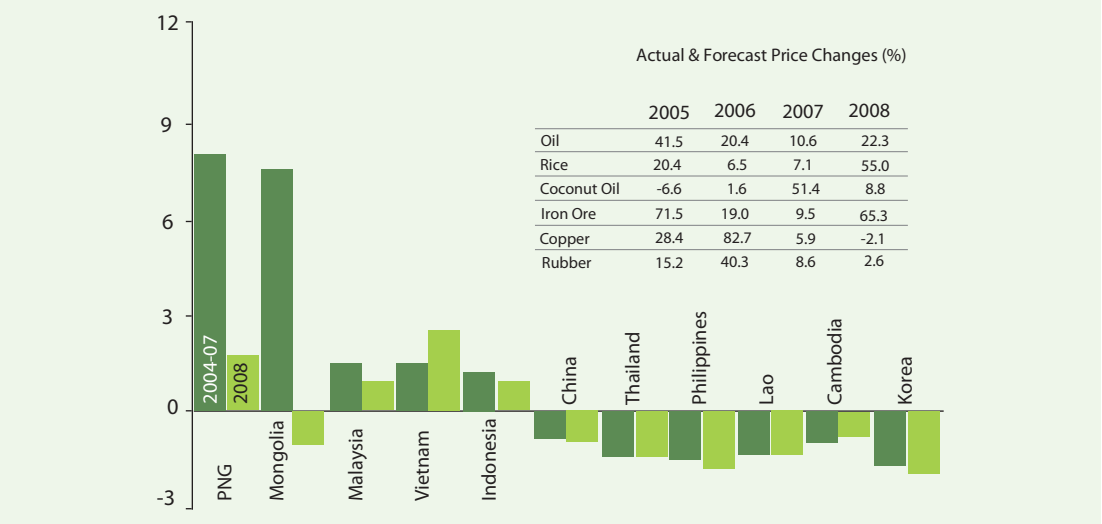
Indonesia has not benefited as much as it might have from the commodity price boom. However, while the commodity price boom has benefited Indonesia's economy, the benefits have not been optimized due to a constraining regulatory environment that severely limited the supply response of most commodity sectors to the high prices. In addition, the Government did not use the windfall revenue productively.

a. The Commodity Price Boom: Positive and Negative Impacts

Dramatic impact on export revenues: In the period 2004-08, oil prices more than tripled, metals increased five-fold and grain prices surged 87 percent. These increases led to increases in the value of exports of around 16 percent per year over the period, the highest and the most sustained expansion in exports experienced by Indonesia since the East Asian crisis. The windfall in export revenues increased the trade balance surplus and helped Indonesia almost double its foreign reserves.[53] Although imports of commodities were also significant, the value of net exports was positive. It is estimated that high commodity prices lifted Indonesia's total income by on average 1.2 percent of GDP in 2004 to 2007 (Figure 7.2).

53 From 2002 to 2007.

Figure 7.2: Impact of commodity prices on countries' terms of trade as a percentage of GDP



Source: World Bank East Asia Update (2009).

Increased commodity production value: The increase in the value of commodity production accounts for 40 percent of nominal growth in GDP over 2005-07. Of this growth, 30 percentage points was due to the contributions of mining, oil and gas, while 10 percentage points were due to agriculture. Volumes of production also experienced an increase although they were concentrated on two commodities, palm oil and coal. The volume of production of palm oil increased by 15.5 percent from 2005 to 2007, while the value of oil palm exports boomed, tripling from 2003 to 2007. In 2007 alone, palm oil export earnings totaled almost US$9 billion with 3.8 million individuals employed in full time jobs in the sector. The growth in the value of exports of palm oil is responsible for one fourth of Indonesia's non-oil export growth from 2005 to 2007. The volume of production of coal increased 94 percent over 2000-07, during which period the price of this commodity increased by 134 percent.

Rising value of the Indonesian stock market, led by companies in the commodities sectors: The Indonesian stock market rose by nearly 250 percent from 2005 to 2007, making it one of the best performing stock exchanges in the world for this period. Higher commodity prices also prompted an important increase in FDI approvals in the primary sector in certain segments during 2005-07 when manufacturing FDI remained stable.

Increased government revenues: While overall increased commodities prices resulted in increases in government revenues, the impact on central and regional governments differed. Due to significant revenue-sharing with sub-national governments and their pegging to the international price of oil, high oil prices had a net negative effect for the central government, while they created fiscal windfalls for many regions (Agustina, del Granado, Bulman, Fengler and Ikhsan, 2008).

Increased incomes for commodity producers and workers: This was particularly true in the commodity producing islands outside Java, with increased incomes on these islands resulting in increased consumption of consumer goods. For instance, PT Indofood Sukses Makmur, the nation's largest instant noodle maker, increased its revenue sales by 23 percent in 2007 and by 39 percent in

2008 due to the strong demand for consumer goods.[54] Similarly, the volume of motorbike sales grew 44 percent in the first half of 2008 compared with the first half of 2007, while the volume of car sales in July 2008 was 58 percent greater than the same month the previous year.[55] Rising commodity prices generally boosted incomes in resource rich provinces off the island of Java, particularly in the plantations and mining areas of Sumatra, Kalimantan and Sulawesi. This has led to a significant increase in car sales in those islands, causing Java and Bali to lose 5 to 7 percentage points market share in Astra car sales in 2009 relative to three or four years ago.[56]

Increased food prices hurt net food consumers: The hike in food prices did hurt net food consumers, but the overall impact of the direct and indirect effects of the high commodity prices is likely to have been a reduction in the poverty rate. The rate of inflation for food in the consumer market place rose from 13 percent in 2006 to 16.4 percent in 2008, hurting poor net consumers of food. However, the Computable General Equilibrium simulation in Chapter 4 suggests that the commodity price increase resulted in reduced levels of poverty due to increases in real wages in the agricultural sector and in real returns to forms of capital owned by the poor. These outweighed the impact of the increases in the price of commodities consumed by the poor, particularly since the price of rice, the main staple of the poor, did not increase as much as in other countries because of import and export restrictions (Chapter 4).[57]

Negative impact on sectors with a higher commodity input intensity: The negative impact was greatest in sectors that have a high commodity input intensity, such as metal products, and those that experienced a sharp increase in the costs of their raw materials despite their lower commodity input intensity (e.g. rubber and plastic products, see the firm survey analysis in annex of Chapter 4). High fuel prices particularly hurt energy-intensive manufacturing firms (which use fuel for their generators). They also resulted in increased energy subsidies, streaming public finances[58] and ultimately forcing the Government to reduce these subsidies (Chapter 5).

Significant appreciation of the exchange rate and an increase in the price of government bonds: The increase in reserves resulting from greater exports and the high domestic inflation contributed to an appreciation of the exchange rate of 48 percent in the period from 2001 to September 2008, which resulted in some loss in export competitiveness (Figure 7.3). Correlation and regression results over the period from January 2007 two November 2009 show an 88 percent correlation of the non-oil EWCPI (a US$ export-weighted commodity price index) with the real exchange rate. These results show that a 1 percent increase in the index is associated with a 0.46 percent appreciation. A similar relationship is found for oil EWCPI (World Bank, 2009c). This relationship between commodity prices and the exchange rate is also found in other natural resource abundant countries. Chen and Rogoff (2003) found a significant correlation between real exchange rates and global commodity prices in Australia, Canada and New Zealand, three countries where commodities also constitute a major component of exports. High international oil prices affected Indonesian bond prices through their impact on fuel subsidies, which put pressure on the public sector's debt. Figure 7.4 shows a strong correlation between Indonesian rupiah five-year bond yields and the gap between the international price of oil and the domestic fuel price.

54 The Jakarta Post, May 14, 2009.

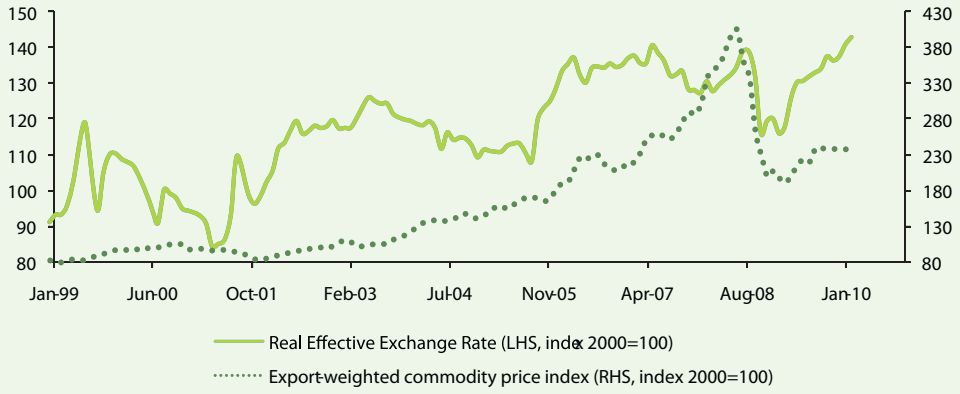
55 "Motorcycle sales rise 44 percent despite higher fuel prices" The Jakarta Post, September 9, 2008.

56 "Astra sees record car sales, to buy mines" Daily report from Concord Consulting, June 8, 2010.

57 Note that the simulation is made assuming there are no other changes in the economy impacting poverty, which was not the case. The actual poverty rate only fell 0.6 percentage points over the 2005-08 period.

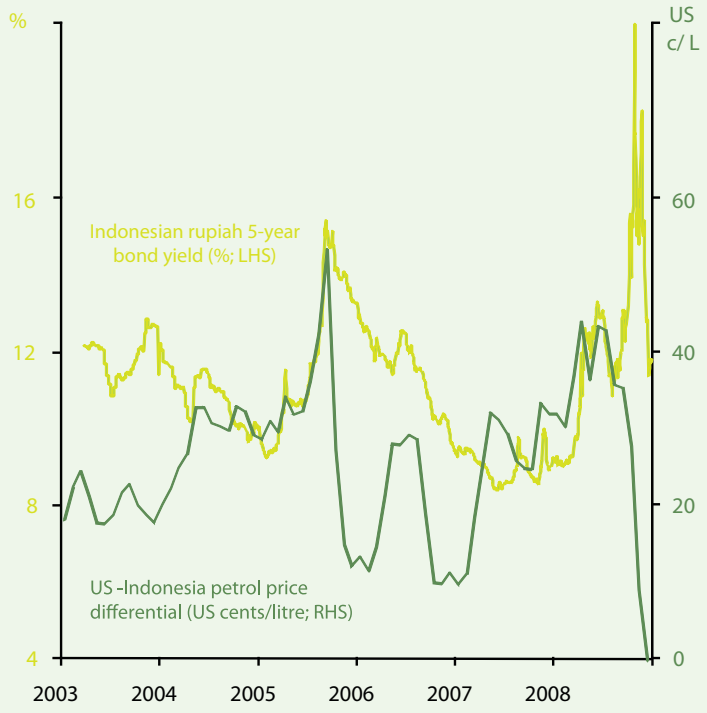
58 For a detailed analysis of the impact of energy subsidies on public finance see Agustina et al. (2008) and the World Bank (2007b).

Figure 7.3: Rising commodity prices have contributed to the appreciation of the exchange rate



Source: IMF and World Bank data.

Figure 7.4: Indonesian bond yields are correlated with the fuel price gap



Source: CEIC; US Department of Energy; World Bank staff calculations.[59]

59 The author is grateful to Tim Bulman for developing this figure.

b. A Missed Opportunity?

Indonesia failed to take full advantage of increased commodity prices to promote growth for two main reasons:

- The supply response of most commodity sectors to the commodity price hike was weak; and
- The Government used the windfall revenues unproductively.

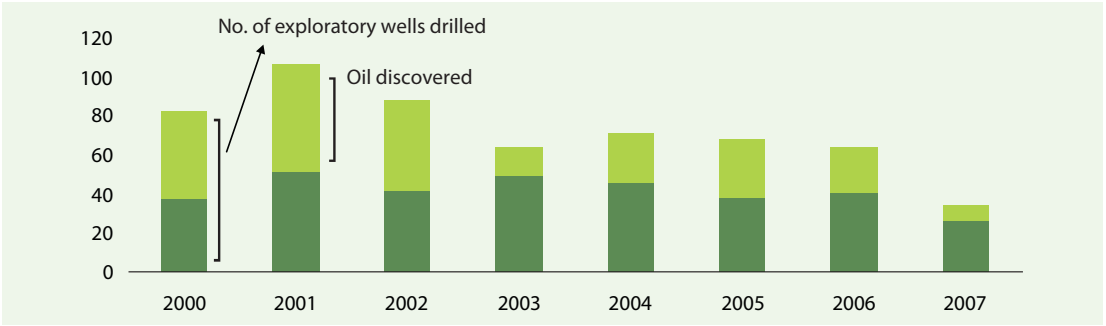
Weak supply response:

While the value of Indonesia's commodity exports increased significantly, increases in the volume of commodity exports was limited. In other words, there was a low supply response on the part of the commodity sectors to the increased commodity prices. A growth decomposition analysis shows that the increase in commodity prices between 2005 and 2007 explained 82 percent of commodity export value growth and 65 percent of total export value growth.

Oil and gas sectors: Supply from the oil and gas sector was disappointing. The supply response from the oil and gas sectors, which contribute to about 11 percent of GDP, was the most disappointing. Instead of increasing oil and gas production in response to the increased prices, Indonesia's production declined steadily, from 1.5 million barrels per day in 1999 to less than 950,000 barrels per day in 2008. As a consequence, since 2004, Indonesia has become a net oil importer. The fall in oil and gas production was largely due to decreased investment in oil and gas exploration, with the level of this investment falling from more than US$1 billion before the onset of the East Asian monetary crisis to well under half that amount by the early years of the last decade (BP Migas data). The reduced investment in exploration caused exploratory well-drilling to fall steadily, from 106 new exploratory wells in 2001 to 34 in 2007 (Figure 7.5). Consequently, the discovery of new oil reserves has decreased dramatically: only eight exploratory wells found oil in 2007, compared with 55 in 2001. The main reason for the fall in investment has been an increase in uncertainty in the already unfavorable business climate of Indonesia.

Weak supply response on the part of non-oil mining sectors: The supply response on the part of the non-oil mining sectors to the rising prices was also negative or very low despite significant potential. With the exception of the coal sector, which achieved significant increases in export volumes from existing mines, the other non-oil mining sectors achieved limited or negative export growth in the volume of exports. The volume of production of copper, which accounts for one fourth of non-oil mining revenues, declined by 21 percent, despite the fact that the price of this commodity increased by 315 percent from 2000 to 2007.

Figure 7.5: Oil exploration activity in Indonesia has declined steadily since 2000



Source: Ministry of Energy and Mineral Resources.

The very low level of growth in supply is explained by declining levels of investment in the mineral sector, from more than US$2 billion in 1998 to less than US$1 billion in 2006. Over the past ten years, Indonesia has been unable to sign a single new Contract of Work with a major international mining company, leading to stagnant and even falling volumes of production of minerals, despite enormous geological potential. As a result, non-coal mining companies' net profits declined by almost half in the period from 2007 to 2008.

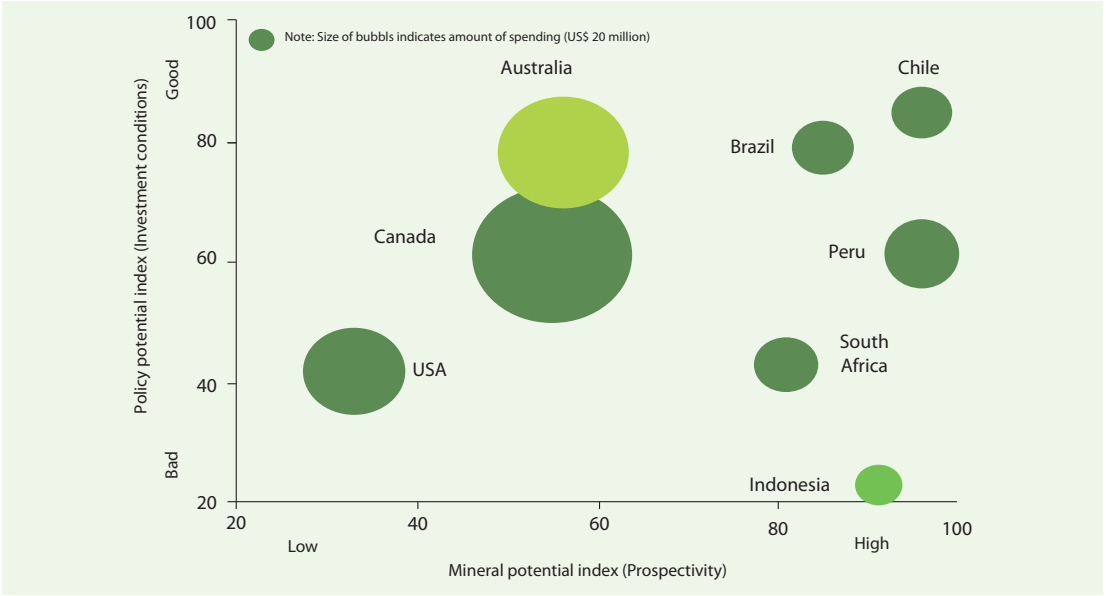
One of the main reasons for the decline in investment in this sector is the non-conducive business climate. Though Indonesia is ranked as one of the countries with highest mining potential in a 2005 survey of mining and exploration companies worldwide conducted by PricewaterhouseCoopers, it ranks very badly in terms of its business climate (Figure 7.6). This explains why its production-to-reserves ratio is low relative to its main competitors: this ratio is half that of Chile and Australia for copper and half that of China for coal.

Unproductive use of revenues:

While increased commodity prices resulted in increased government revenues, these were largely spent on subsidies rather than on productive investments. Klein and Cukier (2009) and other proponents of domestic-led growth criticize East Asian countries for their excessive attention to the export sector and neglect of the domestic sector. This criticism could also be applied to Indonesia. Increased revenues from commodities over the past two decades have not been used to revamp the domestic sector and unleash its growth potential.

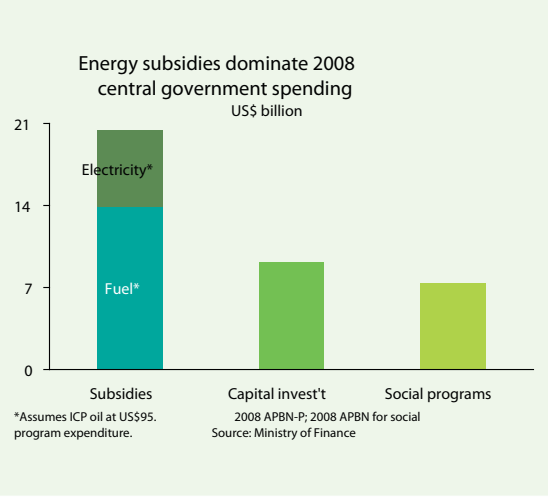
The Government has used a large part of the commodity windfall revenue to pay for subsidies rather than on productive investments. This is very different from the situation in the 1970s, when commodity windfall revenues were used for productive investments in infrastructure, irrigation and agricultural extension services that promoted the expansion of the domestic sector. Energy subsidies

Figure 7.6: Indonesia has tremendous mineral prospects but very unfavorable investment climate and as a result little investment



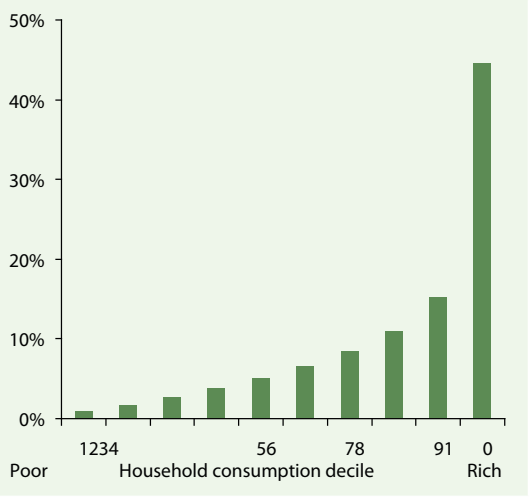
Source: Pricewaterhouse Coopers (2005).

Figure 7.7: Energy subsidies in Indonesia amounted to 2½ times social assistance



Source: World Bank staff calculations.

Figure 7.8: Fuel subsidies benefit the rich more than the poor



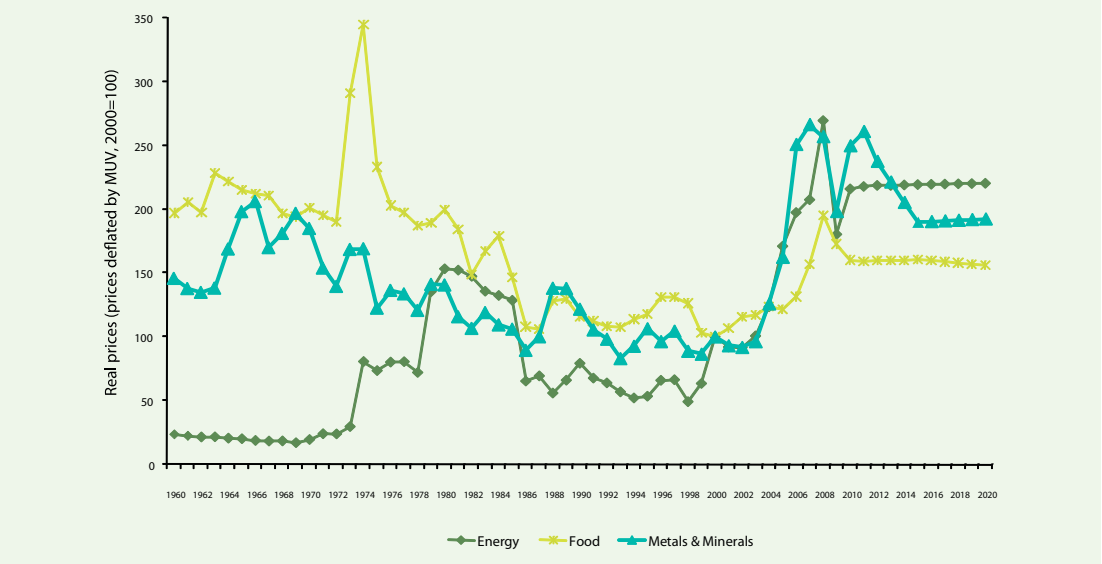
Source: World Bank staff calculations using Susenas 2007.

dominated 2007 and 2008 central government spending, with expenditure on these subsidies before they were reduced in May 2008 amounting to almost two and a half times that on social assistance (Figure 7.7). Despite the cut, energy subsidies remained inefficient and poorly targeted. The richest 20 percent of the population received almost two thirds of the direct benefits of the subsidies, while the bottom 10 percent only received 1 percent of the direct benefits (Figure 7.8).

7.5 The new global reality: High and volatile commodity prices

Despite the recent fall in commodity prices due to the fall in global demand during the global financial crisis, most forecasters expect commodity prices to remain high in the long term. Most experts in commodity price forecasting (IEA, OCDE, FAO, IFPRI, USDA, and university economists) believe that commodity prices are facing a structural break and will remain permanently higher than previously expected. As the world economy recovers from the present global financial crisis, developing countries' demand for energy and metals will continue to increase. This will cause demand to outpace supply, preventing commodity prices from falling. Agricultural prices are likely to follow energy prices due to the link of biofuels and fertilizers to energy prices, assuming that biofuels policies in the US and the EU are maintained and that the price of oil stays above US$50 per barrel (minimum price required for biofuels production to be profitable).

Figure 7.9: Commodity prices increased sharply during most of the current decade and are forecast to remain high for the next decade relative to 2000



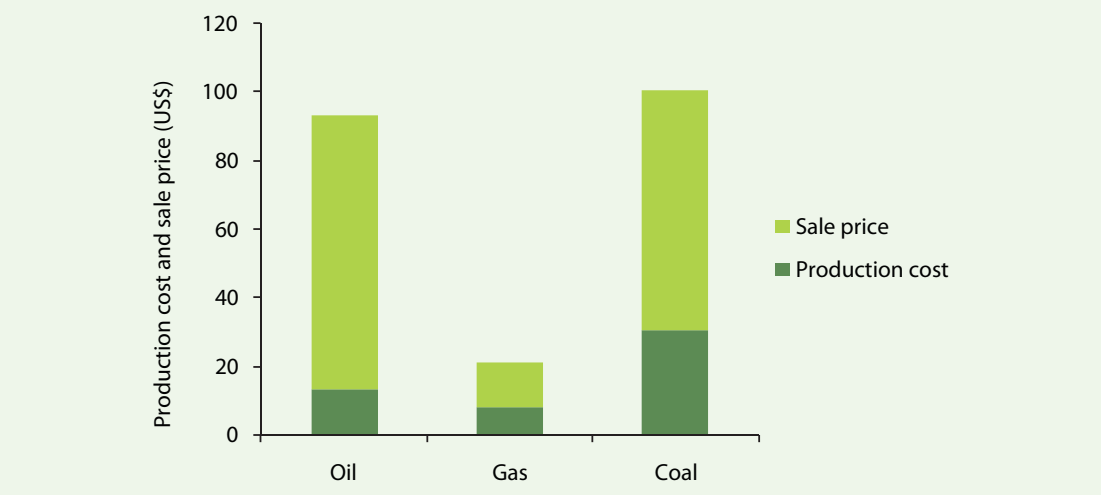
Source: World Bank staff calculations using data from World Development Indicators and forecasts from World Bank DECPG as of April 2010.
Note: Prices are measured relative to the Manufacturing Unit Value of World Exports index (MUV) in constant 2000 US$.

Consistent with this analysis, the World Bank forecasts that commodity prices will recover and remain relatively high for the next decade.[60] The price of commodities relative to the unit value index of global manufacture exports is forecast to remain around 56 percent higher than in 2000 over the coming years in the case of food, 92 percent higher in the case of metals and 120 percent higher in the case of energy (Figure 7.9).

If the business environment in Indonesia were more conducive, the forecasted high commodity prices would represent a great opportunity for energy, metals and mineral producers. As Figure 7.10 shows, the present costs of production of oil, gas and coal in Indonesia are significantly below international sale prices. In a more certain business climate, this should result in highly profitable margins.

60 Note of caution on forecasts: Forecasting commodity prices is difficult and past projections have not always been accurate. This is partly because of the general difficulty of making any economic forecast and partly because commodity markets are especially prone to supply shocks from government policy changes, geopolitical disturbances, cartel behavior and the vagaries of weather. Demand for commodities is also price inelastic which leads to large price changes in response to small changes in quantities demanded or supplied. The often long lags between investments and production lead to capacity constraints that cannot be overcome for several years as is the current situation in crude oil and metals markets. Thus, it is prudent to view all commodity price forecasts with caution. The World Bank regularly makes medium-term price projections for primary commodities, and has done so for more than half a century. These forecasts have generally been too high and prices have declined more rapidly than expected. The current price increases (since 2001) were projected to occur, but the magnitude of the increases were underestimated and the emergence of China as a major consumer and importer of commodities was not fully appreciated.

Figure 7.10: Sale prices of oil, gas and coal are well above production costs in Indonesia



Source: World Bank staff calculations based on data from *Tempo* magazine 14-20 April 2010, p.11.
Note: Price and costs are expressed per barrel for oil, per MMBTU for gas and per ton for coal.

While the average price of commodities is expected to remain high, it is also expected that they will be characterized by an extremely high level of volatility and fluctuation. Commodity markets are especially prone to supply shocks from government policy changes, geopolitical disturbances, cartel behavior and the vagaries of weather. Demand for commodities is also price inelastic which leads to large price changes in response to small changes in quantities demanded or supplied. The often long lags between investments and production lead to capacity constraints that cannot be overcome for several years, as is the current situation in crude oil and metals markets. In addition, the increasing weight of emerging economies in global consumption of commodities increases the sensitivity of commodity markets to their macroeconomic performance which is more volatile than that of developed economies.

7.6 Indonesia: Having its cake and eating it too

It is likely that, on average, commodity prices will remain at historically high levels for another decade at least. So, what role should commodities play in Indonesia's development? In the past, Indonesian policymakers have focused their attention on encouraging and protecting the declining manufacturing sector, which in the past was the engine driving Indonesia's growth, tending to neglect the mining and energy sectors. To some extent, they have also tended to favor the export sector over the domestic sector, which has remained constrained by non-conducive regulatory environment.

a. Unleashing the full potential of all sectors

Indonesian policymakers and others sometimes debate the advantages of either the manufacturing sector or commodity sector as engines of growth, or on the advantages of either a domestic market orientation or an export market orientation. In reality, these debates are based on a false dichotomy. Rather, the real issue should be understanding the distinction between low and high productivity production and encouraging the latter.
Rodrik (2009) argues that the engine of growth in the global economy since the end of the

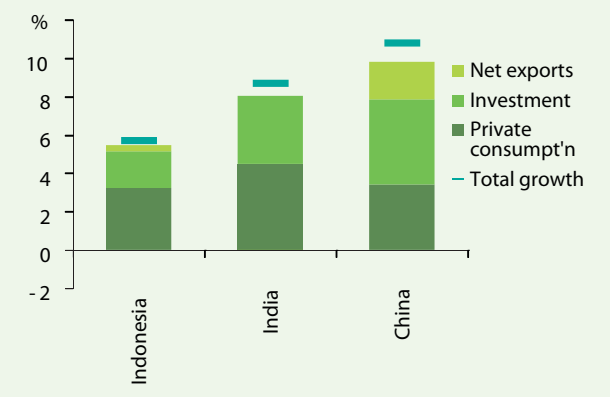
Second World War has been rapid structural change in the developing nations involving a shift from low-productivity ('traditional') to high-productivity ('modern') activities. In his empirical work, Rodrik tends to create a misleading impression by conflating the industrial sector with the modern sector. However, this is rather a matter of practical convenience, given the limited availability of cross-country data on services. Rodrik admits that high productivity activities are not exclusive to the manufacturing sector. Rather, high productivity may also characterize the services and commodities sector. For an example of a high productivity activity in the services sector, he cites call centers, while in the commodities sector he refers to horticulture. Lederman and Maloney (2007 and 2009) and De Ferranti *et al.* (2002) tend to defend commodities as a driver of growth by emphasizing that high productivity activities may also be found in the commodities sector. To paraphrase their point of view, what is important is not what is produced but how it is produced.

Distinguishing between exports and domestic goods does not make much practical sense since the emergence of services has blurred the distinction. In the past, non-tradables were considered to consist mostly of services and other products that cannot be exported, but such a description is no longer valid. Many services are now routinely traded across borders, with the total global value of exports of services worth around US$2.4 trillion (Drake-Brockman, 2010). This is due to both technological improvements which allow many back office services to be provided by workers without regard to their location and by liberalization, which facilitates the trade of services, such as consultancy services, by foreign providers. The distinction between tradables and non-tradables is becoming increasingly less relevant, simply because most products and services can, in fact, be traded to some degree.

The export-led growth model has been misinterpreted to imply an exclusive focus on the export sector, when in fact it advocates reform in both the export and domestic sector. The rationale behind the export led growth model is that, given the challenging task of reforming the whole economy all at once, it is best to focus initially on the export sector to kick start productivity gains and dynamism. When this sector picks speed, it is argued, this dynamism can be spread to the rest of the economy through domestic reforms. While the East Asian tigers were very good at following the first phase of the strategy, as they reaped the benefits from such phase they felt less compelled to perform the painful domestic reform that is needed to promote the domestic sector (Kelvin and Cukier, 2009). Having applied only half of the recipe, the East Asian tigers are now faced with the need to rebalance their orientation and focus on increasing productivity in the domestic economy.

Indonesia should strive to increase productivity in all sectors so that growth is maximized. In this context, it is not necessary to choose to focus on either the commodities sector or the manufacturing sector, or to make a similar choice between domestic markets and export markets. Continued increases in productivity are possible in manufactures and services. They are also possible in the commodity sector, where there is great room for technological improvements. Natural-resource-abundant countries such as Australia, Canada, Finland, Sweden, and the US initially based their development and technological progress on their natural resources. The experience of these countries shows that the development of a product combined with the aggressive pursuit and adoption of new comparative advantages by investing in skills, innovation and good institutions are a proven recipe the growth (De Ferranti *et al.,* 2002). Mining was the main driver of growth and industrialization in Australia and the United States for more than a century, as forestry has been in Finland and Sweden. In fact, even today, all these countries continue to export natural resource-based products, even after having developed the capacity to produce and export high-tech products (De Ferranti *et al.,* 2002).

Figure 7.11: Contributions to annual average GDP growth, 2003-08



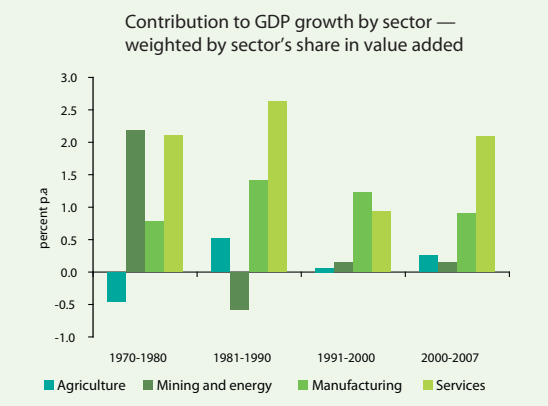
Source: World Bank (2010b).

Compared with some other East Asian countries, Indonesia has not relied on exports as an engine of growth to anywhere near the same extent. Therefore, there is no particular need to rebalance its sources of growth in favor of the domestic sector. Indonesia has been running a modest trade surplus (US$20 billion in 2009) and has not contributed significantly to the total current account surplus of East Asian countries. In the period from 2003 to 2008, domestic consumption has been a much more important driver of growth than net exports. In this regard, the contrast with China is striking (Figure 7.11). Expanding private consumption accounts for about 60 percent of growth in GDP over that period. With growth driven largely by domestic consumption, the impact of the financial crisis was mitigated and the country maintained relatively high growth rates despite the global slowdown. It is expected that consumption will continue to be a key driver of growth in GDP growth. However, the export sectors also hold promise. China's rebalancing from investment to consumption-led growth may open opportunities for Indonesia in terms of capturing market share in manufactures and in terms of greater demand for its consumer exports.

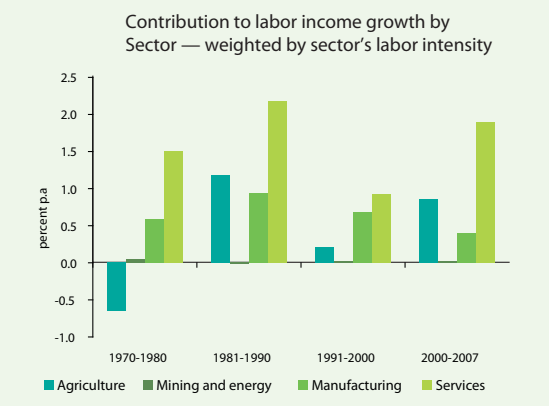
As a natural-resource-abundant country, Indonesia should take advantage of its natural resources and the windfall revenue they could generate. However, with its growing population, it is unlikely that Indonesia will be able to rely on commodities alone. The potential benefits to be derived from the exploitation of natural resources are too great to be ignored. At the same time, a failure to continue developing the manufacturing sector would lead to a spatial concentration of economic activity in islands outside Java. It would also fail to create enough employment opportunities to absorb the rapidly expanding workforce, as the resource sector is generally less labor-intensive than the manufacturing sector. Growth driven by non-labor-intensive sectors would fail to provide employment for the more than 2 million new entrants to the labor force each year. A high rate of growth of employment is needed to provide Indonesia's increasingly educated and skilled workers with better paying and more stable jobs. Indonesia's own past growth experience suggests that expanding manufacturing and services sectors are vital to absorb Indonesia's growing labor force, as both have been the main contributors to labor income growth (see growth decomposition in Figure 7.12). The agricultural and mining sectors contribution to labor income growth has been much less significant, with the exception of the agricultural sector in the 1981-90 and 2000-07 periods, when its contribution to labor income growth was larger than that of the manufacturing sector, although lower than the services sector. In labor-abundant Java, sufficient jobs are only likely to be provided through the development of labor-intensive globally competitive clusters, which will also accelerate growth and achieve greater economic inclusion.

There is also an economic efficiency argument: as an archipelago of islands with very different factor endowments, it does not make sense for the country to focus exclusively on either the manufacturing sector or the commodities sector. Rather, it is important to make the best use of the different factor endowments on each of these various islands. Java has a strong comparative

Figure 7.12: Even when primary sectors contributed significantly to Indonesia's economic growth, manufacturing and services contributed most to labor income growth



Source: World Development Indicators and World Bank staff calculations.



Source: World Bank staff calculations.

advantage in labor intensive manufacturing, whereas the non-Javanese islands have a strong comparative advantage in commodities. Reflecting such comparative advantages in the production of the different islands would contribute to an efficient use of factors of production across the country.

Lastly, an overdependence on the commodities sector would increase Indonesia's exposure to the boom and bust cycles that characterize commodities and could lead to unstable growth. The contribution of commodities to Indonesia's growth over the past three decades has been very volatile compared to the contribution of services and manufacturing sectors. Mining and energy have made a more significant contribution to growth than agriculture, but they share agriculture's growth volatility. For half of the years between 1971 and 2007, mining and energy contributed to GDP growth to a significantly greater level than its share to GDP (11 percent of GDP in 2007). However, for most of the other years, its contribution to GDP growth was negative (Figure 7.13). The growth generated by the mining and energy sector generally reflects mining and energy prices. However, this relationship weakened after the 1997 crisis. The rate of growth from mining and energy has been much lower than in the mid-1970s, despite high price growth. As stated previously, this largely reflects a weak supply response.[61]

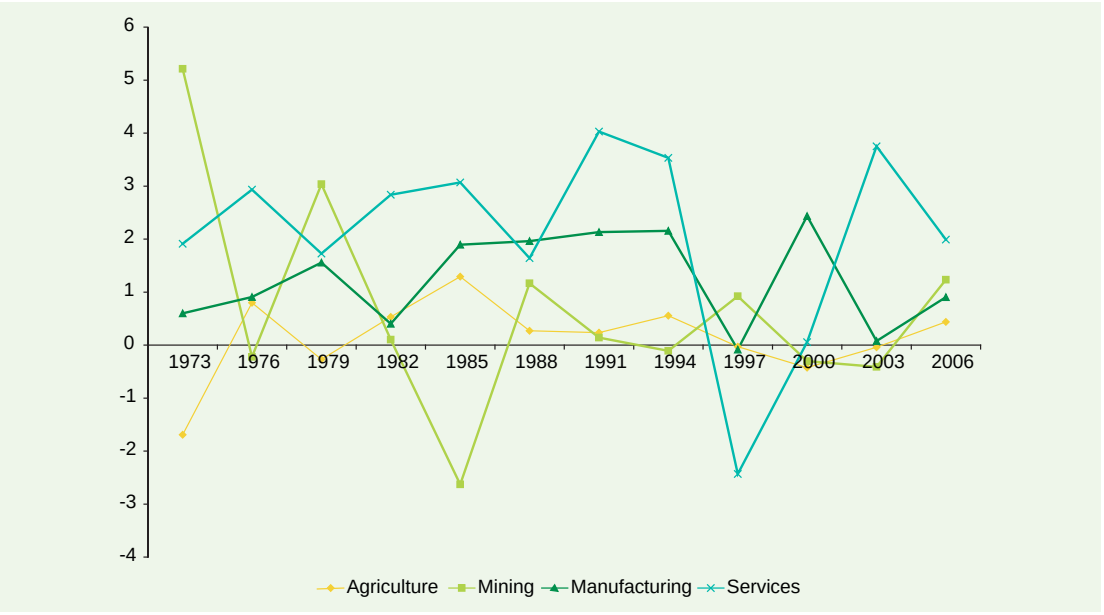
Agriculture has also been characterized by very volatile growth. It has contributed little to GDP growth over most of the past three decades, despite the fact that it continues to contribute to a large portion of GDP (around 14 percent in 2007). The exceptions are the mid-1970s and 2007 (periods of high food prices) and the mid-1980s (Indonesia's Green Revolution). Even so, only in the mid-1980s has agriculture's contribution to GDP growth been higher than its GDP share (Figure 7.13).

b. Making the most of the commodity windfall

How can Indonesia best profit from the development opportunities created by high commodity prices, while at the same time maintaining a diversified economy? First, the Government should maximize the commodity windfall by facilitating an appropriate supply response to high commodity prices. In particular, the commodity windfall would hugely increase if the Government facilitates the supply response in the oil and gas and mining sectors.

61 See Chapter 6 for a growth decomposition analysis.

Figure 7.13: Percentage point contribution to Indonesia's GDP growth by sector, three-year average, constant rupiah 2000



Source: World Bank staff calculations using data from World Bank's World Development Indicators.

Among other means, the Government should facilitate this improved supply response by improving the oil and gas and mining regulatory environment and by entering into mutually beneficial agreements with investors. Independent surveys of the Indonesian mining, oil and gas sectors show that a key impediment to new investment is the lack of certainty with regard to tax and revenue issues. Regulations are often conflicting, resulting in a great degree of uncertainty. Investors perceive Indonesian regulations as non-conducive (Figure 7.6). New market entrants do not understand the complex structure of the nation's oil, gas and mining revenue systems. Even firms that have operated in the country for a long time continue to struggle with these ambiguities.

Potential investors waited for years for Parliament to enact a new mining law. However, when the law was finally promulgated in 2008, it incorporated numerous provisions that do not support large investments. For example, the mining Contract of Work system, which provided legal certainty to investors for decades, has been abolished in favor of a licensing system. However, no implementing regulations have been formulated to provide the framework that would make this new system work. The new mining law also requires that minerals be processed inside Indonesia before being exported, adding to costs and uncertainty. In addition, mining investors face conflicts between mining operations and forestry regulations, overlapping authority between central and local governments, and contradictory tax rules.

In the oil and gas sector, the biggest problems identified by investors are (i) uncertainty over cost recovery and BPKP audits, (ii) contract sanctity, (iii) interference from other government agencies, (iv) tax issues such as 'ring fencing', and (v) security of assets, people and ownership rights. Slow progress resolving these issues caused Indonesia to miss out on a global wave of new oil, gas and mining investment that was sparked by the surge in global commodity prices up to mid-2008. A successful outcome to the ongoing discussions on the implementing regulations for the new mining law would trigger a large response by domestic and international mining investors. For instance, Australia's Senior Trade Commissioner noted that "Australian firms were prepared to invest

more than US$4 billion in Indonesia's mining industry".[62] That investment alone would increase the level of new investment in mining by almost 400 percent.

One area in which the supply response to increased commodity prices has been good has been the palm oil sector. However, ensuring that this continues will require upgrading and enforcement of the country's environmental protection and social standards to secure market access to the EU and the US.[63] Global demand for palm oil is expected to remain strong and Indonesia is well positioned to meet this demand. Indonesia's oil palm production is expected to continue to increase, as the cost of production is relatively low (Jurgens *et al.,* 2009). In addition, the Government strongly supports the increased palm oil production, because it confers significant economic benefits to rural producers and contributes to national export earnings and economic growth.

However, the ongoing expansion of Indonesia's palm oil industry is threatened by serious environmental concerns. In particular, the high cost of securing land for oil palm expansion is causing companies to develop peat lands and primary forests. In many cases, this is leading to the displacement of local communities or to negative impacts on their livelihood opportunities.[64] It is also resulting in a loss in biodiversity and environmental services and in the emission of a significant volume of greenhouse gases. Runaway fires, often caused by land clearing activities, have led to the destruction of large areas of forest, with the smoke and haze from these buyers leads to health problems, economic losses, and damage to Indonesia's standing abroad. As a result of these negative environmental impacts, some large international buyers are becoming increasingly unwilling to purchase palm oil from Indonesia unless it moves to achieve compliance with accepted international environmental standards.

Expansion into less fragile areas, such as degraded forests and grasslands, could facilitate ongoing growth in Indonesia's oil palm industry with less detrimental environmental impacts. Policies to achieve this include a reduction in the private sector's land acquisition costs and the provision of additional incentives to ensure comparable returns in areas of degraded forests and grasslands. Indonesia's international standing could be improved through the establishment of restrictions on expansion of oil palm in forests and peat lands and provision of resources for monitoring and enforcement of such restrictions [see Jurgens *et al.* (2009) for an in depth analysis].

More generally, it is necessary to implement measures to improve agricultural productivity to enable an improved supply response to the high commodity prices. Low productivity is a pervasive problem in Indonesian agriculture, caused largely by a decline in investment in agriculture and the infrastructure required to support it, with this lack of investment resulting in deteriorating irrigation facilities, land degradation, poor extension services and lower yield growth. As an indication of the low level of productivity in Indonesia, its palm oil production per hectare is a third of that of Malaysia[65] while its rubber production per hectare is less than two thirds that of Thailand.[66]

62 The Jakarta Post, 19 February 2008.

63 To be sustainable, growth will need to tackle as well the issue of climate change. The World Bank is currently in the process of supporting the Government of Indonesia in evaluating policy options for addressing climate change in the medium term plans and policies. A first phase of analysis identified the main areas of emissions and policy challenges. A second phase is now underway. It includes a macro policy options element and four detailed sector analyses covering forestry and land use, power generation, transport and energy efficiency.

64 "Nucleus Estates and Smallholders Projects in Indonesia – Performance Audit Report", OED, World Bank, September 1992.

65 As quoted by Pak Joko Supriyono GAPKI general secretary and Pak Susanto GAPKI chairman in The Jakarta Post article "RI CPO competitiveness under threat" by Benget Besalicto Tnb. 25 May 2009.

66 Based on data reported in Jakarta Post article "Govt to doll up aging rubber plantations" 3 June 2010.

To optimize government revenues from the potential windfall from increased commodities prices, it is important that the government enters into mutually beneficial agreements with investors. Based on international experience, these agreements could be formulated according to the following four characteristics (Humphreys, Sachs and Stiglitz, 2007):

- Contracts should factor in any potential increase in commodity prices in the future, as well as changes in output and other economic circumstances. This would help to avoid situations where corporations receive an unconscionably high rate of return and the Government a marginal amount because of contract formulated on the basis of previous lower prices or output;
- Design auctions with the objective of increasing the level of competition between corporations, as it will increase the value received by countries and reduce the risks of cronyism.
- Make contracts transparent and involve domestic constituents in the evaluation of contracts to increase the bargaining power of domestic negotiators vs. the corporation and avoid corruption.
- Require that corporations post bonds in anticipation of future clean-ups to protect the environment.

To maximize the opportunities created by increased commodities prices while at the same time avoiding the Dutch disease, measures to achieve two goals should be implemented:

A. mitigation of the exchange rate appreciation and
B. increased competitiveness of the tradable sectors.

A. Mitigation of the appreciation in the exchange rate:

It appears that the increased price of commodities has already caused the rupiah to appreciate (Figure 7.3). Three alternative strategies could be implemented to mitigate this appreciation:

1. Sterilization of windfall revenues through the creation of a sovereign wealth fund;
2. Increased savings to reduce large capital inflows; and
3. Implementation of a pegged exchange rate.

1. Sterilization of windfall revenues through the creation of a sovereign wealth fund: the establishment of an offshore sovereign wealth fund where the windfall revenues are placed could enable the Government to introduce revenues into the national economy at a controlled pace. Funds in the offshore fund could be invested to generate real interest for the Government. This would transform a non-renewable resource into a financial asset that could last forever (if the Government only draws the real interest rate). It would also convert volatile resource revenues into a stable revenue stream for the Government.

In addition, by placing the money offshore, the Government achieves a form of sterilization that reduces the spending effect that drives up appreciation. The investment revenues derived from the commodities sector drive up the value of the fund without affecting the exchange rate and hurting the country's competitiveness. The most notable case of a country establishing a sovereign wealth fund is Norway, which successfully established a 'Petroleum Fund' in 1995. Other examples are Chile's Copper Stabilization Fund, set up in 1985; the Russian Federation's Stabilization Fund; and Kuwait's Future Generations Fund, established in 1976. More recently, Timor-Leste adopted a similar model, with additional transparency measures, for its oil revenues.

The sterilization effect distinguishes this type of fund from others, such as that of Australia's, which are only designed to address future pension liabilities, not to sterilize the impact on the exchange rate. In the case of Australia's fund, a great share is invested domestically, which drives up the real exchange rate. A key determinant of how much of the sovereign wealth funds to bring into the country every year is the country's absorptive capacity, as the greater the level of financial inflows, the greater the inflationary impact on the real exchange rate. Another important determinant is the value of the national wealth, which should factor in the depletion of stocks and the degradation of the environment. This method of calculating national wealth will avoid the temptation to spend too much of the depletable resource (Humphreys, Sachs and Stiglitz, 2007).

2. Increased savings: measures to increase savings will achieve a reduction in large capital inflows that place pressure on the real exchange rate. This can be achieved by running a budget surplus or by encouraging the private sector to save more, which reduces the need for foreign financing of the government deficit. One means of achieving this is through reductions in income and profit taxes. However, there is limited scope for tax cuts to increase savings, given that taxes in Indonesia are not high relative to its neighbors.

3. Pegged exchange rate: while superficially an attractive measure, this is not an easy policy to implement. It requires a consistent macroeconomic policy stance, particularly in relation to coordination between fiscal and monetary policies, with fiscal policy needing to be flexible and responsive enough to handle price shocks. This can pose important macroeconomic challenges (see Annex 1), as Indonesia found in 1997 when it decided to abandon the crawling peg regime it had operated between 1988 and 1994, with the decision to abandon the peg due to pressures resulting from the collapse of Thailand's currency.

B. Increasing the competitiveness of affected tradable sectors.

The second way to avert the Dutch disease is to boost the competitiveness of the affected tradable sectors: agriculture, manufactures and services. To compensate for the increase in the final price of goods in foreign currency caused by the appreciation in the exchange rate and the greater cost of factors intensively used in the resource sectors, firms need to lower their costs of production by increasing their productivity. There is plenty of scope to increase the productivity of Indonesia's tradable sectors. Indonesia's commodities and manufacturing sectors are generally low tech. In the manufacturing sector, the volume of medium tech and high-tech exports is low (9 percent and 11 percent, respectively, in 2007).

Indonesia's export sector has been characterized by a serious lack of innovation. Since the late 1990s, its export growth has been driven mainly by the increased volume of exports of "old" products rather than the introduction of "new" products. The lack of innovation and dynamism in the manufacturing and commodity processing export sector since the East Asian crisis is confirmed by a decomposition analysis. Such an analysis shows that the expansion of the "intensive margin" products (existing products) was considerably higher than the expansion of "extensive margin" (new products) as a proportion of total export growth during the period 1997-2007 (Table 7.2).[67] Furthermore, it is important to emphasize that a key part of this "intensive margin growth" has been driven by price increases rather than increases in exported volumes. As mentioned before, four-fifths

67 "Intensive margin" can be defined as the volume of existing exported products. "Extensive margin" can be defined as the number of exported products. Expanding the intensive margin implies expanding the volume of currently exported products, while expanding the extensive margin implies increasing the number of exported products (i.e. introducing new exported products).

Figure 7.14: Old stuff still dominates export growth

Source: Data from BPS and World Bank staff calculations.

Table 7.2: Export "discovery" has been minimal

	Products that were "small" in 1997 (bottom decile)	Products "discovered" between 1997 and 2001	
Year	Share over tot. exports (%)	Share over tot. export (%)	Share over mfg. exports (%)
1997	0.00	-	-
2001	0.29	1.17	1.65
2007	1.29	3.12	6.05

Source: World Bank staff calculations by using trade data from BPS.
Notes: "small" products are products that were in the bottom decile in terms of their share in Indonesia's total exports in 1997 (they amounted only to $403,118 in 1997), "Discovered products" are those products that experienced an increase in their share over total Indonesia's exports from close to zero in 1997 to some positive fraction in 2001.

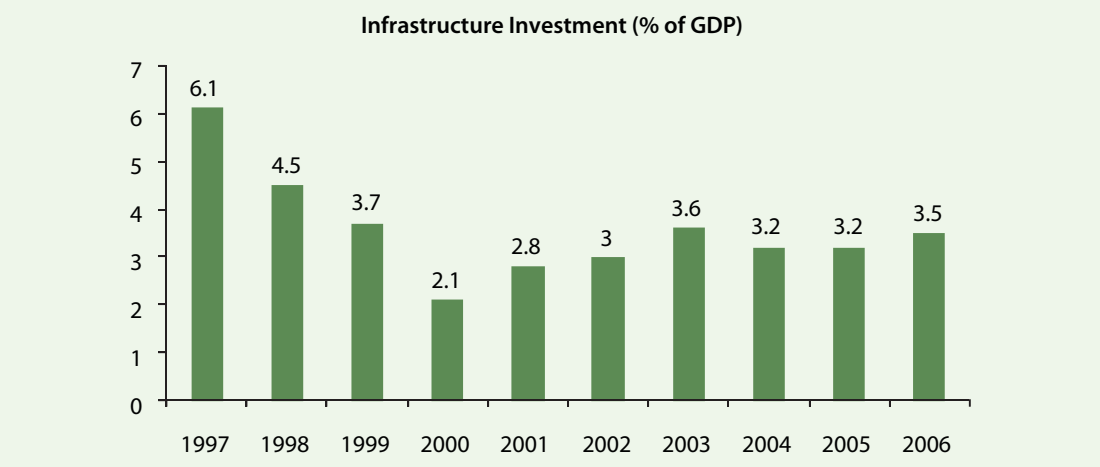
of commodity export growth from 2005 to 2007 is explained by the increase in prices, rather than by increases in export volumes. Indonesia's limited progress in diversifying its exports after 1997 is further confirmed by Table 7.2, which shows that new products and products that were relatively unimportant in terms of Indonesia's exports in 1997 have remained unimportant after 10 years.

While sometimes attractive to policymakers for political reasons, protectionism would only exacerbate the worst effects of Dutch disease. Imposing tariffs on imported goods would increase the costs of imported inputs. This would hurt the competitiveness of enterprises making use of those inputs and would artificially reduce importers' demand for foreign currency, further appreciating the real exchange rate. In turn, this would hurt the competitiveness of the tradable sector.

The Government can implement six key policies to increase the competitiveness, technological sophistication and dynamism of the different sectors:

1. Improved logistics;
2. Encouraging foreign direct investment (FDI) flows and maintaining an open economy to attract the skills and knowledge needed;

Figure 7.15: Infrastructure investment, as a percentage of GDP, is about half what it was before the crisis



Source: World Bank (2007).

3. Encouraging the development of knowledge industries in natural resource based activities;
4. Encouraging the creation of new endowments in human capital and knowledge;
5. Encouraging the development of better institutions and institutional frameworks; and
6. Promoting the development of the services sector.

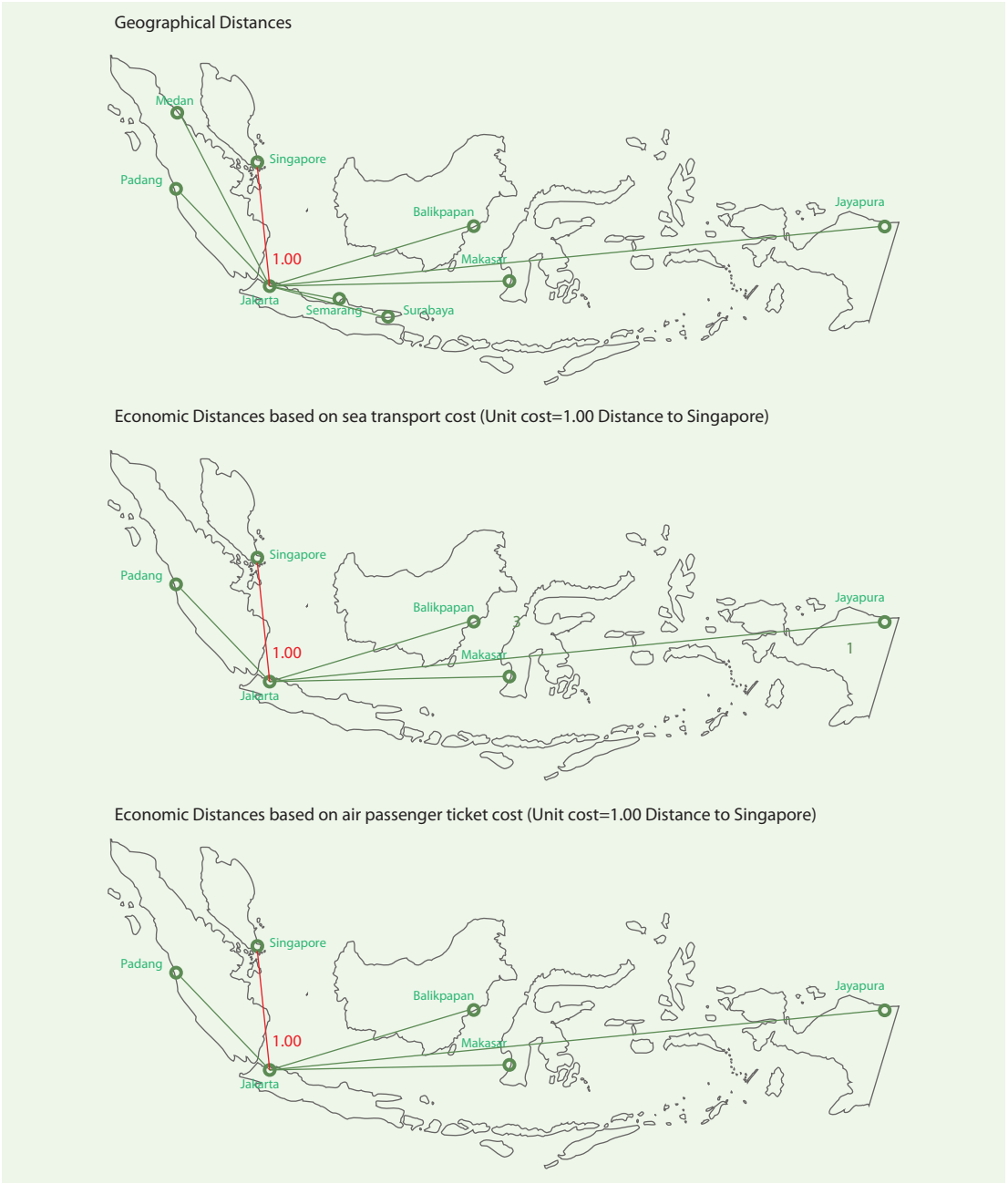
1. *Improved logistics:* Poor logistics reduce the competitiveness of Indonesian products and inhibit greater processing of commodities and the export of higher value-added products. With the high cost of transport, production inputs in remote areas are often extremely expensive, and it is costly to send final products for sale in markets in other regions. As a result of the high cost of domestic transportation services, it is often difficult to establish synergies between the commodity producing outer islands and manufacturing oriented Java. Because of the difficulty of transportation to Java-based processing facilities, some high quality commodities with great potential, such as shrimp from eastern Indonesia, cannot be exported. Others, such as pineapples, are canned abroad.

The high cost of transportation and uncertainty in distribution channels also prevent Indonesia from achieving a higher level of integration with just-in-time production networks to create higher value added products. The high cost of logistics is partly the result of underdeveloped infrastructure: Indonesia's infrastructure investments have declined dramatically since 1996 and as a result the country has one of the lowest levels of access to infrastructure in the region (Figure 7.15).

High logistical costs are also partly due to the non-conducive business environment. Figure 7.16 shows the contrast between the air travel industry which was liberalized after the East Asian crisis and is characterized by a high degree of competition and the maritime industry. Transporting a container from Jakarta to Padang is 2.7 times more expensive than transporting the same container to Singapore, despite the fact that it involves a similar distance.[68] The cost of passenger tickets on airplanes between the same destinations shows the opposite pattern: it is relatively much cheaper for a passenger to fly from Jakarta to domestic destinations than to Singapore. While the cost of

68 Note: Economic distances for sea transport calculated with the cost/mile for a 20-foot container from Jakarta to Singapore as a base unit (US$0.23/mile =1.00). Economic distances for air transport calculated with cost/mile for air passenger ticket costs from Jakarta to Singapore as base unit (Rp. 936/mile=1.00)

Figure 7.16: Maps of economic distances based on air passenger ticket costs and sea transport costs of 20 foot container from Jakarta to major Indonesian cities and Singapore



Source: World Bank staff calculations based on Maersk, Lion Air and Garuda (2009).

shipping pushes the "two Indonesias" — Commodity-Producing Indonesia (off-Java islands) and Labor-Intensive Indonesia (Java) — further apart, air travel draws them together. In addition to stimulating trade and encouraging the processing of commodities, connecting commodity intensive Indonesia with labor-intensive Indonesia will help reduce poverty by increasing income and job opportunities for poor rural households.

A promising development is the Government's recently developed logistics reform blueprint, which rightly focuses on regulatory reform, strengthening human resources in logistics, strengthening logistics service providers, encouraging greater use of information technology in trade facilitation, developing improved infrastructure and facilitating greater coordination between ministries involved in logistics (see Technical Note on Logistics at the end of this report for a list of quick win actions on logistics).[69]

2. Encouraging foreign direct investment (FDI) flows and maintaining an open economy to attract the skills and knowledge needed: As discussed in Chapter 6 and as demonstrated by previous empirical evidence, a higher level of FDI is crucial to attract the needed technological and market knowledge that will drive a diversification of exports, both within and outside the natural resource based sectors. Increased FDI will also result in other desirable outcomes, including higher intra-industry trade, innovation and skills promotion (De Ferranti *et al.,* 2002).Establishing an enabling environment for FDI by improving the business regulatory environment, human capital, public infrastructure, and knowledge clusters is therefore crucial. These are areas where Indonesia lags behind. Indonesia has one of the least favorable business environments for private sector investment in East and Southeast Asia. It is ranked 122nd out of 183 economies on the World Bank's *Doing Business 2010* index (World Bank, 2009b), well below Vietnam, Thailand, Malaysia and China. IMD's (2009) *World Competitiveness Yearbook* 2009 places Indonesia 42nd out of 57 economies, below Thailand, Malaysia and China and India. Steps would need to be taken to improve the investment climate and thereby to promote domestic and foreign investment in knowledge infrastructure, which in turn will improve the technological sophistication of production in the different sectors. The list of reforms that Indonesia would need to perform to attract FDI is extensive, but includes eliminating or reducing conflicting regulations, improving land entitlement and relaxing labor laws. [70]

3. *Encouraging the development of knowledge industries in natural resource based activities where Indonesia has a comparative advantage:* Natural resource-based economic activities can drive the development of knowledge industries. That was the case with mining in the US, which led to the development of a strong technological system; forestry and forest products in Finland and Sweden; and fresh-fruit production and marketing in Chile. Note that developing a dynamic natural resource-based sector is not incompatible with building new comparative advantages in footloose and high-tech manufacturing. Both sectors coexist not only in natural resource-rich developed economies, but also in the already highly diversified export structure of Brazil and Mexico (De Ferranti *et al.,* 2002).

In order to succeed, natural resource wealth needs to be complemented with human capital, knowledge and a good institutional framework. For instance, Indonesia could aim to move from merely extracting minerals to promoting the development of engineering services for mineral extraction. Similarly, it could move from merely producing raw commodities to producing also downstream higher value/knowledge derivatives itself. Indonesia is the world's largest exporter of palm oil in terms of volume, but is second to Malaysia in terms of export value because of the low value-added content of its palm oil exports.

69 The following recommended actions in the technical note have already been undertaken by the government since the dissemination of the technical note: introduction of 24/7 operations in key ports, construction of the Jakarta Outer Ring Road (JORR), establishment of a Logistics Team, and the development of a Blueprint for logistics reform.

70 For a comprehensive review of the investment climate see the World Bank report "Raising Investment in Indonesia: A Second Generation of Reforms." The report suggest actions to improve the investment climate in eight areas: maintain macroeconomic stability, strengthen the financial sector, advance reform in tax and customs administrations, increase flexibility in the labor market, improve public planning and management of infrastructure, ease investment procedures, address key decentralization issues to eliminate nuisance taxes by local governments, and fight corruption.

Although the volume of palm oil exported by Indonesia was 8 percent higher than that exported by Malaysia, Indonesia earned around half the export revenues of Malaysia in 2007. This is explained by the fact that Indonesian palm oil is of lower quality and therefore commands a lower price (Chapter 6) and the fact that more than 75 percent of Indonesia's palm oil output is exported in a raw form, as CPO, whereas Malaysia exports 80 percent of its output in the form of value-added products.[71] The reason for Indonesia not venturing into higher value added downstream activities appears to be the weak distribution and marketing networks, the lack of an appropriate skill base and the huge investment required in establishing an oleo-chemical plant.[72] These together with the lack of strong competition among large plantations and the unconstrained availability of land given weaknesses in enforcing forest regulations, appear to keep the sector from moving up the value chain (Figure 7.17).[73]

The situation is similar for cacao. Indonesia is the world's third largest cacao producer. However, its cacao does not fetch a high price because of low quality due to tree maturity and seed quality. For quality and food safety reasons, the US imposes an automatic detention on cocoa imported from Indonesia, which implies a price discount of around 10 percent.[74] An additional reason for the lower export revenues is that 80 percent of cocoa is exported unprocessed, unlike the case in Malaysia, which exports all its cocoa in a processed form. The reason for such low processing in Indonesia is the low quality of cocoa and a business climate that does not encourage the establishment of value-added processing. In Indonesia, processed cocoa is subject to a 10 percent value added tax by the Government and to high import tariffs in destination markets.[75] The mining sector is also characterized by a high level of exports of unprocessed products. The reason provided by the Indonesian Mining Association is that the local market does not have the same capacity as the global market for processing mining output. Building smelters not only requires a high level of investment, it also means that miners need to deal more with the bureaucracy when it comes to processing permits.[76]

4. *Encouraging the creation of new endowments in human capital and knowledge:* During the period between the mid-1970s until the 1980s, Indonesia was acclaimed for its constructive use of its oil and gas revenues (Gelb, 1988). In particular, Indonesia invested its oil and gas revenues in improving agricultural productivity through extension services, new seeds and infrastructure. Indonesia today could try to learn from that experience and invest the revenues it derives from natural resources in improving its human capital and knowledge infrastructure.

71 Sources: "Slowdon jolts RI's commodity-heavy economy" by Mustaqim Adamrah, The Jakarta Post, November 2008 and "Commodity Profile Series: Indonesian Palm Oil" A Trade Research Publication of the Trade Research and Development Agency TREDA of the Indonesian Ministry of Trade.

72 Sources: "Slowdon jolts RI's commodity-heavy economy" by Mustaqim Adamrah, The Jakarta Post, November 2008 and "Commodity Profile Series: Indonesian Palm Oil" A Trade Research Publication of the Trade Research and Development Agency TREDA of the Indonesian Ministry of Trade.

73 Malaysia went from processing 1 percent of palm oil in 1960 to the majority of it at present. One of the reasons that led it to develop the downstream industry was the limited availability of land.

74 "Commodity Profile Series: Indonesian Cocoa" A Trade Research Publication of the Trade Research and Development Agency TREDA of the Indonesian Ministry of Trade.

75 Sources: Senior Agriculture Ministry official quoted by Jakarta Post "Ministry Says High Taxes Grind Down the Underdeveloped Cocoa Industry", 3 June 2009 and "Commodity Profile Series: Indonesian Cocoa" A Trade Research Publication of the Trade Research and Development Agency TREDA of the Indonesian Ministry of Trade.

76 "New mining bill fails to tempt: Industry group" by Ika Krismantari, The Jakarta Post, 30 October 2007.

Figure 7.17: Key indicators of the knowledge economy pillars

Source: KAM Indicators, World Bank, www.worldbank.org/kam
Note: Basic scorecard. Comparison Group: East Asia and the Pacific; Type: weighted; Year: KAM 2008.

Investing in knowledge and skills to build "new endowments" is crucial to achieve sustained and inclusive growth. As discussed in De Ferranti *et al.* (2002), a key lesson from the experience of other natural-resource-rich countries is that investing in knowledge and skills to build "new endowments" is crucial to achieve sustained and inclusive growth. Public policy has a large role to play by ensuring the provision of quality education in general and lifelong training to support product upgrading and innovation. Public policy would also need to be directed towards the promotion of research and development through the provision of incentives and innovation systems to lead to knowledge and technological progress. In turn, this would improve productivity growth and promote new comparative advantages. Finally, public policy would also need to promote the establishment of knowledge clusters and networks, encompassing private firms, independent research institutions and universities, and the public sector (De Ferranti *et al.,* 2002).

The development of knowledge clusters and networks is vitally important, not just to develop the high-tech manufacturing sector, but also to encourage many high-tech, added value natural resource activities. As Figure 7.17 shows, Indonesia ranks badly compared with its competitors in terms of the key indicators that define a knowledge economy. Indonesian analysts have noted that a lack of R&D incentives has contributed to the low quality of industrial products. Indonesia's annual spending on research averages about US$300 million, a tiny fraction of the sum spent by China, where the figure stood at US$76 billion, or even Malaysia's US$1.2 billion and Singapore's US$2 billion.[77] Furthermore, many innovations and new products developed by research agencies in Indonesia do not achieve their full potential due to poor marketing.[78]

77 "R&D expo to strengthen business competition" Novia D. Rulistia, The Jakarta Post, April 24, 2008.

78 "R&D expo to strengthen business competition" Novia D. Rulistia, The Jakarta Post, April 24, 2008.

5. Encouraging the development of better institutions and institutional frameworks: To facilitate growth in productivity and to develop comparative advantages in high-tech industries, it is also critical to develop good institutions in terms of rule of law, security, effective property rights, transparence, removal of excessive regulatory burdens, and efficiency of public service delivery. Indonesia's institutional framework remains weak, with regulatory uncertainty and lack of clarity being the main complaint of enterprises seeking to do business here. The experience of various Latin American natural resource rich countries shows that the "curse" of natural resources appears to be driven not simply by the existence of rich natural resource endowments. Rather, the "curse" is the result of multiple barriers to adoption of technology. These barriers are usually associated with weak institutions, burdensome regulations and artificially created monopolies (Lederman and Maloney, 2007).

6. Promoting the development of the services sector: Services have been the main engine of growth of Indonesia since the East Asian crisis. In particular, the growth in the services sector has been driven by the liberalization of telecom and airlines. There is still great room for further development, most notably in the health, education, and logistics services sectors. Developing a competitive services sector will increase the competitiveness of other sectors and facilitate diversification into higher value-added products, thus encouraging innovation and the development of a more dynamic economy.

Improving the quality of the services sector is vitally important because services are important inputs for all economic sectors (Arnold, Javorcik and Mattoo, 2006; Arnold, Mattoo and Narciso, 2008). For instance, one third of inputs in the mining sector are services, while in the case of agriculture, forestry and fishing services they comprise about 15 percent of all inputs (Atje and Rahardja, 2010).[79] More specifically, a more efficient services sector would provide reduced service costs, greater variety of services, increased investments in related and supported sectors, enhanced goods and services exports and higher economic growth.

Improving access to Internet-based communication facilities, design and marketing services, financial instruments, and tailored supply chain management would raise the efficiency of local producers and enable them to upgrade their product and find new market niches. In turn, this would make them more competitive and thereby increase their share of the global market. Improved internet penetration would help reduce coordination costs and make it easier for enterprises to hook into international industrial clusters, generate dynamism into the Indonesian tourism industry and facilitate market access for nontraditional agricultural products and processed goods. Recent cases reported in the media and in field trips illustrate the increasing use of online marketing by the furniture sector and its benefits. For instance, some enterprises have established websites to penetrate global markets with little in the way of advertising costs and have thereby achieved significant growth in sales.[80]

Some services, such as export promotion, are "public goods" that should be supported by the public sector. These export promotion services include image building, export support services, market research and policy advocacy. Export promotion services have been shown to have the potential to provide good returns on invested public funds (Lederman, Olarreaga and Payton, 2006). These services could potentially help to lower the costs of entering export markets and promote

79 Estimates from 2005 Indonesia's Input-Output Table, BPS.

80 "Internet allows Cirebon furniture firm to taste success" The Jakarta Post, 5 November 2007.

diversification (Iacovone and Javorcik, 2008a, 2008b). However, export promotion needs to be well targeted and appropriately designed.[81]

In essence, what is required to spur productivity is a different approach to the development of sectors that relies on facilitating their growth rather than on protecting them. Improving the business climate and promoting technological upgrading and competitiveness is a more effective strategy than the creation of obstacles to protect the domestic market. Such obstacles do not encourage technological innovation or competition and may in fact significantly hinder them. A recent example is the maritime industry. A cabotage law has been passed that bars foreign vessels from providing domestic maritime transportation services. The intention of the law is to protect the domestic industry so that it can expand and become more competitive. However, the present environment does not support improvements in productivity: international training schools for sailors are not allowed to provide badly needed services in Indonesia; transport companies have difficulty accessing credit; the regulatory environment is uncertain; and the degree of competition between transportation service providers is not high, as reflected by high fees and frequent claims of collusion in the setting of these fees.

C. Mitigating the impact of the high level of volatility in commodity prices

The final step to lessen the shortcomings of commodities is to mitigate the impact that the higher price volatility inherent in commodities can have on macroeconomic stability and on the population. It would be in Indonesia's best interest to implement a system of prudent fiscal management at the national and regional levels to minimize macroeconomic shocks. This is important because the ability to maintain expenditure during commodity price busts depends on prudence during commodity price booms. Setting up a stabilization fund will not only help diminish the pressure of appreciation on the exchange rate, it will also mitigate the macroeconomic impact of volatility by preventing increased expenditure during commodity booms. This is because the fund smoothes government expenditure over time by limiting the amount of available funds each year. At the same time, the Government also has a role to play in mitigating the impact of price shocks on the poor.

Monetary policy may be required to prevent upward shocks in commodity prices from increasing inflation. The rise in inflation is temporary, reflecting a change in relative prices that, by itself, does not call for action by the central bank. However, if the rise in inflation is high, the impact on some sectors of the economy may be sufficiently significant to cause large job losses as the economy readjusts. Indonesian monetary authorities will need to monitor price trends carefully to ensure that rises in fuel, food, and other commodity prices do not set off an inflationary spiral leading to rising core inflation rates. This danger is greater if an economy shows signs of domestic overheating and excessively rapid credit growth.

Government policy is also needed to mitigate the impact of price volatility on the poor. Poor households that are net consumers of commodities are particularly vulnerable to sharp price increases. To mitigate this impact, governments have a variety of policy options. In fact, the Government tried, with varying degrees of success, to implement a number of these options during the recent food crisis. In February 2008, the Government introduced a policy package to provide

81 For more details see the World Bank (2004) report "Making Indonesia Competitive: Promoting Exports, Managing Trade".

Table 7.3: Summary of policy options

	Transfers to poor households	Public Price Stabilization	Transition towards Market Stabilization Measures
Immediate responses	• Expand existing cash transfer programs • Feeding programs • Food for work programs • Limited subsidies	• Lift import restrictions on food and quotas • Draw down food stocks	• Reducing red tape in transporting goods across regions • Limited intervention using variable tariff
Long-term responses	• Develop cash transfer programs (where previously non-existent)	• Improving farm productivity • Improving village infrastructure • Improving food logistics network	• Encourage investments in private storage and warehouse receipt • Forward contracts • Domestic market efficiency • Future Market, Index-based weather insurance
Policies to avoid	• Universal subsidies • In-kind transfer	• Export bans • Price controls	• Import quota or import bans • Price controls

Source: Based on a note prepared by Louise Cord, Eduardo Ley, Hassan Zaman, Elena Ianchovichina, C. Hull, Emmanuel Skoufias, Mark Thomas, Brian Pinto, and Tahrat Shahid from the World Bank in 2008.

temporary assistance to the poor, to help small producers and to control food price inflation. The package included the elimination of import tariffs and taxes on soybean; a direct subsidy to small scale producers of soybean-based foods; an increased export tax on palm and cooking oil to control cooking oil prices; an expanded program that provides subsidized cooking oil for low income households; the elimination of the VAT on cooking oil; an increased monthly quota of subsidized rice (from 10 to 15 kg) for 19.2 million poor households; the removal of the import tariff on flour; the relaxation of flour fortification standards; and a strengthened role of the state logistics agency (Bulog). As Chapter 5 shows, some of these policies were more effective than others.

Indonesia would need to rethink its price stabilization policies to make them more predictable, better targeted, less costly and more effective. The international experience shows that some policy options are better than others at mitigating the impact on the poor (Table 7.3).

In the short term, policymakers facing a food crisis will need to focus on addressing the needs of the poor and most vulnerable, as well as politically volatile groups. At the same time they need to avoid putting policies in place that will have huge efficiency, equity or fiscal costs over the medium term.[82] These short-term measures should be speedily implementable and politically uncontroversial. They could consist of transfers to target groups (cash transfers, feeding programs, food for work, or if the previous are not possible, food subsidies of inferior goods); responses to macroeconomic problems provoked by rising food prices (balance of payment support); and quick measures to expand supply and reduce prices (lift import restrictions, draw down food stocks, and reduce tariffs and other taxes on key staples). It is important to avoid interventions that are costly to introduce and maintain; that create disincentives on the supply side; or that result in the emergence

82 Some of these recommendations draw from a note prepared by Louise Cord, Eduardo Ley, Hassan Zaman, Elena Ianchovichina, C. Hull, Emmanuel Skoufias, Mark Thomas, Brian Pinto and Tahrat Shahid in 2008.

of black markets and inefficiencies. It is important to avoid programs that are poorly targeted or even biased against the poor, such as fuel subsidies.

While poorly designed and conceived poverty alleviation programs often do not achieve their stated aims, they can be politically extremely difficult to scale back or remove once they have been established. For instance, in-kind transfers usually entail high administrative costs; universal subsidies are poorly targeted and difficult to remove once introduced; and price controls can promote black markets, are biased against the poor and are difficult to remove. Food exporters should avoid applying "beggar-thy-neighbor" policies which consist of restrictions or taxes on food exports. These policies often push world prices higher and thus eventually have an opposite from intended effect, as the recent rice price bubble clearly illustrates (Chapter 2).

For the medium to long term, to be most efficient at stabilizing prices, Indonesia would need to develop policies and institutions that are less distortionary and promote greater market price stabilization. Above all, Indonesia would need to develop a well-defined stabilization strategy and publicize it, moving away from discretionary to rule-based interventions. This would require developing standard operating procedures for price stabilization so that the policies are transparent, consistent and consultative. It may be useful to include a sunset clause to ensure that short-term measures do not become institutionalized in the long term. It is important to set criteria of the implementation of stabilization programs, so that the private sector and citizens know under what conditions these programs will be implemented. It would be better not try to stabilize prices too rigidly. Rather, such systems should be designed to allow a "tolerable" level of price variability. The burden of proof for the need to implement measures to achieve stabilization should be placed on the private sector, rather than on the Indonesian government. Such a stabilization strategy would ensure that complaints are backed by data and that decisions are taken based on a sound cost benefit analysis to prevent policies exacerbating rather than improving the situation. It would also create a more predictable environment, which would encourage the private sector to stock goods and play a greater role in price stabilization.

It would be desirable to facilitate the introduction of market-based instruments that act as price stabilizers. This market infrastructure could take the form of private storage and warehouse receipts, forward contracts, future markets, and index-based weather insurance. It is important to develop and support intermediary institutions that can pool and repackage the risks facing small-scale producers, traders, and processors and then hedge the pooled risks using global futures, options, and insurance markets. Improved statistical capacities, technical support, and education are also needed to facilitate the use of global futures and options markets by large domestic firms. The development of market stabilization mechanisms will help stabilize prices with minimal need for government interference, saving public funds and reducing distortions.

It would also be advisable to rely more on variable tariffs and cash transfers and to tender public procurement rather than relying mainly on public marketing agencies. This is likely to be less costly and more effective. If the Government chooses to intervene in the domestic market, it is preferable to rely more on the use of a small financial reserve for imports or domestic purchases of privately held stock, than on the Government's strategic reserves of commodities. It is less costly for the government to tender public procurement, imports and storage to the private sector than to administer them itself. This will increase efficiency and encourage the development of storage capacity in the private sector. Indonesia could more effectively assist the poorest consumers to deal with commodity price shocks by strengthening its social safety net program and by improving its targeting.

The development of an environment that promotes a quick supply response would benefit producers and help reduce price volatility. A key step would be to expand neglected agricultural extension services to improve farmers' control over their production. It is also important to strengthen institutions that support rural finance markets and expand the availability of credit. The Government can also streamline regulations and reduce transport costs to integrate the market and increase trade flows between regions that would help mitigate regional price shocks.

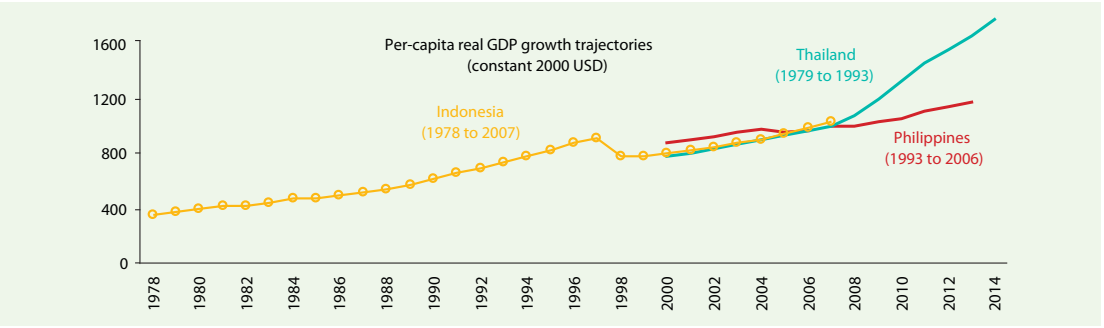
7.7 Conclusion

Indonesia cannot afford to maintain the status quo as the opportunity cost of doing so is too high. Indonesia has been lucky so far, growth reached 6 percent for a few years on the strength of a once-in-three-decades commodity price boom. Exports doubled between 2003 and 2008 despite unfriendly trade and investment policies, not because of them, as evident in the fact that almost all of the export growth was from resource-based sectors and that growth was in large part nominal — commodity price increases account for 82 percent of the increase in commodity export values between 2005 and 2008. The supply response to the prices has been generally very low due to a poor investment climate and a commodity windfall revenue has been mostly used in non-productive spending (fuel and electricity subsidies are the largest item in the state budget). Over the next years commodity prices might stay relatively high but another price boom is unlikely.

Without the boost of a commodity price boom it will be difficult for Indonesia to sustain 6 percent growth by simply maintaining the status quo. It is therefore important to better profit from the opportunity of the present high commodity prices as the economy is displaying worrying symptoms. Export concentration has increased, partly due to the increase in commodity prices, but also because of the emergence of China as a competitor in low- and medium-skilled products, largely as a result of which, Indonesia saw its share of labor-intensive manufactures fall from 30 percent in 1990 and in 2000 to 18 percent in 2007. Indonesia has also failed to promote the development of its medium-tech manufacturing capabilities. In addition, Indonesia's exports mainly consist of low value-added products that are characterized by low export discovery, which in turn results in low economic dynamism. Finally, the Government's policy emphasis on protecting rather than supporting the private sector has not been conducive to increase its competitiveness.

With the appropriate policies, the trend towards high prices of commodities may enable Indonesia to achieve the rates of growth it saw prior to the East Asian crisis and to match the growth rates of regional neighbors. In the three decades prior to the crisis, between 1967 and 1997, Indonesia's economy grew at an annual average rate of 7 percent. Only eleven other countries have enjoyed such an extended period of high growth. Thailand was at Indonesia's current per capita GDP level in 1986, having grown in the previous seven years at almost the same rates as Indonesia has in the past seven (Figure 7.18). Thailand's growth rate subsequently accelerated and within a decade, the country was firmly established as a middle-income economy. Indonesia has the potential to achieve the same. Doing so requires a conducive business environment and good policies to make best use of its factor endowments. The Philippines experience illustrates the cost of not getting it right. It reached the current GDP per capita of Indonesia in 2000. But unlike in Thailand, growth did not accelerate in the seven subsequent years.

Figure 7.18: From Indonesia's current income levels, some economies achieved economic take-off, while others languished



Source: World Bank Development Policy Review (2009) based on data from World Development Indicators.

While policy debate has often created a false dichotomy between the prioritization of the manufacturing sector and of the commodity sector, it seems that Indonesia can have its cake and eat it too. What is needed is for the Government to play a more facilitating role that allows off-Java islands to realize their strong comparative advantage on commodities. Salaries in these islands are likely to increase, which could help diminish the level of migration to Java. The labor-intensive manufacturing sector in Java may become slightly less competitive due to the lower inflow of workers to Java. However, the Government can make use of the commodity windfall to increase the country's productivity across the different sectors and spur greater dynamism in the economy both in Java and off-Java.

The top priority should be ensuring that the business environment is conducive for the full utilization of factors of production and for productivity increases in all sectors (whether tradable or not). Three policies may help the Indonesian economy to improve its competitiveness and to accelerate its economic growth in the new global context:

1. Indonesia should take advantage of its natural resource endowments as they can generate needed revenues: A boom in oil, gas, minerals and palm oil in the context of high prices would generate high revenues for the private and public sectors across Indonesia, particularly in natural-resource-abundant regions. To achieve this, it is necessary to reduce uncertainty in the business environment for oil, gas and mining and enforce environmental standards for palm oil. It is also necessary to price commodities correctly in the domestic market for an effective supply response and for an effective allocation of resources. To maximize the development impact, it is important to embed technology into commodities to increase their added value.

2. Indonesia can prevent an increased focus on commodities from negatively impacting its manufacturing sector by increasing the competitiveness of the tradable sectors and by setting up a sovereign wealth fund: The expansion of the commodity sector may draw factors of production from the other tradable sectors and will put pressure on the exchange rate, both of which could hurt the other tradable sectors. These two effects can be overcome by increasing the productivity of the tradable sectors and setting up a sovereign wealth fund that helps smooth expenditures over time and diminishes exchange rate appreciation pressures.

3. The Government could follow six key policies to increase the competitiveness, technological sophistication and dynamism of all sectors:

a. Improved logistics;
b. Encouraging foreign direct investment (FDI) flows and maintaining an open economy to attract the skills and knowledge needed;
c. Encouraging the development of knowledge industries in natural-resource-based activities where Indonesia has a comparative advantage;
d. Encouraging the creation of new endowments in human capital and knowledge;
e. Encouraging the development of better institutions and institutional frameworks; and
f. Promoting the development of the services sector.

This ambitious agenda would require Indonesia to undertake second-generation reforms that remove barriers to competitiveness and promotes dynamism. In the past ten years, Indonesia has successfully implemented a first generation of reforms. It successfully reformed the political system moving from an autocratic to a democratic state, achieved macroeconomic stability and decentralized government to the regions. These are remarkable achievements. Moving forward, a second generation of reforms is needed to spur greater growth.

The Government can also take actions to mitigate the negative impact of commodity price volatility on the economy and the poor in particular. From an export perspective, it is important to diversify export destinations and products to reduce export volatility. To reduce the impact of commodity price volatility on the poor, well-targeted cash transfer measures are best placed to limit the impact on poverty of price spikes in basic products. Policymakers can also make use of instruments that decrease transaction costs, encourage supply and reduce price volatility. Such instruments include reductions in bureaucratic obstacles that constrain the transportation of goods and reductions in import tariffs and quotas.

In the medium run, it is recommended that policymakers encourage the development of market-based instruments that act as price stabilizers. Measures of this kind include: the promotion of investments by the private sector in storage and warehouse receipt systems; the development of a domestic market for forward contracts; and the development of futures market and of index-based weather insurance. The public sector can support the development of these instruments by fostering an appropriate regulatory environment and by providing direct support to overcome market failures at an initial stage.

The Government can also prevent the greater inequity and governance issues generally associated with greater commodity production by redistributing the resource windfall in a way that promotes social and political stability. The natural resource boom may well increase inequities between Indonesian regions. In turn, this may lead to conflicts between regions over the use of the income, social tensions due to greater income inequality and governance issues such as corruption. A redistribution of revenues between regions and the establishment of a social welfare system to assist the poor will help to make growth more inclusive and to reduce potential political instability.

Annexes

Annex I

Chronology of events May-June 2008

May

3 Cyclone Nargis slams **Burma**. According to preliminary estimates, 2 million tons of paddy was destroyed – both rice in fields awaiting harvest and stocks in hands of farmers and traders from wet and dry season crops. After 32,725 tons sailed under existing commitments, Burma bans rice exports.

4 Head of VFA quoted as saying **Vietnam**ese prices headed for US$1,400.

5 **NFA** tender for 675,000 tons fails as only one offer received and it without a sovereign guarantee; the Philippines talks of waiting until fall to buy. It indicates it will not, in any case, pay above US$1,200/ton.

6 Following objections from the Philippines and the ADB, **Thailand** scraps OREC proposal.

Idea of export tax floated in **Vietnam**.

7 **Philippines** informally requests that Japan provide 200,000 tons of imported rice.

9 **NFA** discloses that it is talking with Japan for 60,000 tons of domestic rice. CGD paper "Unwanted Rice in Japan Can Solve the Rice Crisis – If Washington and Tokyo Act" published.

12 **Malaysia** fails in effort to buy 500,000 tons of Thai rice, but raises domestic support price by 15 percent, announces domestic price controls for 5 percent and 10 percent rice effective June 1, promises to spend up to US$226 million to subsidize imports of 500,000 tons, and intensifies its border control efforts.

Thailand sells 500 tons of stock (of an eventual 1,500 tons) into domestic market at 20 percent below market prices.

A massive earthquake strikes Sichuan, **China** killing as many as 87,000.

13 **U.S.** publicly indicates it would not oppose Japan's re-export of rice; privately it tells Tokyo that it will not press Japan to fulfill the balance of its 2007 buying commitments and those agreed upon for 2008 until after the crisis abates.

Malaysia buys from Thailand 100,000 tons each of 5 percent at US$950 and 15 percent at US$940.

Pakistan affirms it has additional 1 million tons available for export.

19 **Philippines** discloses Japan may also provide 200,000 tons imported rice.

21 Major exporters in **Thailand** resume offering price quotes.

23 **Thailand**'s visiting prime minister reportedly tells President Arroyo that Bangkok is prepared to sell its stocks to the Philippines at friendship prices.

26 **Cambodia** lifts remaining export restrictions.

June

2 At FAO summit on food crisis, **Japan**'s P.M. Fukuda commits "to release in the near future over 300,000 tons of imported rice" to the world market. Japan also discloses Sri Lanka has requested up to 200,000 tons of food aid.

4 Faced with prospect of farmer protests, **Thailand**'s prime minister proposes to increase dry

season paddy support price to Baht 14,000/ton (US$430) – 20 percent above market – with a target of 2.5 million tons. Trade estimates this will result in FOB 100 B prices of over US$800.

9 **Egypt** extends export ban until April 2009.

10 Prime minister takes commerce minister's proposal off cabinet agenda that would authorize **Thailand** to participate in NFA's request for G-to-G offers of 600,000 tons by June 13.

12 **Thailand**'s prime minister orders his staff to inspect government-held stocks.

13 **Philippines** receives offers for G-to-G purchase of 600,000 tons.

18 Vinafood G-to-G sales to **NFA** of 600,000 tons announced; first since 2003.

Vietnam's export ban lifted; MEP US$800 for 5 percent established.

Source: Slayton (2009).

Annex II

A. Determinants of market integration and price transmission in Indonesia

In this annex we discuss in detail the existing literature on determinants of market integration. In addition, we present the methodological strategy used by the study to test for determinants, both for price differences and for spatial market integration, together with the main results obtained.

Literature Review
There is a vast literature on spatial market integration. Annex Table 2.1 summarizes key elements of some of most frequently cited papers in the literature. An excellent review on methodological issues related to the analysis of spatial market integration can be found in Fackler and Goodwin (2001).

A follow-up question to the degree of integration is what the factors that influence the degree of integration are. This, however, has been generally neglected in the literature, and it therefore constitutes an important contribution of this chapter. The rest of the section reviews the limited literature on the latter subject.

Distance between markets has been acknowledged as an important factor affecting market integration. It is common to find measures of market integration tabulated against markets' distances. However, in most of the cases, no formal empirical analysis of the links is carried out [Ravallion (1986), Goodwin and Piggott (2001), Rashid (2004), and Van Campenhout (2007)].

The exception to this is the work done by Goodwin and Schroeder (1991); Goletti, Raisuddin, and Farid (1995); and Ismet, Barkley, and Llewelyn (1998). These three papers address the question of the determinants of integration. Their common feature is that they proceed in two stages. They first measure spatial market integration in their relevant geographical setting. Then, they regress the measure of market integration according to a number of explanatory variables.

Goodwin and Schroeder (1991) use five different cointegration tests to measure market integration in cattle markets in the US over four different periods (from 1980 to 1987). They obtain one test statistic for each pair of markets analyzed and for each period considered. These test statistics are then used as a dependent variable in the second stage. They consider four factors affecting cointegration and spatial arbitrage opportunities:

- ***Costs and risks associated with trade between markets:*** These are proxied with road distance between the markets, which is expected to have a negative influence on the level of cointegration.
- ***The amount of market information reflected in prices at a particular market*:** The authors expect that terminal markets have a more complete set of market information than decentralized direct trade markets. Blasts, they expect that ceteris paribus, terminal markets may be more highly cointegrated than direct trade markets.
- ***Market volume*:** The authors claim that in this case, the expected effect is ambiguous. On one hand, it could be argued that markets with low volumes will have more potential for unwarranted price behavior, so the higher the volume of the market the more the markets will be integrated. On the other hand, volume, as an indicator of self-sufficiency of the market

Annex Table 2.1: Summary of the literature

Authors	Date	Location	Product	Method of Analysis	Dets of integration	Dets of price volat?	Journal
Ravallion, M.	1986	Bangladesh	Rice	Error Correction Model -Instrumental Variables	No	No	American Journal of Agricultural Economics
Goodwin, B.K., T.C. Schroeder	1991	USA	Cattle	Cointegration Analysis	Yes-Regression Analysis	No	American Journal of Agricultural Economics
Alexander, C., J. Wyeth	1994	Indonesia	Rice	Error Correction Model, Cointegration, Causality Tests	No	No	Journal of Development Studies
Goletti,F., R. Ahmad, N.Farid	1995	Bangladesh	Rice	Correlation Coeff, Cointegration, Causality Tests	Yes-Regression Analysis	No	The Developing Economies
Baulch, B.	1997a	Philippines	Rice	Parity Bound Model	No	No	American Journal of Agricultural Economics
Ismet, M. A.P. Barkley, R.V. Liewelyn	1998	Indoenesia	Rice	Multivariate cointegration (Johansen, Juselius)	Yes-Regression Analysis	No	Agricultural Economics
Badiane, O., G.E. Shively	1998	Ghana	Maize	Cointegration ARCH models	Yes-Simulation	Yes-ARCH	Journal of Development Economics
Baffles, J., M.I. Ajwad	2001	World (Selected Regions)	Cotton	Error Correction Model, Cointegration.	No	No	Applied Economics
Goodwin, B.K. N.E. Piggot	2001	North Carolina, USA	Soy-beans	Treshold autorregressive cointegration models, impulse resonse functions	No	No	American Journal of Agricultural Economics
Rapsomanikis, G., D. Hallam, P. Conforti	2003?	Ethiopia, Rwanda, Uganda; Egypt	Coffee; Wheat	Multivariate cointegration (Johansen, Juselius), Causality Test Asymmetric Adj. Tests	No	No	Book chapter, in: Commodity Mkt Review FAO, 2003-2004
Abdulai, A	2003?	Ghana	Maize	Treshold autorregressive and cointegration	No	No	Book chapter
Rashid, S.	2004	Uganda	Maize	Multivariate cointegration (Johansen, Juselius)	Not formally	No	Journal of African Economies
Van Campenhout, B.	2007	Tanzania	Maize	Treshold autorregressive (with a trend for treshold)	No	No	Food Policy
Fossati, S., F. Lorenzo, C.M. Rodriguez	2007	Uruguay	Sorghummaize, wheat, beef	Multivariate cointegration (Johansen, Juselius)	No	No	Journal of Applied Economics

Source: World Bank staff.

may affect integration negatively if high volumes make the market operate independently of markets in other regions because of regional market forces.

- ***Concentration in the packing market*:** It has been argued that increased concentration could increase cointegration if the firms compete in the same market regions. The authors claim that when firms operate plants in spatially separated markets, transaction costs and uncertainty about market outlets for cattle shipped from one region to another is reduced. And it could also facilitate price behavior coordination among meatpackers across regions.

Their model is specified as follows:

$$TS_{ijtk} = \beta_0 + \beta_1 Type_i + \beta_2 CR_j + \beta_3 Volume_{ijt} + \beta_4 Dis\tan ce_{ij} + e_{ijtk} \quad (1)$$

where TS_{ijtk} is the $k-th$ cointegration test statistic between markets i and j, for period t.

- *Type* is an indicator variable equal to one if market i is direct and zero if it is a terminal market;
- *CR* is the concentration ratio in the slaughtering market for time *t* (they use the proportion of beef slaughtered by the largest four firms, which is an aggregate measure for the whole country, so it only varies by period).
- *Volume* is the slaughtered cattle volume in market *i*'s region relative to that of market *j* at period *t*.
- *Distance* is measured as miles between market *i* and market *j,* and
- *e* is a residual error.

The results from estimating Equation 1 provide weak evidence of markets being 'terminal' or 'central' affecting cointegration, as predicted. Packer concentration ratio does seem to affect cointegration positively. The relative market volume affects cointegration negatively, which suggests that smaller markets tend to be more integrated than larger markets (the traditional self-sufficiency argument). The most robust result is related with distance: the degree of price cointegration is negatively influenced by the spatial distance between the markets.[83]

Goletti, Raisuddin, and Farid (1995) examine rice market integration and its determinants in Bangladesh in the period 1989–92, for 64 districts. To measure market integration, the authors combine correlation coefficients on the price series, with cointegration coefficients, dynamic multipliers (which measure how much of a shock in market *i* is transmitted to market *j* in *k* periods) and measures of the speed of adjustment (how many periods it takes for a shock in market *i* to be fully transmitted to market *j*). Then, they regress these measures of market integration on the hypothesized determinants.

Three broad 'structural' determinants of market integration are considered: marketing infrastructure, volatility of policy and dissimilarity of production. The first one is assumed to contribute positively to integration, the second is assumed to affect market integration negatively, as it will make it difficult for the private sector to be able to interpret new information, whereas the third one is assumed to affect integration positively, as the more dissimilar two markets are, the higher the incentive to trade with each other. Marketing infrastructure is captured by the road distance between markets *i* and *j (d)*^{2}, the density of paved roads per square kilometer in the areas surrounding the two markets *i* and *j* (road), the railway density per square kilometer (rail), the number of strikes in the areas surrounding the two markets (strikes), the number of telephones per capita in the areas surrounding the two markets (tele), and the number of bank branches per square kilometer

83 It is worth mentioning that because the dependent variable in Equation 1 is a generated regressand, with a non-normal distribution, inference is invalid if estimated using OLS. Acknowledging that, the authors use bootstrapping techniques.

in the areas surrounding the two markets (bank). Government intervention is potentially a stabilizing force smoothing seasonal and inter-year fluctuations, thus, enhancing price co-movement, but it may become unpredictable and destabilizing, which would induce the opposite effect. The authors measure volatility of intervention by the variation coefficient of the stocks that the government agency keeps in each district at the end of each month (policy). The degree of dissimilarity is measured by the absolute value of the percentage difference in production per capita (productism). Here the idea is that if market *i* is a surplus market and *j* is a deficit market, they are more likely to trade than if both markets were surplus or deficit. Finally, they control for supply shocks affecting districts (shock) (using information collected from newspapers on days of flooding drought, cyclones, salinated water and pest attacks).

The estimated equation is as follows:

$$TS_{ijk} = \beta_0 + \beta_1 d_{ij} + \beta_2 road_{ij} + \beta_3 rail_{ij} + \beta_4 strike_{ij} + \beta_5 tele_{ij} + \beta_6 bank_{ij} + \beta_7 policy_{ij} + \beta_8 productism_{ij} + \beta_9 shock_{ij} + e_{ij} \quad (2)$$

where *i* and *j* are the pair of markets, and *k* indicates the integration measure used.

The signs of the effects of the covariates were found to depend on the measure of integration used as a dependent variable. The authors claim that this is because each measure refers to different aspects of spatial integration. However, all dimensions of integration considered are positively correlated, and so, we would expect the same sign in the estimated coefficients on the covariates, across different measures of integration.[84] When looking at their results, there is no covariate for which the effect is significant and of the same sign regardless of the measure of integration used. Some of the covariates actually have the opposite sign one would predict (the idiosyncratic supply shocks, for example, affect integration positively). Distance and dissimilarity in production seem to be the two covariates whose coefficients are most plausible: a negative and significant effect of distance on price correlation coefficients, and on the cointegration coefficient statistics, and a positive and significant effect of production dissimilarity on correlation coefficients, the long term multiplier and the speed of adjustment. More distant markets are less integrated, and surplus-deficit markets seem to be more integrated than surplus-surplus or deficit-deficit.[85]

The last study to be considered is that of Ismet, Barkley, and Llewelyn (1998), which focuses on the effects of government intervention on rice market integration in different regions of Indonesia during the period 1982-1993, and compares the pre and post self-sufficiency sub periods. In the first stage, they measure the degree of spatial integration using the multivariate Johansen approach to test for cointegration of the regional price series. They also explore the dynamics of the price transmission process. Then, they extract the test statistic (the test statistic for the null of no cointegration) obtained from that first stage procedure, for five regions 5, and use it as a measure of market integration. The larger the statistic, the higher the strength of the "rejection" of the null of no cointegration, so the stronger the degree of market integration. The second stage regression equation is as follows:

84 Take the trace statistic and the speed of adjustment to equilibrium. Two provinces that are strongly cointegrated exhibit a strong degree of price co-movement, which implies a fast speed of adjustment to equilibrium after a shock. So, even if across different regressions (that use different measures of integration as dependent variables) it's reasonable to expect different sizes for the coefficients, it would be quite difficult to argue for different signs.

85 These results should be interpreted with caution, however, as the authors apply OLS on Equation 2, not acknowledging the non-normality of the dependent variable, given that it is a generated regression and they are testing integration in each of these regions, among the four major markets

$$TS_{it} = \beta_0 + \beta_1 PROC_{it} + \beta_2 DISTR_{it} + \beta_3 ROAD_{it} + \beta_4 PCI_{it} + \beta_5 DUM_{it} + e_{it} \quad (3)$$

where TS_{it} is the value of the test statistic for region *i,* at period *t*.

- *PROC* is the government procurement performed by Dolog (Bulog's provincial office), normalized by rice production during the procurement period in region i at period t.
- *DISTR* is the government's injection of rice into the market by Dolog, normalized by rice production during the distribution period in region *i*, at period *t*.
- *ROAD* is the kilometers of roads in region *i* normalized by square kilometers of the region at period *t*.
- *PCI* is the real per capita income in region *i* at period *t*, which proxies for economic development other than length of roads. *DUM* represents the rice self-sufficiency period, being equal to one after 1984, and zero otherwise.

The results for the whole period of analysis suggest that only the purchases of rice by Dolog (PROC) had a significant effect on market integration. The rest of the variables do not significantly explain it. For the self-sufficiency period, procurement also has a significantly positive effect, as well as per capita income.[86] [87]

Summarizing, there is scarce literature exploring determinants of market integration. Furthermore, the results have been quite ambiguous. Probably, the most robust lesson that has been learnt is that spatial integration is weaker in distant provinces and stronger in central ones. This chapter attempts to contribute to this scarce literature by tackling the question of what are the factors that determine market integration in the context of Indonesian commodity markets.

B. Dataset: Review and Descriptive Statistics

In this chapter consumer price time series for the period 1993/01 – 2007/12 for rice, sugar and cooking oil, and producer price time series for soybean and maize are used, for the period January 1992 – December 2006. All price series were obtained from the National Bureau of Statistics of Indonesia (BPS). Data was also obtained from CEIC (CEIC Data Company Ltd) and BPS for the analysis of determinants of integration.

Annex Table 2.2 presents the mean, standard deviation, maximum and minimum of each of the variables used in this analysis, across provinces. Distance is the minimum distance in kilometers to one of the main five cities in the country (Jakarta, Surabaya, Medan, Makassar or Batam). However, in itself this measure is not sufficient. For example, Banda Aceh is relatively close to one of the largest cities in the country, Medan. It could not be argued, however, that Banda Aceh is a 'central' city. For a given distance to one of the main five cities, centrality depends on the size of the particular city its referent close to. Thus, the notion of centrality is captured by weighting the distance in kilometers by the inverse of the population of the closest city. This weighted variable is called remoteness.[88]

86 A possible methodological shortcoming is that if the motivation of government intervention is to equalize prices across provinces, then there is an issue of reverse causality: government intervention would be caused by the absence of spatial integration. This could lead to inconsistency of their estimates

87 The estimates are obtained by bootstrapping because of the non-normality of the dependent variable, being a generated regression

88 As the measure of remoteness was very small, in the table remoteness⊠1000 is reported, for convenience of presentation.

Annex Table 2.2: Descriptive statistics

	Variable	Mean	Std Dev	Min	Max	80/20th Pct
	Distance	570.87	587.84	0.00	2381.13	2.82
	Remoteness	0.071	0.092	0.000	0.341	13.78
	Infrastructure	0.53	0.24	0.15	0.98	2.46
	Population *	6,538	9,462	1,520	35,000	3.72
	PCI *	1,998	1,762	682	7,915	2.47
Rice	Output PC	229.06	173.83	1.74	1442.26	3.37
	Productivity	40	8	25	55	1.49
	Trace Stat	19.51	5.47	9.60	42.82	1.54
	Price Diff	259	186	6	870	4.54
	Price	2,520	221	2,174	3,044	1.17
Soybeans	Output PC	2.95	4.08	0.55	22.88	3.23
	Productivity	11.96	1.53	8.48	14.96	1.25
	Trace Stat	12.14	5.04	3.81	28.51	2.20
	Price Diff	850	725	4	2,555	11.76
	Price	2,664	770	1,872	4,427	1.65
Maize	Output PC	36.55	42.35	0.01	170.78	11.98
	Productivity	26.14	6.45	16.00	45.00	1.42
	Trace Stat	13.85	9.13	2.83	51.65	2.36
	Price Diff	359	284	3	1,298	5.93
	Price	973	316	478	1,776	1.73
Sugar	Trace Stat	26.69	11.99	7.59	65.19	2.33
	Price Diff	191	173	0	720	5.89
	Price	3,369	179	3,161	3,880	1.07
C. Oil	Trace Stat	13.74	8.54	3.71	74.19	2.26
	Price Diff	565	422	2	1,929	4.54
	Price	4,192	489	2,958	4,887	1.16

Source : World Bank staff calculations based on data from BPS and Bulog.
Note: * Population and PCI are expressed in thousands.

Infrastructure measures quality of roads, as the proportion of asphalted roads in total roads.

Population is the number of inhabitants by province while *PCI* is real per capita income expressed in rupiah at constant prices of 1993.

Turning to the commodity-specific variables, *Output PC* is the annual average output of the commodity (in kilograms) while *Productivity* is the average yield per hectare (in tons) over the period.[89]

Trace Stat is the trace statistic, which is a measure of the degree of market integration which will be calculated and described in more detail in Section C. The larger the trace statistic between province *i* and *j*, the "stronger" is the market integration between them. Here the average for province *i* over all possible *j* is reported.

Price Diff is the average price difference over the period, of one province averaged against all the others, and *Price* is the average price of the commodity over the period of analysis. Both are expressed in rupiah per kilo. One of the striking patterns in Annex Table 2.2 is the provincial heterogeneity. This is

89 These two variables are only available, at a province level, for soybean, rice and maize only.

clear when one looks at the difference between the maximum and the minimum. Take infrastructure, for example: in one province almost all roads are asphalted, while in others only 15 percent of them are. When looking at the commodity-specific variables, besides the provincial heterogeneity for each particular commodity, there is also important heterogeneity across commodities. For instance, it can be observed that there are important price differences from province to province.[90] While for soybean and maize the price differences across provinces can be higher than 30 percent of the average prices, the differences in rice and sugar markets are of 10 percent and 6 percent respectively. This is consistent with the higher trace statistic values in the latter two markets relative to the former two. As expected, in general, cointegrated markets exhibit lower price differences.

To unveil this provincial heterogeneity in a simple way, Annex Table 2.3 presents some summary statistics for key variables considered.

Annex Table 2.3 shows that Papua is the remotest region, both in terms of distance and remoteness. Papua also has the highest price differentials relative to all other provinces. Jakarta is obviously the core. In terms of transport infrastructure, quality is low in Papua and the Kalimantan provinces, with the exception of South Kalimantan. Jakarta and Papua have the lowest levels of output of rice per capita, while East Kalimantan has the highest. Per capita income is highest in East Kalimantan and Jakarta, and lowest in East and West Nusa Tenggara.

Annex Table 2.4 shows that Papua has the highest average price for rice, while South Sulawesi the lowest. After Papua, West Kalimantan has the highest price differential relative to other provinces.

90 These differences should be analyzed in conjunction with the average price.

Annex Table 2.3: Descriptive statistics by province

Province	Distance	Remote	Population	PCI	Infrast
NAD	424	0.037	3,990	2,714	0.45
North Sumatra	0	0.000	11,600	1,878	0.49
West Sumatra	460	0.123	4,396	1,617	0.71
Riau	291	0.078	3,734	4,880	0.35
Jambi	304	0.082	2,498	1,210	0.58
South Sumatra	424	0.047	6,512	1,714	0.53
Bengkulu	566	0.063	1,520	1,069	0.72
Lampung	195	0.022	6,836	933	0.49
Jakarta	0	0.000	9,000	6,298	0.98
West Java	121	0.000	34,900	1,526	0.70
Central Java	258	0.007	31,400	1,216	0.64
Yogyakarta	264	0.008	3,040	1,542	0.76
East Java	0	0.000	35,000	1,566	0.58
West Kalimantan	607	0.163	3,817	1,667	0.31
Central Kalimantan	624	0.018	1,837	2,066	0.15
South Kalimantan	485	0.014	3,032	1,854	0.56
East Kalimantan	583	0.084	2,543	7,915	0.21
North Sulawesi	953	0.136	1,982	1,235	0.72
Central Sulawesi	484	0.069	2,072	1,046	0.54
South Sulawesi	0	0.000	6,985	1,150	0.51
SE Sulawesi	367	0.053	1,755	901	0.45
Bali	317	0.009	3,085	2,223	0.97
West Nusa Tenggara	402	0.012	3,843	858	0.76
East Nusa Tenggara	726	0.104	3,828	682	0.40
Papua	2381	0.341	1,633	3,132	0.15

Source: World Bank staff calculations based on data from BPS and CEIC Data Company Ltd.
Note: Population is expressed in thousands. PCI in rupiah at constant prices of 1993, in thousands. Distance is in kilometers, to one of the five main cities. Infrastructure is the % of asphalted roads in the province. Remoteness weights distance to the main city by the inverse of the population of the main city.

Annex Table 2.4: Descriptive statistics by province - commodity specific variables

	Rice				Soybean				Maize				Sugar		Cooking Oil	
Province	**P'tivity**	**Outp PC**	**Price Diff**	**Trace**	**P'tivity**	**Outp PC**	**Price Diff**	**Trace**	**P'tivity**	**Outp PC**	**Price Diff**	**Trace**	**Price Diff**	**Trace**	**Price Diff**	**Trace**
NAD	42	0.35	234.41	19.93	13	12	155.36	12.29	29	18	165.05	18.86	102.31	20.94	434.79	11.97
North Sumatra	41	0.28	294.64	20.02	11	1	150.37	9.88	33	58	82.06	17.18			704.66	19.73
West Sumatra	44	0.42	283.20	15.66	13	1	127.57	12.61	37	23	144.47	37.53	77.01	26.22	410.44	13.35
Riau	31	0.12	278.07	17.88	10	1			22	11			77.92	21.61	699.15	15.27
Jambi	37	0.23	86.59	19.29	13	2			30	11			0.25	21.40		
South Sumatra	36	0.28	95.89	20.85	13	1			27	12			26.17	19.81	397.39	10.67
Bengkulu	37	0.25	157.22	19.54	9	2			23	38			87.65	23.49	433.18	14.10
Lampung	42	0.28	92.22	21.96	10	2	162.24	10.93	31	171	171.09	3.56	75.64	20.78	583.31	16.85
Jakarta	47	0.00	385.95	19.85					19				120.30	27.11	378.42	12.45
West Java	52	0.28	162.43	22.15	13	1	168.19	15.92	45	14	130.06	14.95	101.58	21.89	438.26	12.65
Central Java	52	0.27	124.66	21.53	14	5	138.60	11.94	35	56	150.28	8.92	42.79	16.51	642.41	10.44
Yogyakarta	51	0.22	88.30	19.31	11	16	133.95	14.82	31	64	132.89	14.84	75.37	17.63	382.42	11.25
East Java	53	0.25	103.14	20.18	13	10	113.31	14.50	36	109	166.43	13.44	28.36	9.44	446.84	7.13
West Kaliman	29	0.10	454.19	14.75	11	1			30	20			28.17	19.76	602.12	12.09
Central Kaliman	25	0.22	224.64	15.99	11	1			19	4			143.03	22.25	472.18	8.57
South Kaliman	34	0.20	46.06	14.10	12	2	272.18	10.75	26	13			75.56	27.92	436.14	13.82
East Kaliman	33	1.44	49.72	15.22	12	1			22	5			189.22	25.63	368.89	5.21
North Sulawesi	45	0.15	62.01	15.61	13	3	146.25	11.33	25	90	117.77	11.29	188.44	28.83	514.73	9.06
Central Sulawesi	40	0.39	172.58	21.03	11	1			24	27	246.72	9.65	183.35	40.18	461.79	10.99
South Sulawesi	46	0.19	0.00		15	4	89.62	10.63	33	93	81.50	10.08	118.14	26.87	576.18	11.90
SE Sulawesi	37	0.26	180.12	20.73	9	2			22	43			234.95	36.81	592.15	10.61
Bali	55	0.30	156.27	21.07	14	4	58.43	6.12	28	28	310.49	15.92	80.50	28.03	617.40	15.72
West Nusat	45	0.10	244.59	29.21	12	23			23	19	98.34	12.15	122.76	24.59	724.13	17.19
East Nusat	29	0.35	131.91	18.86	10	1			23	147			532.28	21.41	286.91	11.64
Irian Jaya	32	0.04	545.83	18.16	11	3			16	4			510.61	34.66	594.24	17.55

Source: World Bank staff calculations.

C. Measuring the Degree of Spatial Integration

In this section spatial integration among Indonesian provinces is measured in the markets for rice, soybean, maize, sugar and cooking oil using monthly price time series.

Following Fackler and Goodwin (2001), two markets are defined as being integrated when shocks arising in one region are transmitted to the other region. More specifically, the market for good x in region i is said to be spatially integrated with that of region j if i, a shock that shifts, say, demand in i but not in j affects the price in both i and j. This implies that the price series for commodity x in region i shares a long run trend with that of region j. If there is perfect integration, the effect of the shock on both prices would be the same.

Since the purpose here is to be able to measure the degree of integration in each market and use that measure as an input for the analysis of determinants, a testable concept associated with a pair of provincial prices sharing a long run trend needs to be introduced. For that, the concept of co integration first introduced by Granger (1981) and further elaborated further by Engle and Granger (1987) is of help. Two price series are said to be co integrated if they are both integrated of the same order, say I (1), and there exists a linear combination of them, $\beta_1 p_{1t} + \beta_2 p_{2t}$ which is stationary. The tests for co integration basically check if that stationary linear combination exists. In this chapter the Johansen co integration test (Johansen, 1988) is used.[91] The test suggests co integration, when the trace statistic (Johansen's co integration test statistic) is higher than a critical value. The two series are then said to share a common long-run trend. The higher the trace statistic for a pair of provincial prices, the more strongly co integrated the series are, and therefore, the higher the degree of integration of the two provinces is.

Johansen co integration tests were performed on all possible pairs of provincial prices for the period of analysis and for the commodities under consideration (1993/01–2007/12 for rice, sugar and cooking oil; 1992/01–2006/12 for soybean and maize). Annex Table 2.5 shows the trace statistic obtained for the rice market. Take for example the cell in the first column and second row: the trace statistic obtained when testing co integration between the rice price series of Central Java and Bali is 30.4. This is higher than the critical value (15.41), and thus strongly suggests a high degree of co integration, which in turn implies the two markets are spatially integrated. The higher the trace statistic, the higher is the degree of co integration. Looking at the first column, thirteenth row, the evidence suggests that South Sulawesi and Bali's markets are not spatially integrated, as the value of trace statistic is lower than the critical value. In total, 300 co integration tests (all possible combination of provincial prices) are performed; of which 229 suggest spatial integration. Thus in 76 percent of the cases, evidence of spatial integration is found.

Annexes Tables 2.6 to 2.9 show similar estimations for the markets of soybean, maize, sugar and cooking oil respectively. In the soybean market only 26 percent of the pair of provinces are spatially integrated, 28 percent in the case of maize, 83 percent in the case of sugar, and 29 percent in the case of cooking oil.

The values of the trace statistic for every pair of provinces, in each commodity market will be a key input for the analysis of determinants of integration in Section D.

91 A very good Presentation of the Johansen co integration procedure can be found in Banerjee and Hendry (1995).

Annex Table 2.5: Trace statistic matrix for rice

Rice	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Bali																								
Central Java	30.45																							
Central Kalim	23.46	15.31																						
Central Sulaw	18.75	29.95	16.51																					
East Java	18.01	18.66	15.67	24.05																				
East Kalim	17.65	17.59	23.48	15.15	13.70																			
East Nusat	22.66	21.48	12.93	20.55	23.34	16.87																		
Irian Jaya	22.20	21.77	26.34	20.64	20.15	18.93	15.58																	
Jakarta	24.68	18.88	14.87	20.65	13.27	18.73	24.89	18.74																
North Sulaw	18.01	26.59	11.19	17.03	16.83	15.17	15.25	16.98	19.27															
SE Sulaw	18.83	25.55	14.71	24.62	20.93	12.72	19.00	17.11	23.41	15.36														
South Kalim	20.20	18.22	18.22	15.38	19.91	18.04	20.44	40.11	19.81	13.80	13.99													
South Sulaw	12.73	25.96	13.20	26.48	23.72	12.44	14.80	13.94	17.78	17.42	25.24	14.10												
Sum NAD	14.22	20.37	13.64	21.89	18.13	10.44	15.01	10.50	16.29	15.89	23.49	16.53	31.11											
Sum Bengk	23.58	22.18	15.48	19.63	17.23	19.30	17.52	12.71	25.91	24.26	23.48	15.26	18.27	20.14										
Sum Jambi	15.32	20.80	14.67	20.11	19.93	13.45	20.39	13.10	20.77	18.05	23.29	19.46	19.86	22.92	21.11									
Sum Lamp	21.79	29.70	16.39	22.48	31.42	21.84	20.93	22.09	19.20	21.39	20.58	23.27	17.93	19.54	17.35	22.56								
Sum Medan	15.97	21.50	16.32	25.31	15.89	12.24	16.99	11.24	22.91	18.54	30.39	15.94	22.98	17.91	28.47	18.96	18.78							
Sum Padang	16.34	16.72	13.35	14.63	13.09	18.98	13.98	20.62	15.35	26.39	11.72	11.23	12.47	13.03	19.71	16.41	17.62	15.71						
Sum Palemb	24.11	18.73	13.53	16.64	17.15	13.22	15.52	13.50	21.07	24.04	21.69	17.04	17.84	33.00	19.95	23.27	20.27	20.31	15.27					
Sum Riau	18.00	18.93	11.26	17.98	16.84	17.69	21.07	13.67	23.20	21.67	19.09	13.93	12.44	17.72	23.18	18.64	18.15	18.13	15.41	18.24				
West Java	22.07	23.47	15.23	24.57	20.64	14.64	24.36	17.15	17.42	17.02	24.41	15.52	25.91	23.03	21.48	27.07	22.43	21.38	12.75	27.10	17.01			
West Kalim	15.77	13.62	12.71	17.28	15.35	9.60	15.36	11.34	17.57	12.18	13.48	18.34	12.86	11.62	17.74	12.69	16.00	11.51	10.52	13.71	13.72	13.96		
West Nusat	26.84	26.73	17.53	42.56	29.96	23.79	24.52	19.01	20.57	25.54	42.82	21.57	41.76	30.86	25.12	35.57	26.44	31.19	18.80	27.04	17.99	34.10	19.51	
Yogyakarta	28.34	17.56	15.85	23.62	18.76	18.85	22.22	18.52	17.71	21.55	21.18	18.94	17.90	19.45	22.53	22.37	25.37	17.59	15.32	30.25	19.95	26.21	24.11	23.04

Source: World Bank staff calculations based on data from Bulog.
Note: (1) Significant coefficients in bold.
(2) Numbers in column headings correspond to the same provinces as in row headings.

Annex Table 2.6: Trace statistic matrix for soybean

Soybeans	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Bali																			
Central Java	6.69																		
Central Sulaw	13.79	4.22																	
East Java	6.39	**16.77**	6.05																
East Kalim	7.85	5.38	7.83	9.85															
North Sulaw	**19.47**	6.26	12.97	12.14	11.10														
SE Sulaw	10.74	5.60	10.50	13.46	**28.51**	15.15													
South Kalim	5.72	11.30	9.90	8.34	9.59	12.20	13.02												
South Sulaw	5.09	10.45	4.86	**17.22**	8.19	3.81	15.53	10.04											
Sum NAD	4.63	10.70	5.32	**15.94**	10.97	5.52	17.34	10.78	19.94										
Sum Bengk	11.36	4.05	9.20	6.41	8.81	14.64	22.21	9.81	5.10	7.48									
Sum Jambi	11.25	8.20	8.92	8.95	6.76	11.61	17.17	13.21	12.35	9.84	12.16								
Sum Lamp	7.35	11.81	11.03	8.51	11.98	14.13	13.37	15.39	11.83	7.35	11.97	15.01							
Sum Medan	5.30	9.28	7.19	7.31	6.81	5.54	8.91	12.20	8.82	8.20	4.93	8.17	**17.43**						
Sum Padang	8.56	**19.44**	9.78	11.70	14.52	**19.01**	**19.06**	15.10	13.57	10.96	11.39	10.03	**20.73**	**15.51**					
Sum Palemb	**18.08**	**17.69**	**16.48**	**17.93**	13.27	**26.80**	15.09	13.80	**16.73**	**15.41**	15.04	**20.70**	**19.10**	10.07	**17.16**				
Sum Riau	**25.68**	10.00	9.49	11.05	6.75	11.49	9.17	11.30	7.40	7.84	7.21	12.73	15.33	9.85	10.02	**20.57**			
West Java	7.65	**17.97**	5.98	**18.30**	8.42	8.43	10.57	12.73	10.48	9.99	6.99	9.70	15.36	9.12	14.99	**23.41**	8.48		
West Nusat	6.12	**18.68**	8.26	**17.61**	**15.89**	11.51	**22.04**	7.85	**16.17**	**17.16**	10.30	15.28	7.53	7.84	9.76	**15.91**	**18.79**	**25.97**	
Yogyakarta	9.01	**18.00**	7.68	**17.31**	11.21	18.85	14.46	7.37	**16.61**	**17.97**	8.62	12.92	8.71	7.52	11.02	**18.50**	**23.32**	**23.48**	**16.99**

Source: World Bank staff calculations, based on data from BPS.
Note: (1) Significant coefficients in bold.
(2) Numbers in column headings correspond to the same provinces as in row headings.

Annex Table 2.7: Trace statistic matrix for maize

Maize	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Bali																			
Central Java	9.01																		
Central Sulaw	12.65	11.28																	
East Java	**15.79**	7.10	7.43																
East Kalim	**18.12**	11.46	4.49	10.07															
North Sulaw	**17.41**	14.84	4.85	**17.78**	3.58														
SE Sulaw	**15.77**	8.95	**15.47**	8.21	9.78	3.67													
South Kalim	2.98	4.42	5.03	5.13	9.55	4.72	5.19												
South Sulaw	**18.96**	9.66	4.57	**23.07**	**18.44**	**19.06**	14.02	4.24											
Sum NAD	**15.47**	**17.64**	5.92	11.85	10.11	**22.37**	6.78	3.55	11.70										
Sum Bengk	10.92	13.19	4.01	10.15	15.32	7.33	8.68	**17.51**	13.94	8.53									
Sum Jambi	**17.89**	14.47	8.20	11.47	14.78	8.24	13.18	**18.66**	**15.56**	15.36	**15.53**								
Sum Lamp	13.14	13.43	10.21	8.65	11.60	14.30	10.51	3.56	8.20	**23.20**	10.87	**18.93**							
Sum Medan	**16.59**	**26.98**	12.43	8.91	15.20	**15.94**	13.27	3.49	9.24	**22.21**	12.70	**17.38**	**22.17**						
Sum Padang	**49.21**	**39.71**	**23.45**	**33.51**	**30.51**	**40.22**	**25.09**	12.78	**51.65**	**50.24**	**31.01**	**37.48**	**32.17**	**44.89**					
Sum Palemb	12.95	6.73	11.68	9.26	9.25	7.21	14.32	2.83	8.91	12.15	8.85	13.48	10.42	10.84	**18.06**				
Sum Riau	11.06	9.01	8.62	9.20	6.21	3.80	12.97	5.98	4.78	9.08	7.28	13.63	11.02	14.14	**27.79**	**15.54**			
West Java	14.54	**19.22**	12.00	9.91	9.27	**15.69**	8.66	3.33	9.39	**20.02**	9.12	13.62	14.64	**31.56**	**39.00**	8.88	6.46		
West Nusat	9.70	12.77	4.49	9.22	4.93	**19.37**	4.56	4.03	10.09	11.28	9.39	14.89	12.43	**17.31**	**39.84**	6.99	5.74	10.78	
Yogyakarta	**19.50**	9.75	14.13	11.15	12.23	**20.17**	12.53	6.45	**20.22**	13.44	11.41	13.14	9.15	11.95	**34.76**	9.30	11.75	10.80	10.33

Source: World Bank staff calacultions, based on data from BPS.
Note: (1) Significant coefficients in bold.
(2) Numbers in column headings correspond to the same provinces as in row headings.

Annex Table 2.8: Trace statistic matrix for sugar

Sugar	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Bali																								
Central Java	**43.57**																							
Central Kalim	**32.22**	**23.25**																						
Central Sulaw	**58.53**	**65.19**	**43.38**																					
East Java	**17.84**	**30.15**	**21.25**	**34.84**																				
East Kalim	**37.91**	**38.44**	**23.54**	**45.43**	**16.81**																			
East Nusat	**21.24**	14.55	**20.56**	**25.57**	12.12	**20.22**																		
Irian Jaya	**38.96**	**54.75**	**40.41**	**42.76**	**40.34**	**37.32**	**28.31**																	
Jakarta	**56.84**	**33.43**	**22.08**	**65.08**	**21.82**	**28.53**	**20.48**	**46.42**																
North Sulaw	**34.06**	**46.24**	**38.56**	**43.31**	**31.35**	**28.77**	**17.63**	**33.93**	**35.79**															
SE Sulaw	**43.88**	**50.19**	**50.79**	**46.41**	**21.98**	**50.97**	**30.33**	**20.24**	**51.77**	**27.31**														
South Kalim	**43.90**	**47.12**	**39.09**	**52.51**	**31.29**	**41.60**	**19.83**	**44.79**	**38.93**	**46.97**	**54.38**													
South Sulaw	**37.65**	**43.71**	**32.47**	**41.71**	**19.51**	**36.78**	**18.65**	**28.40**	**38.12**	**25.05**	**30.56**	**38.67**												
Sum NAD	**21.54**	**15.41**	**15.60**	**23.19**	14.97	**15.69**	**28.83**	**22.24**	**18.21**	**16.18**	**24.18**	**16.64**	**16.98**											
Sum Bengk	**28.32**	**18.96**	**21.17**	**31.72**	14.00	**17.23**	**27.35**	**29.17**	**18.94**	**20.71**	**33.80**	**21.00**	**22.80**	**23.05**										
Sum Jambi	**22.20**	15.24	**21.00**	**31.20**	10.02	**16.14**	**24.06**	**25.24**	**17.54**	**16.24**	**31.28**	15.11	**17.15**	**31.91**	**41.82**									
Sum Lamp	**39.78**	**39.41**	**25.88**	**48.32**	**20.20**	**34.90**	**16.74**	**40.18**	**41.42**	**32.12**	**38.64**	**37.82**	**37.77**	**17.32**	**18.33**	14.53								
Sum Medan	**19.14**	11.02	11.88	**19.93**	10.71	10.97	**20.32**	**22.66**	10.86	12.57	**17.70**	13.57	**15.61**	**18.97**	**16.41**	**21.40**	12.98							
Sum Padang	**23.55**	**19.62**	**18.31**	**26.84**	13.94	**19.07**	**28.78**	**24.86**	**20.89**	**19.63**	**30.10**	**19.00**	**20.40**	**27.20**	**25.44**	**40.68**	**17.64**	**26.06**						
Sum Palemb	**24.37**	**16.78**	**21.38**	**36.16**	10.70	**18.46**	**28.94**	**25.46**	**17.48**	**18.88**	**34.37**	15.24	**17.20**	**24.19**	**44.93**	**27.95**	**17.91**	**21.92**	**33.64**					
Sum Riau	**20.56**	14.61	**17.45**	**26.68**	13.63	**17.45**	**20.96**	**25.76**	**18.26**	15.26	**25.86**	13.52	**17.68**	**30.34**	**27.17**	**34.59**	**16.33**	**26.61**	**47.46**	**21.96**				
West Java	**49.26**	**24.44**	**16.68**	**49.12**	**26.32**	**22.87**	**16.15**	**46.81**	**27.52**	**42.69**	**49.12**	**35.05**	**47.12**	14.43	15.26	15.29	**34.17**	10.16	**16.77**	**16.36**	13.38			
West Kalim	12.53	9.38	14.34	13.48	7.59	9.13	12.70	**18.26**	9.71	10.85	**16.32**	11.50	11.63	**22.86**	**20.28**	**22.40**	10.19	**17.13**	**31.40**	**18.68**	**34.63**	7.98		
West Nusat	**32.90**	**28.25**	**24.61**	**48.25**	13.07	**29.66**	**23.28**	**38.67**	**51.02**	**27.84**	**36.31**	**28.88**	**31.03**	**24.05**	**27.08**	**22.51**	**33.08**	**18.94**	**25.64**	**29.52**	**22.50**	**31.29**	13.61	
Yogyakarta	**28.61**	**32.90**	**21.82**	**47.25**	**27.48**	**28.83**	**16.32**	**49.49**	**19.91**	**42.38**	**43.98**	**51.73**	**34.94**	14.38	**15.71**	13.33	**30.27**	9.43	**16.20**	14.24	14.05	**20.18**	8.41	**17.53**

Source: World Bank staff calculations based on data from BPS.
Note: (1) Significant coefficients in bold.
(2) Numbers in column headings correspond to the same provinces as in row headings.

Annex Table 2.9: Trace statistic matrix for cooking oil

Cooking Oil	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Bali																								
Central Java	9.80																							
Central Kalim	6.56	7.85																						
Central Sulaw	7.92	13.84	6.97																					
East Java	14.98	9.76	6.51	8.61																				
East Kalim	8.72	9.47	4.27	6.32	10.57																			
East Nusat	5.10	7.57	4.51	10.60	4.07	5.03																		
Irian Jaya	**15.68**	10.03	10.89	9.17	11.21	6.43	6.82																	
Jakarta	**17.30**	10.79	**20.79**	**17.05**	10.12	8.23	**23.97**	**23.59**																
North Sulaw	**16.04**	9.61	10.34	11.63	9.36	6.44	**15.63**	**25.26**	12.90															
SE Sulaw	10.60	**16.26**	8.44	11.60	11.60	15.21	8.55	9.06	7.88	8.40														
South Kalim	**21.55**	11.79	9.28	9.97	**24.33**	10.46	8.40	**19.15**	13.16	12.14	11.13													
South Sulaw	12.47	**16.02**	8.65	15.33	8.83	7.50	9.06	15.17	13.91	11.55	8.37	12.71												
Sum NAD	**17.29**	**19.15**	10.19	13.86	**17.65**	13.38	8.30	15.20	7.44	10.50	13.86	**16.79**	**16.45**											
Sum Bengk	**33.62**	9.74	11.33	12.51	15.20	7.43	5.43	**50.72**	8.80	12.19	9.36	**20.07**	12.02	12.74										
Sum Jambi	6.31	6.70	8.04	8.05	4.52	5.39	11.64	6.50	9.15	5.10	6.64	6.07	6.34	5.43	4.29									
Sum Lamp	**22.56**	12.42	6.26	9.54	**25.47**	8.83	6.78	11.15	11.91	12.28	11.81	**17.95**	13.93	**21.73**	**44.32**	4.93								
Sum Medan	**30.47**	11.60	8.45	10.75	**16.88**	7.13	8.12	**28.52**	**18.90**	**20.16**	9.57	**21.92**	**15.51**	**19.90**	**74.19**	6.18	14.91							
Sum Padang	12.12	11.12	5.58	8.46	**30.56**	**17.02**	5.50	9.80	9.62	8.84	13.73	**21.51**	10.86	**17.15**	**15.08**	4.82	12.73	9.29						
Sum Palemb	**26.13**	9.27	5.84	8.79	**21.93**	8.59	4.51	**16.05**	8.16	8.24	10.64	**19.76**	9.60	13.26	**15.06**	3.71	**41.69**	**29.23**	11.40					
Sum Riau	**19.41**	11.66	8.88	15.28	**25.31**	12.60	8.15	15.21	10.42	12.12	11.35	**17.49**	11.44	**19.89**	**16.32**	5.86	**31.65**	**23.15**	**22.94**	**18.88**				
West Java	**24.03**	11.02	15.32	**17.83**	10.54	6.98	**18.83**	**49.12**	12.08	14.83	7.65	**15.95**	**17.00**	9.00	**17.83**	5.37	**17.25**	**27.19**	7.28	9.29	11.31			
West Kalim	8.97	9.13	11.41	12.45	7.29	5.39	13.93	**17.47**	**39.66**	14.02	6.89	8.19	14.75	8.46	9.18	9.84	8.87	12.82	6.84	4.82	7.13	**25.31**		
West Nusat	**20.68**	10.25	7.10	12.84	15.11	7.38	7.27	**21.39**	**19.32**	**16.86**	8.65	**18.65**	12.40	**16.76**	**47.48**	6.09	**24.10**	**29.66**	7.82	**20.33**	**15.45**	**28.96**	9.92	
Yogyakarta	**24.00**	8.91	7.77	13.20	10.64	7.19	9.00	**27.71**	15.25	14.41	8.81	**20.25**	12.20	12.87	**37.83**	5.26	14.78	**32.40**	7.96	11.94	14.83	**26.35**	10.91	**27.97**

Source: World Bank staff calculations based on data from BPS.
Note: (1) Significant coefficients in bold.
(2) Numbers in column headings correspond to the same provinces as in row headings.

D. Determinants of Price Differences and Market Integration

In this section, the determinants of price differences across provinces and of market integration across provinces are examined.

Price differences between province *i* and province *j*, and their trace statistic tend to be negatively correlated. Provincial prices that are highly co integrated exhibit lower price differences. Yet, the two are not equivalent. The notion of market integration between two provinces is compatible with price differentials, as long as these differentials are stable over time.[92] In the presence of logistic costs (transport and distribution costs), a pair of provinces can exhibit a high price differential, and still form a market with information flowing smoothly, and so price signals. This is why an alternative way of measuring market integration is to look at the stability of the price differentials over time.

Still, examining price differences across provinces at a given point in time is illuminating. Understanding whether price differences are driven by distance, poor infrastructure, market power, etc, gives essential information to the policymaker, at the time of deciding where to canalize scarce resources to increase availability and reduce prices for the consumer, of key staples, without affecting the revenue received by the farmers.

This chapter makes use of both measures. Section (i) focuses on provincial price differences, and identifies regularities associated with them. This will increase the understanding of what is the potential for government policy to reduce them. Section (ii) examines the determinants of market integration by looking at the factors that explain the trace statistic. Understanding market integration and its determinants is very relevant from a policy perspective. The implication is that an integrated economy uses its factor resource more efficiently.

There can also be an additional reason from a public policy perspective. When markets are integrated the costs of intervention are lower. If the Government wants to sell stocks of rice or buy rice to affect price, it would be irrelevant where the rice is sold, as the shock of excess of supply or demand in, say, East Java, will be transmitted to the rest of the provinces. This would reduce the costs of the intervention, as it would reduce transportation costs. Having information on the factors that determine integration is key therefore from an economic and a public policy perspective.

Before turning to the econometric analysis of determinants of price differences and of market integration, a correlation matrix is constructed to understand how these variables co-move and identify possible sources of collinearities in the subsequent analysis. Annex Table 2.10 shows bivariate correlation coefficients.

The price differences in rice, maize and sugar markets are significantly correlated with distance and remoteness, as expected. For all markets, price differences show a negative correlation with infrastructure. Better transport infrastructure reduces transport costs and therefore facilitates price convergence.

[100] Assuming that logistic costs are stable over time. If they are always increasing, then a constantly increasing price differential may still be consistent with market integration.

PCI is positively correlated with price differences in rice, soybean and maize markets. This may be due to PCI capturing patterns of product quality differences in consumption. The correlation is not significant for sugar and cooking oil.[93]

One interesting feature is that for the rice, soybean and maize markets the degree of market integration (the trace statistic) is significantly and negatively correlated with distance and the absolute value of the correlation increases when considering remoteness instead. Remoteness attempts to capture transportation costs as well as "being part of a hub".[94] Therefore this variable is capturing two interacting forces: from one side it captures the physical cost of moving goods, which should negatively affect integration. At the same time, it also captures the 'market potential'[95] effect or the effect of being closer to a 'hub' which could be associated to higher information flows and a better functioning market, which should positively affect integration. The fact that remoteness is more strongly correlated to the market integration than distance is suggesting that it is important to factor in the "market potential" effect is important to be factored in and we should not only approximate the transport costs with the plain distance.[96]

Annex Table 2.10: Correlation matrix

	Variable	Distance	Remote	Pop	PCI	Infra	Output PC	P'tivity	Trace
	Distance								
	Remote	0.091							
	Pop	-0.376	-0.349						
	PCI	-0.059	0.096	-0.112					
	Infra	-0.461	-0.468	0.209	-0.172				
Rice	**Output PC**	-0.229	-0.222	0.051	-0.155	-0.020			
	P'tivity	-0.467	-0.510	0.576	-0.040	0.826	0.127		
	Trace	-0.138	-0.254	0.134	-0.141	0.278	-0.065	0.314	
	Price Diff	0.412	0.486	-0.195	0.276	-0.233	-0.404	-0.268	-0.159
Soybeans	**Output PC**	-0.058	-0.312	0.020	0.001	0.254			
	P'tivity	-0.119	-0.147	0.137	-0.051	0.125	0.208		
	Trace	-0.043	-0.088	0.100	0.101	0.040	0.034	-0.130	
	Price Diff	0.084	0.232	-0.386	0.152	-0.486	-0.451	0.047	0.183
Maize	**Output PC**	-0.438	-0.413	0.407	-0.444	0.148			
	P'tivity	-0.598	-0.716	0.815	-0.244	0.394	0.319		
	Trace	-0.163	-0.345	0.183	-0.052	0.255	0.058	0.398	
	Price Diff	0.180	0.431	-0.364	0.275	-0.346	-0.313	-0.639	-0.342
Sugar	**Trace**	0.189	0.206	-0.215	-0.031	-0.044			
	Price Diff	0.626	0.620	-0.236	-0.064	-0.425			0.013
C. Oil	**Trace Stat**	0.061	0.052	-0.065	0.025	0.016			
	Price Diff	-0.006	0.006	-0.008	-0.001	-0.033			-0.209

Source : World Bank staff calculations.

93 It could be argued that the scope for quality differentials in sugar is lower than in the case of rice. That would explain the insignificant correlation of PCI and Price Diff. The same argument would not hold for cooking oil, however.

94 In fact, this is a measure of distance that adjusts for the size of the main market that province i is close to.

95 This "market potential" effect is related to the population size of the city.

96 Interestingly, for sugar and cooking oil the correlations are positive and they don't change significantly when looking at distance or remoteness.

E. Determinants of Price Differentials

In section C, important price differences in the markets considered were documented, as well as important provincial heterogeneity in several dimensions (production conditions, geography, infrastructure, wealth, etc.). The next step is to examine to what extent this heterogeneity can explain price differences across provinces. The average price difference between province *i* and province *j*, over the period 1993/01 to 2007/12 is estimated to see the effect of a number of covariates on these differences.[97]

This exercise is an attempt to explain divergences from the law of one price. With trade being costly, one could re-state the law of one price as the following condition:

$$\left| p_i - p_j \right| \leq t \tag{4}$$

The absolute difference between the price in *i* and the price in *j* is expected to be lower or equal to the transport and distribution costs, *t*. In other words, if the price of rice that results from the interaction of domestic supply and demand forces in Jakarta (P_J) is well above the price of rice in West Java (P_W) plus the cost associated with transporting the rice from West Java to Jakarta($t_{WJ,J}$), then West Javanese producers would send their rice to Jakarta and the price in Jakarta would go down to $PW_J + t_{WJ,J}$.

If instead, the initial difference is lower than the transportation cost (either because transport costs are high or because initial price differences are very small), then prices in different locations will reflect supply and demand conditions in the province. If price differences are to be examined, these may lie in differences in supply conditions, which will be determined by how efficient the process of production is. The level of efficiency will depend on how productive labor, capital and land are, and in the case of commodities, it will be definitely affected by weather conditions. Supply conditions will also be impacted by differences in demand conditions will depend on consumers' purchasing power and population size.

Finally, another source of price differences may be related to unobserved quality heterogeneity. For example, the quality of rice consumed in different provinces may vary significantly. However, long enough time series of prices for IR-II across provinces are not ready available.[98]The problem of quality differentials seems difficult to avoid. However, if richer households consume better quality, and therefore more expensive, rice, then PCI should capture those product quality.

The model specified is the following:

$$\begin{aligned}\left(P_i - P_j\right) &= \beta_0 + \beta_1 Remote_i + \beta_2 Remote_j + \beta_3 Remote * Infra_i + \beta_4 Remote * Infra_j \\ &+ \beta_5 Contiguity_{ij} + \beta_6 Productivity_i + \beta_7 Productivity_j + \beta_8 OutputPC_i + \beta_9 OutputPC_j \\ &+ \beta_{10} PCI_i + \beta_{11} PCI_j + e_{ij}\end{aligned} \tag{5}$$

97 The reason a panel is not used to analyze the determinants of price differences along time and across provinces is because data for most of the explanatory variables are available only for selected years, and in general, there is only limited overlapping among them.

98 In addition to this, based on discussions with Bulog experts, even IR-II, a very specific type of rice, varies by province.

Annex Table 2.11: Determinants of cross-province price differentials

Dep Var:	Rice	Soybeans	Maize	Sugar	Cooking Oil
Price Difference 'i-j'	**Coef.**	**Coef.**	**Coef.**	**Coef.**	**Coef.**
Remoteness 1	0.375	4.607	1.134	0.600	0.073
	(6.57)***	(11.67)***	(3.8)***	(14.28)***	(1.68)***
Remoteness 2	0.100	-0.586	-0.262	0.035	0.001
	(0.38)	(-3.27)***	(-0.91)	(0.41)	(0.01)
Contiguity	-0.195	-0.028	0.029	-0.303	0.102
	(-1.52)	(-0.14)	(0.17)	(-3.04)***	(0.64)
Remote*Infra 1	-0.162	-3.493	-1.073	-0.217	-0.110
	(-2.64)***	(-11.92)***	(-4.89)***	(-4.97)***	(-1.96)*
Remote*Infra 2	-0.020	0.494	0.241	-0.038	0.191
	(-0.1)	(3.09)***	(0.96)	(-0.45)	(2.49)**
Income PC 1	0.300	-1.030	-0.258	-0.176	-0.033
	(3.14)***	(-9.33)***	(-1.76)*	(-4.1)***	(-0.5)
Income PC 2	0.075	0.092	-0.281	-0.088	0.114
	(1.11)	(0.63)	(-1.62)	(-1.38)	(2.3)**
Land Productivity 1	-0.156	1.420	-2.118		
	(-0.88)	(2.2)**	(-4.35)***		
Land Productivity 2	0.181	0.758	0.237		
	(0.62)	(1.55)	(0.49)		
Output of Rel Comm 1	0.210	-0.146	-0.081		
	(1.56)	(-3.09)***	(-1.24)		
Output of Rel Comm 1	0.425	0.038	0.189		
	(2.92)***	(0.56)	(1.83)*		
Constant	-80.706	-74779.590	95522.850	173.907	427.005
	(-0.61)	(-1.35)	(4.12)***	(9.01)***	(7.02)***
Obs.	**300**	**91**	**91**	**300**	**300**
Prob>F	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
R-Squared	**0.3605**	**0.7217**	**0.6043**	**0.4405**	**0.0752**

Source: World Bank staff calculations.
Note: (1)*** indicates significance at 1%, **significance at 5%, * significance at 10%.
(2) T-statistics in brackets.

where $P_i - P_j$ is the price difference between province *i* and *j* measured in rupiah; $Remote_i$ is the distance of province *i* to the closest main city weighted by the inverse of the population of that main city, and controls for transportation costs. Then, $Remote * Infra_i$ is an interaction term between the weighted distance and a measure of transport infrastructure (quality of roads). It is expected that distance affects the price more, the worse the quality of the transport infrastructure. The dummy variable contiguity that takes value 1 if the two provinces share a border and 0 otherwise, is trying to capture the fact that road transport is relatively cheaper than other types. Supply conditions are

captured with $Productivity_i$, which is a measure of yield per hectare, and $OutputPC_i$, which is the level of output of the commodity normalized by the population in the province. PCI_i is per capita income and captures demand-push effects, quality differences across provinces, and government intervention, as the latter is greater in poorer provinces.

Annex Table 2.11 presents the results for the five commodities analyzed, and reports elasticity. Note that because data for output and productivity data by province is only available for soybean, maize and rice, these variables are omitted in the regression for sugar and cooking oil. For rice, sugar and cooking oil, data is available for 25 provinces, yielding 300 possible price differences (25 × 24/2). For soybean and maize data is available for 14 provinces, yielding 91 possible price differences (14 × 13/2). For ease of interpretation of the results, the model is run on the 300 pairs for which the price difference is positive. This means that the price in province *i* is always higher than in *j*. A variable that increases the price in *i,* ceteris paribus, will increase the price difference, while one that increases the price in *j* will decrease it. [99]

In the case of rice, the expected signs in remoteness, the interaction of remoteness and infrastructure, and provincial output of rice are obtained. But productivity differences do not seem to affect the price differential, nor does the contiguity condition. The effect of differences in qualities consumed associated with income per capita seems to be dominating for the case of rice, as the coefficient for income per capita in province 1 is positive and significant.

For soybean, the results are similar. The only difference is that the "development" effect of per capita income seems to dominate over the quality differentials for this commodity. The same thing is found when looking at maize. For this commodity, productivity differentials explain price differentials as well. This is reasonable, since market integration for maize is much lower than for rice and land productivity is expected to play a more important role in price setting if provinces are less integrated. In addition, for the case of maize, when two provinces are contiguous, the price differential is lower.

For sugar and cooking oil, a reduced set of variables is incorporated due to a data availability constraint. Signs of remoteness and infrastructure are as expected in both cases. The effect of different qualities consumed of income per capita seems to dominate in the case of sugar, while the "development" effect seems to dominate in the case of cooking oil. This is perhaps surprising, as one would expect to find a larger variety of cooking oils on the market, than of sugar.

These results suggest interesting patterns: remote provinces pay higher prices than central ones, everything else equal. But this does not amount to geographic determinism, with remote provinces inevitably paying higher prices. The impact of remoteness is negatively correlated with the quality of transport infrastructure. Furthermore, in less integrated markets, such as the markets for soybean and the maize, domestic production conditions also seem to affect price differentials between provinces.

99 It should be taken into account, that in the estimation of the model on price differences, the degrees of freedom of the regression are given by the number of provinces we have data on (25), and not by the number of pair-wise combination of provinces. This is taken into account when analyzing the significance of the coefficients.

F. Determinants of Spatial Integration

With the determinants of spatial market integration, the dependent variable is the test statistic for the period 1993 – 2007 of the cointegration test between a pair of markets (Johansen's trace statistic). A high value is evidence of strong co-movement of prices and therefore of spatial integration, while a low value points to the opposite.

The potential determinants of spatial integration are a subset of those that explained price differentials:

- **Remoteness:** a higher weighted distance increases transport costs and therefore reduces the degree of spatial integration;
- **Contiguity:** a positive sign is expected since this variable attempts to better capture transportation costs. Given Indonesian geography, a measure of remoteness could prove insufficient to capture transportation costs. If for example, transportation by land is cheaper than by sea, one would expect that contiguous provinces are more integrated than those that are not, because trade between them is less costly for a given degree of remoteness;
- **Infrastructure (Interacted with remoteness):** it is expected that better infrastructure will decrease transportation costs, and thus increase the degree of spatial integration);
- **PCI:** income per capita would control for the fact that richer provinces will consume better quality rice. If that's the case, then when rice price series for different provinces are compared, the comparison may involve prices of different products and a rejection of cointegration wouldn't be indicative of no spatial integration for one specific type of rice. If this effect is predominant, a negative coefficient will be observed for this control variable. On the other hand, PCI may also capture a development effect of the market. Markets with higher income per capita are more developed, exhibit better infrastructure, and so trading tends to be cheaper. If this effect is predominant, a positive coefficient for this variable will be observed; and
- **Output PC:** output of the relevant commodity normalized by the population of the province. Goodwin and Schroeder (1991) argue that low volume markets have "a bigger potential for exhibiting unwarranted price behavior". On the other hand, it could be argued that provinces that are 'self-sufficient' in a certain commodity (they produce enough to cover demand in the province) could be to some extent, isolated from extra-province's price movements.

For these reasons, the effect of output on spatial integration is uncertain a priori. Worth mentioning is that this latter "self-sufficiency" effect would mean that the higher the level of output, the lower the degree of integration. However, beyond a certain threshold of output, one would expect that the province becomes an exporter of the commodity, which would lead to an increase in its linkages with neighboring markets. To test if a self-sufficient province is less integrated than one that is not, allowance needs to be made for a non-linear relationship between output and market integration. Thus, the squared value of output PC is added, *Sq Output PC*.

Then, Equation 6 is estimated:

$$TS_{ij} = \beta_0 + \beta_1 Remote_i + \beta_2 Remote_j + \beta_3 Continguity_{i,j} + \beta_4 PCI_i + \beta_5 PCI_j + \beta_6 OutputPC_i + \beta_7 OutputPC_j + \beta_8 SqOutputPC_i + \beta_9 SqOutputPC_j + e_{ij} \quad (6)$$

Annex Table 2.12: Determinants of spatial market integration in Indonesia

Dep Var:	Rice		Soybeans		Maize		Sugar	Cooking Oil
Trace Statistic	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(2)**	**(1)**	**(1)**
Remoteness 1	-0.075	-0.090	0.043	-0.052	-0.296	-0.397	-0.238	-0.249
	(-3.03)***	(-3.01)***	(0.813)	(-0.27)	(-2.12)**	(-2.44)**	(-5.9)***	(-3.84)***
Remoteness 2	-0.029	-0.048	0.164	0.112	-0.594	-0.568	0.066	0.106
	(-1.51)	(-2.3)**	(0.397)	(0.570)	(-3.53)***	(-3.2)***	(2.76)***	(2.17)**
Contiguity	-0.001	0.000	0.009	0.009	-0.004	-0.005	0.021	0.007
	(-0.33)	(-0.14)	(0.551)	(0.620)	(-0.22)	(-0.28)	(3.11)***	(0.580)
Remote*Infra 1	-0.005	0.009	-0.045	0.025	0.209	0.295	0.129	0.146
	(-0.2)	(-0.32)	(0.794)	(0.140)	(1.73)*	(2.08)**	(3.47)***	(2.33)**
Remote*Infra 2	-0.011	-0.009	-0.093	-0.052	0.481	0.459	0.001	-0.142
	(-0.51)	(-0.39)	(0.552)	(-0.33)	(3.61)***	(3.21)***	(0.030)	(-3.21)***
PCI 1	-0.063	-0.082	-0.097	-0.056	0.150	0.123	0.078	0.046
	(-3.36)***	(-2.63)***	(0.382)	(-0.49)	(1.380)	(1.070)	(1.87)*	(1.100)
PCI 2	-0.038	-0.134	0.020	0.003	0.144	0.138	-0.054	-0.091
	(-2.02)**	(-3.21)***	(0.848)	(0.020)	(1.85)*	(1.77)*	(-2.32)**	(-3.38)***
Output PC 1	0.009	-0.059	0.109	-0.227	-0.013	-0.294		
	(0.590)	(-0.69)	(0.080)	(-0.9)	(-0.21)	(-1.14)		
Output PC 2	-0.023	-0.306	0.010	-0.179	-0.001	0.037		
	(-1.5)	(-2.99)***	(0.788)	(-1.24)	(-0.02)	(0.190)		
Sq Output PC 1		0.024		0.207		0.137		
		(-0.83)		(1.390)		(1.140)		
Sq Output PC 2		0.129		0.089		-0.023		
		(2.83)***		(1.400)		(-0.22)		
Obs.	**300**	**300**	**91**	**91**	**91**	**91**	**300**	**300**
Prob>F	**0.000**	**0.000**	**0.508**	**0.242**	**0.003**	**0.002**	**0.000**	**0.000**
R2	**0.1563**	**0.1946**	**0.0840**	**0.1217**	**0.1935**	**0.2060**	**0.1271**	**0.0672**

Source: World Bank staff calculations.
Note: (1) *** indicates significance at 1%, ** significance at 5%, * significance at 10%.
(2) T-statistics in brackets.

The first thing to observe is that the model for the soybean market is not well determined. None of the covariates are significant, nor the model as a whole (Annex Table 2.12). A quite robust result, for the rest of the commodities considered, is that remoter provinces seem to be less integrated than central provinces. This seems reasonable and is in line with what has been found in the literature (Goodwin and Schroeder, 1991), (Goletti, Raisuddin, and Farid, 1995). The effect of remoteness on market integration is attenuated by the quality of infrastructure only in the markets for maize and sugar, while in the rice and cooking oil markets, the results are not significant or mixed. Contiguity seems to affect market integration positively only in the sugar market. The quality effect of PCI seems to dominate in the market for rice, as the coefficient on PCI is negative, while the "market development" effect seems to dominate for the case of maize and sugar.[100] One interesting finding is that related to the self-sufficiency hypothesis. The results for the market for rice suggest that market integration is related to output in a non-linear way. More output produced leads to less market integration, up to a certain level, after which the relationship changes sign.[101] Self-sufficiency seems to affect market integration only for rice.

100 It has been already argued that the scope for quality differences in the case of sugar is lower than that in the case of rice. For maize, probably the same could be argued, given that maize is generally used for animal feeding purposes.

101 This turning point was estimated at about 0.7 tons per capita of paddy rice. The conversion from paddy to white rice is generally done at 1.5kg of paddy rice for 1 of white rice, which would imply, assuming no waste, that the turning point is when the province produces more than about 466kg of rice per capita.

Annex III

A. Theoretical Structure of the Wayang 2005 Model

The structure of the model itself is relatively conventional. Wayang 2005 belongs to the class of general equilibrium models that are linear in proportional changes, sometimes referred to as Johansen models, after the seminal work of Johansen (1964), which also used this approach. Wayang shares many structural features with the highly influential ORANI general equilibrium model of the Australian economy (Dixon, *et al.* 1982), which also belongs to this Johansen category, but these features have been adapted in light of the realities of the Indonesian economy.

The analytical structure includes the following major components:

- Household consumption demands, of each of the 10 broad household types, for 20 categories of consumer goods, one of which is rice. These are derived from the linear expenditure system;
- The household supplies of skilled and unskilled are assumed to be exogenous;
- A factor demand system - based on the assumption of CES production technology- that relates the demand for each primary factor to sectoral outputs and prices of each of the primary factors. This reflects the assumption that factors of production may be substituted for one another in ways that depend on factor prices and on the elasticities of substitution between the factors;
- A distinction between skilled and unskilled labor, which are 'nested' within the sectoral production functions. In each non-agricultural sector, skilled and unskilled labor enters a CES production function to produce 'effective labor'. Effective labor, variable capital and fixed capital then enter the production functions for domestic output;
- Leontief assumptions for the demand for intermediate goods. Each intermediate good in each sector is assumed to be demanded in fixed proportion to the gross output of the sector;
- Demands for imported and domestically produced versions of each good, incorporating Armington elasticities of substitution between the two;
- A set of equations determining the incomes of the 10 household types from their (exogenous) ownership of factors of production, the (endogenous) rates of return to these factors, and any net transfers from elsewhere in the system;
- Rates of import tariffs and excise taxes across commodities, rates of business taxes, value added taxes and corporate income taxes across sectors, and rates of personal income taxes across household types which reflect the structure of the Indonesian tax system, using data from the Indonesian Ministry of Finance;
- A set of macroeconomic identities which ensures that standard macroeconomic accounting conventions are observed.

Empirical features of the model

Sectors

The national model contains 74 producer goods and services produced by 74 corresponding sectors - 21 agricultural sectors, 9 mining sectors, 14 food processing sectors, 25 manufacturing and utility sectors and 5 service sectors. Each sector produces a single output, so the set of commodities coincides with the set of sectors. The various sectors of the model are classified as either 'export-oriented' or 'import-competing'. The level of exports of an export-oriented sector is treated as being

endogenous, while the exports of an import-competing sector are treated as being exogenous.[102] The criterion used to classify these sectors is the ratio of a sector's imports to its exports. If this ratio exceeds 1.5, then the sector is regarded as producing an importable. If the import/export ratio is less than 0.5, then the sector is deemed to be export-oriented. For ratios between 0.5 and 1.5, additional relevant information is used in classifying the sector.

Commodities

Wayang 2005 contains two types of commodities - producer goods and consumer goods. Producer goods come from two sources: domestically-produced and imported. All 74 producer goods are in principle capable of being imported, although some have zero levels of imports in the database, services and utilities representing most of the examples. The 20 consumer goods identified in the model are each transformed from the producer goods, where the proportions of domestically produced and imported producer goods of each kind used in this transformation is sensitive to their (Armington) elasticities of substitution and to changes in their relative prices.

Factors of production

The mobility of factors of production is a critical feature of any general equilibrium system. 'Mobility' is used here to mean mobility across economic activities (sectors), rather than geographical mobility. The greater the factor mobility that is built into the model, the greater is the economy's simulated capacity to respond to changes in the economic environment. It is clearly essential that assumptions about the mobility of factors of production be consistent with the length of run that the model is intended to represent.

Four types of labor are identified: farmer, operator, administrator and professional. All four types of labor are assumed to be fully mobile across all sectors. The four types are partially substitutable for one another but the proportions in which they are employed in the various sectors vary greatly. These assumptions imply that within each of the four categories of labor wages must be equal in all sectors, though wages for the four types of labor will differ and need not move together (Annex Table 3.1).

It is assumed that in every sector there is constant elasticity of substitution (CES) production technology with diminishing returns to scale to variable factors alone. However, we also introduce a sector-specific fixed factor in each sector to assure that there are constant returns to scale in production to all factors. We refer to the set of specific factors in the agricultural sectors as 'land', and to the set of those in the non-agricultural sectors as 'fixed capital'. The assumption of constant returns means that all factor demand functions are homogeneous of degree one in output. In each sector, there is a zero profit condition, which equates the price of output to the minimum unit cost of production. This condition can be thought of determining the price of the fixed factor in that sector.

102 Given that the exported and domestically sold good are treated as being identical, this assumption is necessary to make it possible to separate the domestic price of the import competing good from the price of the exported good. Otherwise, the Armington structure would be redundant.

B. Tables

Annex Table 3.2 summarizes the cost structures of the agricultural, mining, food processing, industrial and services sectors. The agricultural sector is highly labor-intensive and this point will be important for later discussion.

Length of run

The model can be operated in either short-run or long-run modes. In both modes, labor is mobile among all sectors, but they differ in the degree of mobility of capital and agricultural land. In the short-run mode there are two kinds of mobile capital - one that is mobile among agricultural sectors, and another that is mobile among non-agricultural sectors. It is assumed that mobile agricultural capital cannot be used outside agriculture and mobile non-agricultural capital cannot be used in agriculture. In this treatment, agricultural capital is thought of as machinery such as tractors of various kinds, which can be used in a variety of agricultural activities. Non-agricultural mobile capital is thought of as industrial machinery and buildings. The total stock of agricultural land is fixed exogenously and land is immobile among agricultural sectors. In its long-run mode the model allows full inter-sectoral mobility of all forms of capital. The rate of return is endogenously determined. The total stock of agricultural land remains fixed exogenously but land is mobile among agricultural sectors.

Households

The model contains ten major household categories - seven rural and three urban - differentiated by socio-economic group, as identified in the 2005 SAM. They are listed in Annex Table 3.3. The sources of income of each of these household types depend on their ownership of factors of production and are estimated from the household income and expenditure survey called Susenas. Drawing on the Susenas data, each of the 10 household categories is sub-divided into a further 100 sub-categories each of the same population size, arranged by real consumption expenditures per capita, giving a total of 1,000 sub-categories.[103] The consumer demand equations for the various household types are based on the linear expenditure system. Within each of the 10 major categories, the 100 sub-categories differ according to their budget shares in consumption.

In the social accounting matrix each household's sources of income are classified into several sources. The sources and disposal of income appearing in the SAM are:

a. Wages and salaries
b. Rent from capital
c. Incoming transfer
d. Total above
e. Income tax
f. Net income
g. Final consumption
h. Outgoing transfer
i. Saving

103 The population sizes of the 10 major categories are not the same, but *within* each of these 10 categories the population sizes of the 100 sub-categories are the same.

The factor ownership characteristics of the 10 major household categories are summarized in Annex Table 3.3. These household categories vary considerably in the composition of their factor incomes, but within the analysis of this chapter, the composition of factor incomes is assumed to be uniform among the 100 sub-categories of each of these 10 major categories; these 100 sub-categories thus obtain their incomes from factors of production in the same proportions as one another. Of course, the incomes of these 100 sub-categories vary considerably, so they should be thought of as owning varying quantities of a uniform bundle of factors. The composition of the factor bundle varies across the 10 major household categories but is assumed to be uniform within each.

A surprising feature of the table is the importance of non-agricultural capital and administrator wages for the incomes of all ten socio-economic groups. An explanation for this feature of the data, reflecting Indonesia's official Social Accounting Matrix (SAM) is that within these data 'household' membership is defined in a very inclusive manner. For example, some individual members of even the poorest rural socio-economic households, may be migrants to urban areas, owning significant amounts of non-agricultural capital and/or holding administrative (or professional) jobs. But they are included, for the purposes of these data, within their rural households of origin.

Annex Table 3.4 summarizes the major characteristics of the ten household categories as they relate to poverty incidence. The ten categories shown correspond to those used in the construction of Indonesia's official SAM. Poor people are found in all ten household categories, at rates varying from roughly 30 percent (Rural 3) to 5 percent (Urban 3). It is important to understand that these ten socio-economic categories are classified by the location of residence and occupation of the household head. But the household may also include members whose location of residence and occupation are quite different from that of the household head. For example, the category Rural 1 (farming households not owning land) derives significant income from administrator and professional wages and even some income from land, reflecting income earned by household members other than the household head, as shown in Annex Table 3.4. Indeed, this category, Rural 1, turns out to have lower poverty incidence than any of the rural household categories actually owning land (Rural 2, Rural 3 and Rural 4). Annex Table 3.2 shows that this occurs because the latter categories earn less income from 'administrator' wages.

Official data on rural and urban poverty incidence for 2005, calculated from the Susenas data set and published by the Central Bureau of Statistics, are: rural areas (20 percent) and urban areas (11.7 percent). But official data on poverty incidence for the 10 household categories were not available. For the purpose of this study poverty incidence was calculated for each of the 10 household categories, using estimated poverty lines for rural and urban areas, as follows. The distribution of total rural expenditures was assembled by aggregating detailed expenditure data for the seven rural household categories, using their respective population shares as weights. The same was done for urban households. The rural and urban poverty lines which replicated the official poverty incidence data were then found for these rural and urban expenditure distributions. The resulting poverty lines were: rural households Rp 117,500 and urban households Rp 152,000 per person per month.

This rural poverty line was then applied to the distributions of expenditures for each of the seven rural categories to estimate poverty incidence in each rural category. The same was done for the three urban categories. The virtue of this approach is that it is guaranteed to produce estimates of poverty within the 10 socio-economic groups which are consistent with the official data on rural and urban poverty incidence. The disadvantage is that it assumes a common rural poverty line for all seven rural categories and similarly a common urban poverty line for all three urban categories.

Elasticity estimates

The elasticity estimates used in Wayang 2005 for the consumer and factor demand systems were based on empirical estimates derived econometrically for a similar model of the Thai economy, known as PARA. These parameters were amended to match the differences between the databases for Wayang 2005 and PARA to ensure the homogeneity properties required by economic theory. All export demand elasticities were set equal to 20. The elasticity of supply of imports to Indonesia were assumed to be infinite (import prices were set exogenously) except for rice, where the assumed elasticity was 10 (also varied in the discussion below). All production functions are assumed be CES in primary factors with elasticities of substitution of 0.5. The Armington elasticities of substitution in demand between imports and domestically produced goods were set equal to 2, except for rice, where the assumed value was 6, reflecting the assumption that imported and domestically produced rice are closer substitutes than is the case for most other commodities.

Annex Table 3.1: Cost shares of major factors of production: paddy and other sectors, 2005

	Labor				Capital				Total
					Agriculture		Non-agriculture		
	Farmer	Operator	Administ.	Professional	Land	Capital	Fixed	Variable	
Agriculture (1 to 21)	85.41	0.74	0.54	0.48	7.62	5.21	-	-	100
Mining (22 to 30)	0.00	12.35	3.89	2.39	-	-	66.86	14.51	100
Food processing (31 to 44)	0.00	34.26	5.91	1.73	-	-	38.56	19.54	100
Sector (45 to 69)	0.00	29.87	5.05	2.60	-	-	31.82	30.66	100
Services (70 to 74)	0.00	8.80	44.70	9.49	-	-	29.71	7.30	100
All sectors (1 to 74)	9.98	14.32	23.53	5.60	1.54	1.05	30.82	13.16	100
Total payments to factors (Rp billion)	282,816	405,217	666,363	158,217	43,502	29,752	872,280	372,507	2,830,654

Source: Database of Wayang 2005 model, calculated from Susenas and Input-output table data.
Note: '-' means not applicable.

Annex Table 3.2: Sources of factor incomes of the broad household groups, 2005

(percent of factor income, except final row)

	Labor				Capital				Total
	Farmer	Operator	Admin.	Professional	Agriculture		Non Agriculture		
					Land	Capital	Fixed	Variable	
Rural 1	35.56	13.51	26.09	3.19	0.71	0.49	14.33	6.12	100
Rural 2	36.19	12.08	21.57	1.61	0.94	0.64	18.89	8.07	100
Rural 3	26.17	16.98	9.41	8.44	1.29	0.88	25.81	11.02	100
Rural 4	16.82	4.80	8.68	5.68	2.11	1.45	42.37	18.09	100
Rural 5	7.30	20.73	23.48	2.08	1.53	1.05	30.71	13.11	100
Rural 6	19.51	20.66	4.37	4.41	1.69	1.15	33.79	14.43	100
Rural 7	11.94	8.65	13.86	6.22	1.96	1.34	39.26	16.77	100
Urban 1	0.46	29.55	24.59	1.72	1.44	0.99	28.92	12.35	100
Urban 2	0.81	14.60	33.98	3.62	1.55	1.06	31.10	13.28	100
Urban 3	0.60	4.73	36.39	11.78	1.53	1.05	30.78	13.14	100
Total	**9.99**	**14.32**	**23.54**	**5.59**	**1.54**	**1.05**	**30.82**	**13.16**	**100**
Total income from factors (Rp billion)	**282,815**	**405,217**	**666,360**	**158,216**	**43,503**	**29,753**	**872,279**	**372,507**	**2,830,649**

Source: Database of Wayang 2005 model, based on Susenas, 2005 and Social Accounting Matrix 2005, Central Bureau of Statistics, Jakarta.
Note: See Annex Table 3.3 for a definition of the household groups.

Annex Table 3.3: Summary of household categories

No.	Category	Description
1	Rural 1	Agricultural employees - agricultural workers who do not own land.
2	Rural 2	Small farmers - agricultural workers with land < 0.5 ha.
3	Rural 3	Medium farmers - agricultural workers with land 0.5 ~ 1 ha.
4	Rural 4	Large farmers - agricultural workers with land >1 ha.
5	Rural 5	Rural low income - non-agricultural households
6	Rural 6	Rural non-labor– not part of labor force
7	Rural 7	Rural high-income - non-agricultural managers, entrepreneurs, technicians, professionals, military officers, teachers
8	Urban 1	Urban low-income - small retail store owners, small entrepreneurs, small personal service providers, and manual workers
9	Urban 2	Urban non-labor – not part of labor force
10	Urban 3	Urban high income – managers, technicians, professionals

Source: BPS, Social Accounting Matrix, Indonesia, 2005, Jakarta.

Annex Table 3.4: Expenditure and poverty incidence by household group, 2005

Household group:	% of total population in this group	% of total households in this group	Mean per capita expenditure (Rp. /mo.)	% of population in this group in poverty	% of all poor people in this group
Rural 1	13.46	13.30	200,619.36	21.2	15.8
Rural 2	17.70	17.76	197,156.54	23.1	23.6
Rural 3	6.62	6.42	174,083.71	30.1	11.1
Rural 4	4.61	4.41	184,329.33	25.2	7.3
Rural 5	15.77	15.60	228,953.77	15.1	12.9
Rural 6	4.76	5.62	213,088.12	20.1	5.5
Rural 7	6.89	6.57	302,682.28	7.2	3.1
Urban 1	15.98	15.65	331,473.86	15.0	13.5
Urban 2	5.37	6.13	390,314.96	13.0	4.4
Urban 3	8.84	8.54	509,114.08	5.0	2.8
Indonesia	**100**	**100**	**267960.90**	**16.0**	**100**
Memo items:					
Headcount poverty incidence national (%)				16.0	
Headcount poverty incidence rural (%)				20.0	
Headcount poverty incidence urban (%)				11.7	

Source: World Bank staff calculations, using data from BPS, Jakarta.

Annex Table 3.5: Short-run shocks to export and import prices for simulations SR-1 to SR-6
(percent change from base)

	SR-1	SR-2	SR-3	SR-4	SR-5	SR-6
Energy sector (3 commod.)						
1. Crude oil	24.3	-	-	24.3	-	24.3
2. LNG	71.5	-	-	71.5	-	71.5
3. Petroleum products	80.4	-	-	80.4	-	80.4
Agricultural sector (19 commod.)						
4. Rice	-	109.3	-	109.3	-	109.3
5. Wheat flour	-	91.0	-	91.0	-	91.0
6. Other flour	-	18.0	-	18.0	-	18.0
7. Maize	-	125.5	-	125.5	-	125.5
8. Soybean	-	91.6	-	91.6	-	91.6
9. Soybean product	-	29.2	-	29.2	-	29.2
10. Other cereals	-	18.0	-	18.0	-	18.0
11. Other food crops	-	18.0	-	18.0	-	18.0
12. Sugar	-	15.9	-	15.9	-	15.9
13. Oil palm	-	123.1	-	123.1	-	123.1
14. Cacao	-	53.0	-	53.0	-	53.0
15. Animal and vegetable oil	-	94.2	-	94.2	-	94.2
16. Coffee and tea	-	41.5	-	41.5	-	41.5
17. Other foods	-	16.0	-	16.0	-	16.0
18. Tobacco	-	3.1	-	3.1	-	3.1
19. Rubber	-	71.0	-	71.0	-	71.0
20. Rubber product	-	40.8	-	40.8	-	40.8
21. Livestock products	-	2.5	-	2.5	-	2.5
22. Other agriculture	-	22.3	-	22.3	-	22.3
Mining sector (6 commod.)						
23. Coal	-	-	169.6	169.6	98	267.6
24. Copper ore	-	-	86.1	86.1	98	184.1
25. Nickel and bauxite ore	-	-	45.1	45.1	98	143.1
26. Tin ore	-	-	14.3	14.3	98	112.3
27. Other metals	-	-	70.5	70.5	98	168.5
28. Other mining	-	-	18.1	18.1	98	116.1

Source: World Bank staff calculations, based on price forecasts.
Note: '-' denotes zero. The above shocks also apply to simulations SR-1T to SR-6T.

Annex Table 3.6: Long-run shocks to export and import prices for simulations LR-1 to LR-6
(percent change from base)

	LR-1	LR-2	LR-3	LR-4	LR-5	LR-6
Energy sector (3 commod.)						
1. Crude oil	20.2	-	-	20.2	-	20.2
2. LNG	31.1	-	-	31.1	-	31.1
3. Petroleum products	20.2	-	-	20.2	-	20.2
Agricultural sector (19 commod.)						
4. Rice	-	17.6	-	17.6	-	17.6
5. Wheat flour	-	30.1	-	30.1	-	30.1
6. Other flour	-	18.0	-	18.0	-	18.0
7. Maize	-	32.6	-	32.6	-	32.6
8. Soybean	-	2.1	-	2.1	-	2.1
9. Soybean product	-	8.1	-	8.1	-	8.1
10. Other cereals	-	18.0	-	18.0	-	18.0
11. Other food crops	-	18.0	-	18.0	-	18.0
12. Sugar	-	30.4	-	30.4	-	30.4
13. Oil palm	-	26.7	-	26.7	-	26.7
14. Cacao	-	17.3	-	17.3	-	17.3
15. Animal and vegetable oil	-	13.3	-	13.3	-	13.3
16. Coffee and tea	-	10.5	-	10.5	-	10.5
17. Other foods	-	16.1	-	16.1	-	16.1
18. Tobacco	-	3.1	-	3.1	-	3.1
19. Rubber	-	7.9	-	7.9	-	7.9
20. Rubber product	-	7.9	-	7.9	-	7.9
21. Livestock products	-	0.7	-	0.7	-	0.7
22. Other agriculture	-	22.3	-	22.3	-	22.3
Mining sector (6 commod.)						
23. Coal	-	-	17.8	17.8	98	115.8
24. Copper ore	-	-	14.6	14.6	98	112.6
25. Nickel and bauxite ore	-	-	16.3	16.3	98	114.3
26. Tin ore	-	-	15.5	15.5	98	113.5
27. Other metals	-	-	11.1	11.1	98	109.1
28. Other mining	-	-	18.1	18.1	98	116.1

Source: World Bank staff calculations, based on price forecasts.
Note: '-' denotes zero. In simulations SR-5 and SR-6 the shocks to the mining sector are applied to export prices only.

Annex Table 3.7: Closure: Summary of short-run and long-run closure assumptions

Variable	Short-run closure	Long-run closure
Current account balance	Exogenous	Exogenous
Aggregate capital stock	Exogenous	Exogenous
Capital use per sector	Exogenous	Endogenous
Return to capital	Endogenous	Endogenous
Total stock of agric. land	Exogenous	Exogenous
Land use per agric. sector	Exogenous	Endogenous
Return to agric. land	Endogenous (by industry)	Endogenous
Aggregate labor supply	Exogenous (4 types)	Exogenous (4 types)
Labor use per sector	Endogenous (4 types)	Endogenous (4 types)
Real wage	Endogenous (4 types)	Endogenous (4 types)
Government expenditure	Exogenous	Exogenous
Rice import volume	Exogenous	Exogenous
Rice import tariff	Endogenous	Endogenous
Rice export volume	Exogenous	Exogenous
Rice export tax	Endogenous	Endogenous
Real domestic fuel price	Exogenous (equal to observed increase)	Exogenous (equal to observed increase)

Source: World Bank staff.

Annex Table 3.8: Summary of targeted cash transfers and their financing

Category	Gross positive transfer to each poor person	Gross negative transfer to each person	Net positive transfer to each poor person	Net negative transfer to each non-poor person
Rural 1	22534.43	3993.19	18541.24	3993.19
Rural 2	22875.86	3993.19	18882.67	3993.19
Rural 3	22094.73	3993.19	18101.54	3993.19
Rural 4	21828.53	3993.19	17835.34	3993.19
Rural 5	22534.43	3993.19	18541.24	3993.19
Rural 6	26960.83	3993.19	22967.64	3993.19
Rural 7	21776.06	3993.19	17782.87	3993.19
Urban 1	22312.41	3993.19	18319.22	3993.19
Urban 2	26031.15	3993.19	22037.96	3993.19
Urban 3	22040.97	3993.19	18047.78	3993.19

Source: World Bank staff calculations.
Note: Units are rupiah per person per month in 2005 prices.

Annex Table 3.9: Short-run results - Output of agricultural and mining sectors
(Units: percent change from base value of volume of output)

	SR-1	SR-2	SR-3	SR-4	SR-5	SR-6
1. Paddy	-0.14	-0.46	3.09	2.47	2.39	4.84
2. Maize	-0.30	7.53	1.36	8.57	1.05	9.61
3. Cassava	0.11	-1.36	2.75	1.48	2.15	3.62
4. Soybean	-0.38	120.23	-21.66	98.75	-16.98	82.09
5. Other food crops	0.26	-1.93	1.69	0.03	1.33	1.36
6. Fruit and vegetables	0.30	-8.03	-1.49	-9.13	-1.13	-10.22
7. Other cereal food crop	-0.71	-1.57	-3.42	-5.57	-2.71	-8.20
8. Rubber	-1.04	3.04	-0.87	1.15	-0.72	0.45
9. Sugar cane	-2.09	0.36	-4.43	-6.04	-3.49	-9.47
10. Coconut	-0.90	8.15	0.35	7.37	0.22	7.45
11. Oil palm	-2.28	37.03	-2.62	31.16	-2.16	28.43
12. Other estate crop	-1.33	-7.30	-4.50	-13.01	-3.59	-16.53
13. Tobacco	-0.75	1.01	3.98	4.19	3.05	7.21
14. Coffee and tea	-1.17	8.01	-4.67	2.30	-3.69	-1.32
15. Cloves	-0.80	0.08	2.74	2.00	2.09	4.07
16. Cacao	-0.57	25.23	-10.81	14.11	-8.43	5.83
17. Other agriculture	-0.41	0.70	-2.11	-1.72	-1.68	-3.35
18. Livestock	-0.25	-3.19	2.80	-0.63	2.17	1.55
19. Wood and forestry prod.	-1.38	-2.35	-1.78	-5.46	-1.47	-6.90
20. Sea fish products	0.14	-3.01	0.25	-2.59	0.20	-2.37
21. Fresh water fish	0.35	-1.74	2.27	0.88	1.79	2.67
22. Coal	-0.85	-0.61	19.70	18.26	11.20	29.47
23. Crude oil	0.86	-0.26	-0.39	0.21	-0.31	-0.10
24. Natural gas	2.11	-0.05	-0.29	1.77	-0.28	1.49
25. Tin ore	-4.21	-0.66	-1.47	-6.32	-1.45	-7.75
26. Nickel and bauxite ore	-1.21	-0.87	5.89	3.83	14.57	18.42
27. Copper ore	-0.50	-0.38	6.28	5.40	7.35	12.76
28. Gold ore	-1.80	-0.98	-1.90	-4.65	-1.81	-6.44
29. Other metal mining	-4.89	-3.19	34.65	26.68	50.12	76.85
30. Other mining	-1.39	-0.62	0.76	-1.22	7.03	5.82

Source: World Bank staff calculations.

Annex Table 3.10: Short-run results - employment in agricultural and mining sectors
(Units: percent change from base value of level of employment)

	SR-1	SR-2	SR-3	SR-4	SR-5	SR-6
1. Paddy	0.05	-0.81	2.90	2.12	2.25	4.36
2. Maize	0.20	6.88	0.88	7.94	0.70	8.64
3. Cassava	0.31	-1.77	2.55	1.08	2.00	3.08
4. Soybean	-0.15	121.32	-22.25	99.48	-17.43	82.39
5. Other food crops	0.36	-2.14	1.60	-0.17	1.27	1.11
6. Fruit and vegetables	0.53	-8.52	-1.75	-9.65	-1.33	-10.92
7. Other cereal food crop	-0.01	-2.35	-3.98	-6.20	-3.11	-9.23
8. Rubber	-0.66	2.63	-1.29	0.71	-1.03	-0.30
9. Sugar cane	-1.91	-0.41	-5.30	-7.48	-4.15	-11.54
10. Coconut	-0.67	8.51	0.08	7.68	0.03	7.56
11. Oil palm	-2.06	39.44	-3.50	32.83	-2.83	29.37
12. Other estate crop	-0.62	-9.26	-5.68	-15.41	-4.48	-19.80
13. Tobacco	1.57	-1.55	2.43	2.44	1.97	4.41
14. Coffee and tea	-0.39	7.67	-5.82	1.61	-4.55	-2.84
15. Cloves	-0.15	-0.88	2.48	1.43	1.91	3.34
16. Cacao	-0.06	27.33	-12.53	15.03	-9.74	5.47
17. Other agriculture	0.20	-0.06	-2.79	-2.53	-2.18	-4.65
18. Livestock	-0.38	-3.67	3.06	-0.98	2.37	1.39
19. Wood and forestry prod.	-2.30	-3.59	-2.29	-8.12	-1.91	-9.99
20. Sea fish products	0.10	-5.95	0.49	-5.30	0.40	-4.87
21. Fresh water fish	0.48	-3.36	3.96	1.07	3.11	4.18
22. Coal	-3.95	-2.84	91.83	85.13	52.23	137.41
23. Crude oil	8.73	-2.70	-3.98	2.14	-3.19	-1.00
24. Natural gas	30.47	-0.76	-4.24	25.54	-4.02	21.57
25. Tin ore	-21.84	-3.40	-7.61	-32.74	-7.49	-40.17
26. Nickel and bauxite ore	-4.01	-2.89	19.49	12.68	48.19	60.92
27. Copper ore	-4.33	-3.29	54.02	46.50	63.24	109.80
28. Gold ore	-11.24	-6.13	-11.87	-29.07	-11.31	-40.28
29. Other metal mining	-6.40	-4.18	45.41	34.96	65.68	100.71
30. Other mining	-1.71	-0.76	0.94	-1.50	8.63	7.14

Source: World Bank staff calculations.

Annex Table 3.11: Short-run results – price transmission

Commodity	International price change (2005-2008) A	Simulated change in producer price B	Column A minus change in GDP deflator C = B – 19.6	Transmission ratio D = C/A
Energy sector				
1. Crude oil	24.3	23.23	3.63	0.1494
2. LNG	71.5	63.92	44.32	0.6199
3. Petroleum products	80.4	40.36	20.76	0.2582
Agricultural sector				
4. Rice	109.3	21.79	2.19	0.0206
5. Wheat flour	91.0	29.34	9.74	0.1070
6. Other flour	18.0	24.49	4.89	0.2717
7. Maize	125.5	32.72	13.12	0.1045
8. Soybean	91.6	34.72	15.12	0.1651
9. Soybean product	29.2	34.29	14.69	0.5031
10. Other cereals	18.0	33.94	14.34	0.7967
11. Other food crops	18.0	34.32	14.72	0.8178
12. Sugar	15.9	29.23	9.63	0.6057
13. Oil palm	123.1	32.01	12.41	0.1008
14. Cacao	53.0	35.85	16.25	0.3066
15. Animal and vegetable oil	94.2	59.52	39.92	0.4238
16. Coffee and tea	41.5	20.29	0.69	0.0166
17. Other foods	16.0	25.52	5.92	0.3700
18. Tobacco	3.1	21.59	1.99	0.6419
19. Rubber	71.0	32.02	12.42	0.1749
20. Rubber product	40.8	21.20	1.60	0.0392
21. Livestock products	2.5	21.22	1.62	0.6480
22. Other agriculture	22.3	30.22	10.62	0.4762
Mining sector				
23. Coal	169.6	74.96	55.36	0.3264
24. Copper ore	86.1	48.9	29.30	0.3403
25. Nickel and bauxite ore	45.1	29.35	9.75	0.2162
26. Tin ore	14.3	29.13	9.53	0.6664
27. Other metals	70.5	22.85	3.25	0.0461
28. Other mining	18.1	27.27	7.67	0.4238

Source: World Bank staff calculations.
Note: Results in columns G, S and D refer to Simulation SR-4.
International price change (column A) means the exogenous shocks summarized in Table 24.
Simulated change in producer price minus change in GDP deflator (column B) means the percentage change in the producer price minus the percentage change in the GDP deflator (19.6 percent), both from simulation SR-4. Transmission ratio (column D) means the ratio of column C to column A.

Annex Table 3.12: Short-run results – real factor returns (CPI deflator) percent change

(Units: percent change from base value)

	SR-1	SR-2	SR-3	SR-4	SR-5	SR-6
Farmer wage	-2.81	16.35	8.45	21.80	6.43	28.12
Operator wage	9.18	-0.57	-0.68	7.90	0.09	7.97
Administrator wage	-0.97	-5.28	-0.33	-6.50	-0.43	-6.88
Professional wage	1.20	-5.66	-0.20	-4.54	-0.23	-4.71
Agricultural capital	-3.81	12.97	8.51	17.47	6.42	23.78
Non-agr. capital	13.25	-4.12	3.37	12.58	2.62	15.24
Land	-3.20	11.14	9.40	17.16	7.15	24.20

Source: World Bank staff calculations.

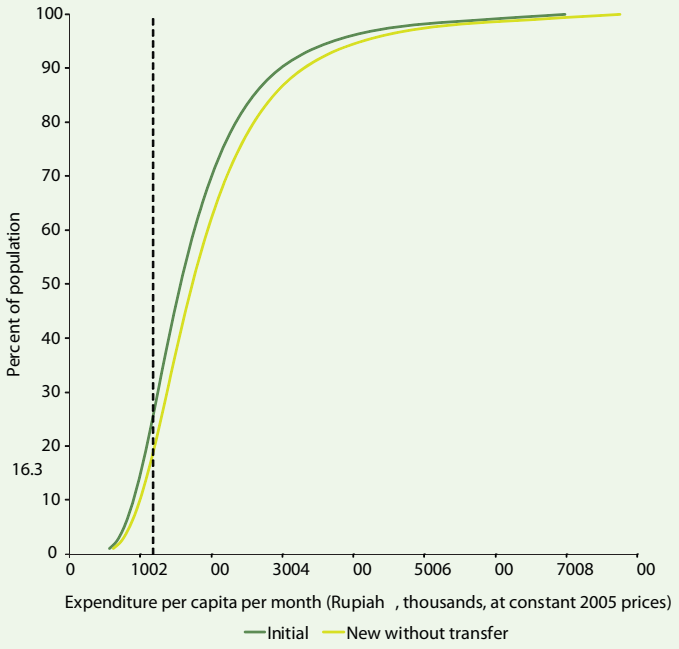
Annex Table 3.13: Short-run results – real household expenditures (CPI deflator)

(Units: percent change from base value)

	SR-1	SR-2	SR-3	SR-4	SR-5	SR-6
Rural 1	-4.20	2.98	6.72	5.40	5.14	10.48
Rural 2	-1.22	3.37	5.70	7.78	4.42	12.15
Rural 3	1.91	3.88	6.47	12.18	5.03	17.16
Rural 4	5.36	2.06	6.36	13.74	4.95	18.67
Rural 5	-0.23	1.78	7.49	8.94	5.87	14.74
Rural 6	2.79	3.08	6.49	12.30	5.20	17.45
Rural 7	-2.88	5.04	11.98	13.96	9.35	23.21
Urban 1	2.49	0.66	6.10	9.17	4.84	13.96
Urban 2	0.98	0.20	6.47	7.59	4.99	12.55
Urban 3	0.13	-0.01	6.91	6.98	5.33	12.28

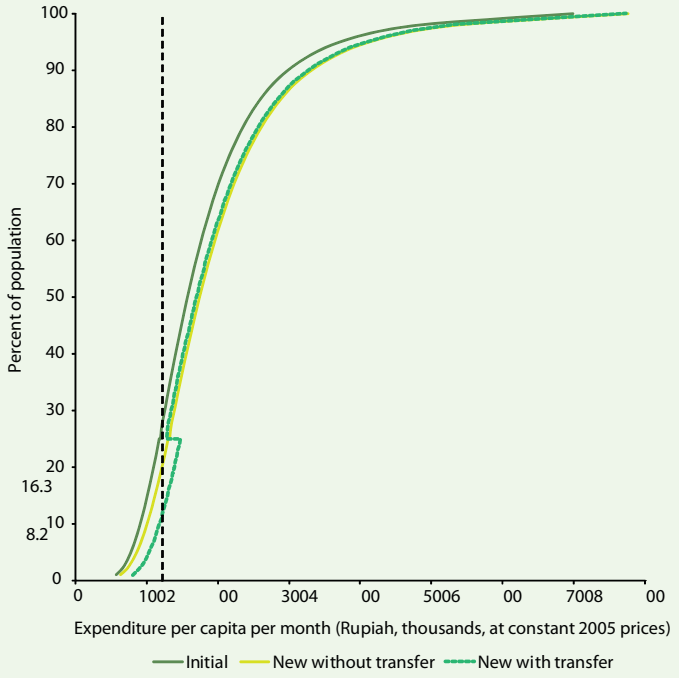
Source: World Bank staff calculations.

Annex Figure 3.1: Simulation of the impact of a cash transfer to socio-economic group Rural 4 on its per capita expenditure



Source: World Bank staff calculations.

Annex Figure 3.2: Impact of simulation SR-4 plus a cash transfer on per capita expenditure of socio-economic group Rural 4



Source: World Bank staff calculations.

Annex Table 3.14: Short-run results - poverty incidence, without transfers

Category	Pop. Share	Initial poverty incidence	SR-1	SR-2	SR-3	SR-4	SR-5	SR-6
			New (simulated) poverty incidence					
Rural 1	13.46	21.2	24.2	19.2	17.1	18.2	18.2	15.1
Rural 2	17.70	23.1	24.0	20.3	19.2	18.0	20.0	15.3
Rural 3	6.62	30.1	28.2	26.5	24.4	21.2	26.0	18.2
Rural 4	4.61	25.2	21.2	23.2	20.3	16.3	21.2	14.1
Rural 5	15.77	15.1	15.1	14.1	11.2	11.0	12.1	9.0
Rural 6	4.76	20.1	18.2	18.0	16.0	13.1	16.3	11.2
Rural 7	6.89	7.2	8.1	5.2	4.1	4.0	4.2	2.2
Urban 1	15.98	15.0	13.4	14.4	12.2	11.1	13.1	9.2
Urban 2	5.37	13.0	12.2	12.2	10.1	10.1	10.3	8.2
Urban 3	8.84	5.0	4.2	5.0	3.2	3.2	3.2	3.0
Rural	70.00	20.0	20.2	17.8	15.8	14.9	16.7	12.4
Urban	30.00	11.7	10.6	11.3	9.2	8.7	9.8	7.3
National	100	16.0	15.8	14.3	12.3	10.5	13.1	9.4
			Simulated changes in poverty incidence					
Rural 1			3.0	-2.0	-4.1	-3.0	-3.0	-6.1
Rural 2			0.9	-2.8	-3.9	-5.1	-3.1	-7.8
Rural 3			-1.9	-3.6	-5.7	-8.9	-4.1	-11.9
Rural 4			-4.0	-2.0	-4.9	-8.9	-4.0	-11.1
Rural 5			0.0	-1.0	-3.9	-4.1	-3.0	-6.1
Rural 6			-1.9	-2.1	-4.1	-7.0	-3.8	-8.9
Rural 7			0.9	-2.0	-3.1	-3.2	-3.0	-5.0
Urban 1			-1.6	-0.6	-2.8	-3.9	-1.9	-5.8
Urban 2			-0.8	-0.8	-2.9	-2.9	-2.7	-4.8
Urban 3			-0.8	0.0	-1.8	-1.8	-1.8	-2.0
Rural			0.2	-2.2	-4.2	-5.1	-3.3	-7.6
Urban			-1.1	-0.4	-2.5	-3.0	-1.9	-4.4
National			-0.2	-1.7	-3.7	-4.5	-2.9	-6.6

Source: World Bank staff calculations.

Annex Table 3.15: Long-run results - output of agricultural and mining sectors
(Units: percent change from base value of volume of output)

	LR-1	LR-2	LR-3	LR-4	LR-5	LR-6
1. Paddy	0.19	-0.09	-0.01	0.09	1.26	2.79
2. Maize	0.02	2.62	-0.01	2.63	0.38	1.13
3. Cassava	0.35	1.04	-0.01	1.38	0.99	2.57
4. Soybean	-0.15	4.97	0.02	4.78	-6.54	-10.06
5. Other food crops	0.48	1.59	0.00	2.06	0.78	2.32
6. Fruit and vegetables	0.55	0.02	0.01	0.56	-0.10	0.77
7. Other cereal food crop	-0.37	8.33	-0.01	7.94	-1.21	-1.03
8. Rubber	-1.22	-0.84	-0.02	-2.09	-0.95	-2.60
9. Sugar cane	-2.05	23.19	-0.03	21.10	-2.96	-5.12
10. Coconut	-0.88	0.23	-0.02	-0.63	-0.72	-3.57
11. Oil palm	-2.69	-9.29	-0.03	-11.86	-3.21	-16.14
12. Other estate crop	-1.24	1.29	-0.03	0.01	-2.10	-3.85
13. Tobacco	-0.16	-0.37	-0.03	-0.55	1.50	3.03
14. Coffee and tea	-0.68	-3.98	-0.01	-4.68	-1.72	-6.95
15. Cloves	-0.28	-0.31	-0.02	-0.61	1.10	2.24
16. Cacao	-0.16	-12.96	0.02	-13.13	-3.32	-16.98
17. Other agriculture	0.05	8.24	-0.02	8.26	-0.55	7.58
18. Livestock	0.02	-0.50	-0.01	-0.50	0.90	2.45
19. Wood and forestry prod.	-2.01	0.19	-0.03	-1.85	-1.89	-4.12
20. Sea fish products	0.15	0.02	0.00	0.17	0.10	0.70
21. Fresh water fish	0.54	-0.13	0.00	0.41	0.95	2.43
22. Coal	-2.76	0.22	8.07	5.53	42.01	46.86
23. Crude oil	7.49	0.27	-0.03	7.72	-3.58	0.83
24. Natural gas	21.88	0.40	-0.02	22.26	-5.49	15.26
25. Tin ore	-4.86	0.06	-0.29	-5.09	-0.52	-3.26
26. Nickel and bauxite ore	-3.00	0.26	-8.07	-10.81	45.21	49.55
27. Copper ore	-3.28	0.23	-8.06	-11.12	50.14	54.31
28. Gold ore	-2.79	0.16	-0.10	-2.73	-2.22	-5.19
29. Other metal mining	-4.60	0.50	8.31	4.20	9.43	5.32
30. Other mining	-1.77	0.09	1.40	-0.28	0.33	-1.03

Source: World Bank staff calculations.

Annex Table 3.16: Long-run results - employment in agricultural and mining sectors
(Units: percent change from base value of level of employment)

	LR-1	LR-2	LR-3	LR-4	LR-5	LR-6
1. Paddy	0.27	-0.09	-0.01	0.17	1.25	2.85
2. Maize	0.23	2.64	0.01	2.87	0.36	1.23
3. Cassava	0.43	1.04	0.00	1.47	0.98	2.61
4. Soybean	-0.06	5.03	0.02	4.94	-6.66	-10.19
5. Other food crops	0.52	1.60	0.00	2.12	0.78	2.34
6. Fruit and vegetables	0.65	0.01	0.02	0.66	-0.12	0.81
7. Other cereal food crop	-0.07	8.43	0.01	8.35	-1.20	-0.83
8. Rubber	-1.13	-0.92	-0.01	-2.05	-1.02	-2.67
9. Sugar cane	-2.11	25.31	-0.02	23.16	-3.30	-5.61
10. Coconut	-0.88	0.20	-0.01	-0.65	-0.85	-4.01
11. Oil palm	-2.78	-10.19	-0.02	-12.83	-3.62	-17.73
12. Other estate crop	-1.07	1.38	-0.01	0.29	-2.36	-4.14
13. Tobacco	0.87	-0.39	0.03	0.51	1.68	4.01
14. Coffee and tea	-0.39	-4.42	0.01	-4.81	-1.90	-7.43
15. Cloves	-0.04	-0.39	-0.01	-0.44	1.21	2.63
16. Cacao	0.01	-14.53	0.04	-14.51	-3.74	-18.89
17. Other agriculture	0.30	8.99	0.00	9.28	-0.60	8.45
18. Livestock	-0.12	-0.62	-0.02	-0.76	0.87	2.41
19. Wood and forestry products	-3.16	0.10	-0.05	-3.12	-2.87	-6.32
20. Sea fish products	0.07	-0.08	0.01	-0.01	0.05	0.93
21. Fresh water fish	0.76	-0.32	0.00	0.44	1.53	3.92
22. Coal	-0.56	0.32	8.01	7.76	42.79	49.77
23. Crude oil	10.02	0.37	-0.09	10.29	-2.69	4.17
24. Natural gas	24.50	0.51	-0.08	24.91	-4.56	18.71
25. Tin ore	-2.59	0.16	-0.35	-2.79	0.29	-0.27
26. Nickel and bauxite ore	-1.04	0.34	-8.12	-8.82	45.91	52.14
27. Copper ore	-0.80	0.33	-8.12	-8.60	51.02	57.59
28. Gold ore	-0.43	0.26	-0.16	-0.33	-1.38	-2.07
29. Other metal mining	-4.01	0.52	8.29	4.79	9.83	6.29
30. Other mining	-1.32	0.12	1.38	0.17	0.59	-0.31

Source: World Bank staff calculations.

Annex Table 3.17: Long-run results – regional output (GRDP)
(Units: percent change from base value of volume of regional output)

	LR-1	LR-2	LR-3	LR-4	LR-5	LR-6
NAD	15.64	-0.16	-0.06	15.45	1.88	18.49
Sumut	-0.30	-1.87	-0.17	-2.27	9.06	16.55
Sumbar	0.13	-2.68	0.01	-2.50	12.07	18.52
Riau	4.69	-0.67	-0.04	3.98	-0.90	3.51
Jambi	2.53	-0.95	-0.08	1.53	3.34	8.09
Sumsel	8.14	-1.84	0.19	6.53	11.11	25.31
Babel	-1.90	-0.20	-0.22	-2.32	8.28	8.51
Bengkulu	1.39	-0.65	0.17	1.10	21.09	36.50
Lampung	1.22	-2.60	-0.19	-1.53	10.98	19.10
DKI Jakarta	-6.51	0.43	-0.06	-6.15	-6.17	-13.22
Jabar	-1.01	-0.72	-0.11	-1.80	3.65	8.08
Banten	-1.91	-0.15	-0.09	-2.14	-0.17	0.14
Jateng	7.91	-0.69	-0.11	7.17	7.14	20.75
DIY	0.52	-1.62	-0.19	-1.24	11.24	23.57
Jatim	-1.28	-1.74	-0.22	-3.17	8.33	13.94
Kalbar	-1.32	-1.42	-0.06	-2.75	6.50	9.69
Kalteng	-0.73	-1.85	-0.12	-2.64	6.18	8.86
Kalsel	-1.20	-0.54	0.70	-1.01	14.90	18.28
Kaltim	16.79	0.13	0.37	17.28	4.59	19.05
Sulut	0.37	-1.59	-0.33	-1.52	8.85	14.65
Gorontalo	0.78	-0.89	-0.11	-0.16	8.42	15.86
Sulteng	-0.14	-4.00	-0.18	-4.28	10.21	15.83
Sulsel	-0.56	-1.31	0.20	-1.65	10.62	13.62
Sultra	1.63	-0.64	0.25	1.36	15.17	25.07
Bali	-4.90	0.01	-0.12	-4.98	-0.91	-2.84
NTB	-1.63	-0.28	1.28	-0.62	25.07	28.86
NTT	0.78	-0.18	-0.06	0.60	7.52	13.95
Maluku	0.10	-0.05	-0.07	0.06	6.70	12.73
Malut	-1.75	0.42	0.23	-0.97	11.27	17.51
Papua	1.91	0.25	-0.13	2.05	1.81	5.42

Source: World Bank staff calculations.

Annex Table 3.18: Long-run results – real factor returns (CPI deflator)

(Units: percent change from base value)

	LR-1	LR-2	LR-3	LR-4	LR-5	LR-6
Farmer wage	-3.27	-0.44	-0.10	-3.78	0.93	-0.45
Operator wage	-0.14	-0.70	0.19	-0.66	0.25	0.22
Administrator wage	-2.31	-0.52	-0.05	-2.89	-0.30	-1.27
Professional wage	-1.64	-0.41	0.07	-1.99	0.28	-0.37
Agricultural capital	-4.86	-1.41	-0.12	-6.36	-0.23	-3.33
Non-agr. capital	4.53	-0.40	-0.05	4.07	2.66	7.56
Land	-4.08	-1.23	-0.10	-5.39	0.47	-1.34

Source: World Bank staff calculations.

Annex Table 3.19: Long-run results – real household expenditures (CPI deflator)

(Units: percent change from base value)

	LR-1	LR-2	LR-3	LR-4	LR-5	LR-6
Rural 1	-0.85	-0.65	-0.03	-1.52	1.85	3.23
Rural 2	-0.53	-0.44	-0.03	-0.99	1.55	2.85
Rural 3	0.10	-0.59	-0.02	-0.50	2.21	4.27
Rural 4	1.54	-0.56	-0.05	0.94	2.58	5.92
Rural 5	0.63	-0.59	-0.02	0.03	2.61	5.62
Rural 6	1.00	-0.68	-0.01	0.32	2.23	4.98
Rural 7	1.03	-0.73	-0.05	0.27	4.01	8.73
Urban 1	0.80	-0.57	0.01	0.25	2.33	5.06
Urban 2	0.73	-0.70	-0.02	0.01	2.54	5.44
Urban 3	0.34	-0.63	-0.04	-0.32	2.54	5.49

Source: World Bank staff calculations.

Annex IV

Annex Table 4.1: Policy recommendations for countries to tackle high commodity prices

	Transfers to poor households	Public Price Stabilization	Transition towards Market Stabilization Measures
Immediate responses	• Expand existing cash transfer programs • Feeding programs • Food for work programs • Limited subsidies	• Lift import restrictions on food and quotas • Draw down food stocks	• Reducing red tape in transporting goods across regions • Limited intervention using variable tariff
Long-term responses	• Develop cash transfer programs (where previously non-existent)	• Improving farm productivity • Improving village infrastructure • Improving food logistics network	• Encourage investments in private storage and warehouse receipt • Forward contracts • Domestic market efficiency • Future Market, Index-based weather insurance
Policies to avoid	• Universal subsidies • In-kind transfer	• Export bans • Price controls	• Import quota or import bans • Price controls

Source: Based on a note prepared by Louise Cord, Eduardo Ley, Hassan Zaman, Elena Ianchovichina, C. Hull, Emmanuel Skoufias, Mark Thomas, Brian Pinto, and Tahrat Shahid from the World Bank in 2008.

Annex Table 4.2 : Trade policy instruments in a market context

Instrument	Countries where this is being implemented presently (not exhaustive)	Effects	Likely to work best where…	Pitfalls to watch for
Grain export bans or taxes	Argentina, Croatia, India, Kazakhstan, Pakistan, Russia, Serbia, Ukraine, Vietnam	• Reduces the domestic price of grain in the short run; • Transfers income from grain producers to consumers, and • Taxes grain producers relative to all other domestic activities,	• Net grain exporters where cereal exports are small share of production or trade • There are effective institutions to monitor trade and implement regulations • Grain exporting regions are not dependent on sales to neighboring countries because of geographic factors	• Can raise international grain prices and price volatility further if big players are involved • Reduces incentives for greater domestic grain output • Can have terrible impacts on neighbors that habitually rely on importing the items in quest (e.g. Bangladesh imports of Indian rice, for example) • Creates incentives for costly physical grain self-sufficiency and buffer stocks in importing countries
Reduction in grain import tariffs	Morocco, Nigeria and Turkey	• Lowers domestic prices over the counterfactual • Stabilizes domestic grain prices if implemented as a variable levy	• Economic and political conditions have allowed grain import duties in the past (i.e. there is something to lower) • There is the institutional capacity to operate a variable levy according to economic principles	• Import tariffs tend to raise domestic grain prices • Discretionary levies can create opportunities for rent seeking • Lack of predictability of policy discourages domestic resource inflow to production and marketing
Import subsidies for specific grains available to all importers/ consumers	Saudi Arabia (rice)	• Is akin to having a separate exchange rate for grain imports • Makes grain cheaper relative to other items • Can lower domestic grain market volatility if used appropriately	• Net grain importers where cereal imports are small share of production or trade • Where subsidies can be kept variable depending on global market volatility, to lower domestic price variability • There are effective institutions to monitor trade and global markets, make decisions, and implement regulations quickly	• Need to avoid creating rents (as with any subsidy) • Need to tailor to rapid global market changes
State enters grain import trade in competition with private sector to depress private margins	Bangladesh, Turkey, Yemen	• Can lower domestic grain prices and if applied variably, and thus reduce volatility	• There are pre-existing cartel-like features in private grain trade	• Danger of public sector entity displacing the private sector from the better connected and more lucrative urban markets without vulnerable or remote populations being much better off
Relaxation of import regulations or blind eye to increased grain smuggling	Nigeria (relative to illicit rice imports via Benin)	• Reduces the domestic price of grain in the short run;	• Blind-eye policies may be easier to implement if rapid policy reversal is expected in the near future, but generally are always a second-best policy to open market liberalization	• Creates rents and opportunities for corruption • Raises transport and handling costs above what they would be under open liberalization

Source: Based on a note entitled "Template on policy options to address rising food prices" prepared by Christopher Delgado (World Bank ARD) and Hassan Zaman (World Bank PRMPR) in March 2008.

Annex Table 4.3: Domestic market intervention instruments

Instrument	Countries where this is being implemented presently (not exhaustive)	Likely effects	Likely to work best where…	Pitfalls to watch for
Selective grain/ bread subsidies to poor consumers with or without rationing of individual households	Egypt, Ethiopia (adapting CCT to this issue)	• Raises food consumption of target groups • May not distort domestic markets much to the extent that this consumption is truly additional	• Ability to target effectively due to strong institutions and existing knowledge/ data bases about who is eligible • Share of poor is relatively low • There is the institutional ability to operate "low price" shops serving the target groups • Effective rationing is feasible	• Need to avoid creating rents and opportunities for corruption • Disincentives to the near poor who do not qualify • Rich hire the poor to stand in line to procure subsidized items
Price controls on prices for "strategic" staples or trader margins	China, Kazakhstan, Kyrgystan, Morocco (during Ramadan), Russia,Venezuela, Zimbabwe	• Lowers grain/ bread prices to all consumers regardless of need • Discourages domestic production and processing and trade depending on form	• Staple foods are already a small share of total household expenditures for most households (e.g. French bread subsidies until the 1990s) • Implemented for a pre-determined very short term (e.g. Morocco in Ramadan)	• Discourages production and imports, preventing market-led solutions to the underlying problems • Danger of aggravating rapid migration to cities over time
Forcible state procurement at below market prices with distribution to targeted groups	Zimbabwe	• Grain disappears from market • Domestic production declines	• Always a bad idea	• The beneficiaries are rarely the deserving poor • Domestic agriculture ceases to function effectively
Cash transfers to the poor	Mexico	• Raises domestic cereal prices if share of poor is large in overall market • Improves welfare of those who actually get transfer	• The problem is a longer term one of structural poverty of specific sub-groups within a region • Share of poor in overall market is low • Transfers are tied to desirable behaviors (education, heath, rural infrastructure creation etc.) that target underlying poverty	• Creation of rents • Lack of fiscal sustainability • Disincentives to other adaptations to lack of income

Instrument	Countries where this is being implemented presently (not exhaustive)	Likely effects	Likely to work best where…	Pitfalls to watch for
Grain transfers to the poor (food aid) with or without work program requirement	Bangladesh	• Directly transfers cereal • Impact on local markets depends on additionality of consumption and re-sales of food aid by recipients	• There is a large public stockpile of grain or food aid is available (this was true previously in much of South Asia and parts of Africa, but not now) • Effective self-targeting of aid to poor where work is required	• Under current and foreseeable grain market conditions, costs are likely to be higher using this instrument than other options • Food aid commitments may not materialize as agencies run out of budget
School lunch programs	Kenya, Mexico, USA	• Effectively targets children • Can be combined with sending food home (e.g. a little cooking oil, etc., as a form of transfer to further encourage sending kids to school)	• Children would otherwise be kept away from school to help on the farm or at work • Costs are low relative to fiscal ability to implement	• Does not address issue of parental malnutrition directly, even if there is some fungibility in food use at home

Source: Based on a note entitled "Template on policy options to address rising food prices" prepared by Christopher Delgado (World Bank ARD) and Hassan Zaman (World Bank PRMPR) in March 2008.

Annex V

A. Using Exchange Rate Devaluation as a Development Policy

Some countries devalue their exchange rate because it can have a positive effect on a country's exports and output in the short run. This is explained by the interplay of a supply and a demand effect. The supply effect results from a change in the composition of output between traded goods (imports and exports) and nontraded goods originating from the change in the relative price of traded and nontraded goods. The undervaluation raises the price of tradables relative to that of non-tradables, raising the profitability of tradables and promoting the expansion of production and exports of tradables. The demand effect results from a fall in overall private spending originating from the increase in the price level – caused by the increase in the price of imports – and from a change in the composition of demand towards nontradables. The final impact of these supply and demand effects depends on structural characteristics of the economy, like the price and wage formations in the nontradable sector and the degree of dependence of the economy on imported inputs (Agénor 2004). To the extent that prices of factors (labor and capital, say) rise less than proportionately to the increase in the domestic-currency price of output, and the impact of the increase in the cost of imported inputs on output is small, profitability will likely raise causing an increase in investment and in activity in the short run. This will lead to an increase in exports and domestic sales, which will be further stimulated by the increase in the relative price of importables (Agénor 2004). The resulting effect will be an increase in the trade balance. However, this effect may not be immediate. There are countries where the response of quantities to these price changes may involve considerable delays. In such a case the devaluation may worsen the trade balance before it increases, a phenomenon known as the J effect (Agénor 2004).

The impact on output of a devaluation depends to a large extent on the movement of nominal wages. If they remain unchanged or increase little the product wage (the nominal wage divided by the price of the domestic good) then real labor costs will fall raising profitability and investment, which in turn will increase production. This explains the Chinese government's efforts to keep wages low. In contrast, in countries where wages are (even partially) indexed, nominal wages will rise proportionately adjusting fully to the devaluation and causing a contraction effect on output – the magnitude of which depends on the degree of indexation (Agénor 2004).[104] In any case, the positive effect that a devaluation may have on output and the trade balance tends to be short lived. In the long run nominal wages and domestic prices tend to adjust fully to the devaluation, this causes the country to lose its initial competitiveness and the domestic output to move back.

Governments who want to maintain the positive impact of a devaluation on the trade balance over the medium run and stimulate output growth need to ensure that the real exchange rate[105] stays depreciated, which is a policy that requires careful implementation. The nominal exchange rate will need to be kept fixed to some degree (either fixed or pegged). This is usually done through a combination of legally enforced capital controls or through government trading of foreign currency reserves to manipulate the money supply – this is one reason governments maintain foreign reserves. If the nominal exchange rate moves too far below the desired rate, the government buys its own currency in the market using its reserves. This increases demand for the currency increasing

112 A nominal devaluation can also have a negative short run impact on output through various other channels. Examples in the literature include changes in interest rates, taxation or the domestic-currency value of external debt resulting from the devaluation, as explained in Gylfason and Risager (1984) and van Wijnbergen (1986) and cited in Agénor (2004).

105 The real exchange rate is defined as the exchange rate adjusted for relative price differences between countries.

its price. If the exchange rate moves too far above the desired rate, the opposite measures are taken. **But fixing the nominal exchange rate comes at a cost. A country cannot simultaneously maintain a fixed exchange rate, free capital flow, and a sovereign monetary policy (this feature is known as the Impossible Trinity hypothesis).[106] It must pick two of the three**. A country can keep a fixed exchange rate and an independent monetary policy, but only by maintaining controls on capital flows (like China does). Alternatively, it can fix the exchange rate and keep capital flows free, but only by abandoning any ability to change the interest rate to fight inflation or recession (like Argentina, or most of Europe) (Krugman 1999). Both scenarios present challenges.

Under the first scenario of fixed exchange rate and control on capital flows, governments will need to maintain a high level of official reserves to signal the Central Bank's commitment to defend the currency from speculative attacks. This will not be possible if the government's ability to borrow from the world capital market is limited and if domestic inflation is high since the resulting loss in competitiveness will cause a growing trade deficit pushing down reserves. To diminish the appreciation pressure that growing exports generate some countries like China have established sovereign wealth funds that sterilize export revenues. Another less used method to maintain a fixed exchange rate under this first scenario is to make it illegal to trade currency at any other rate. This is difficult to enforce and often leads to a black market in foreign exchange. But some countries have been highly successful at using this method thanks to government monopolies over all money conversion, like China during the 1990s.

Under the second scenario of fixed exchange rate and free capital flows, countries are faced with two challenges. First, if inflation increases, it will work against the real exchange rate depreciation. Second, keeping the real exchange rate depreciated will require that the economy generates an increase in saving relative to investment (to avoid capital inflows exerting pressure on the exchange rate), which has implications for fiscal policy (Rodrik, 2009). Overall consistency of the macroeconomic policy stance will be needed, particularly the coordination between fiscal and monetary policies. As the monetary policy is devoted to maintaining the peg, the burden of adjustment to a shock will fall on fiscal policy (public spending and tax). For the peg to be credible to the market the fiscal policy must be flexible and fast enough to respond to shocks (Caramazza and Aziz, 1998).

A common challenge to the two scenarios is that unless the cost of devaluation (economic or political) is sufficiently high, the commitment to a fixed or pegged exchange rate will lack credibility. Unless the cost is high, the government will feel tempted to allow an unexpected devaluation because of its high returns in terms of output increases.

The recent economic literature increasingly suggests that the undervaluation of the exchange rate can be a tool for economic development. As Mattoo and Subramanian note "at least ruling it out as a tool would be difficult to justify on economic grounds (Prasad, Rajan and Subramanian, 2007; Rodrik 2008; Bhalla, 2007). Rodrik (2009) shows empirically that the relationship between undervalued currencies and high output growth is a very robust feature of post-war data, particularly for lower-income countries. Rodrik (2008 and 2009) further argues that this is because the undervaluation acts as an industrial policy. The reason for this is that the devaluation promotes tradables which spurs the expansion of modern industrial sectors (as they are included among tradables) which are key to growth. He further notes that an advantage of undervaluation as opposed to explicit industrial policies is that it is a policy that applies to all traded sectors so it does not require selectivity, thus avoiding rent-seeking and corruption.

106 This relationship was derived from the Mundell-Fleming model.

Besides the complexity of maintaining a real exchange rate depreciated, there are several disadvantages of undervaluation as a development strategy, as noted by Rodrik (2009). First, it does an imperfect job of targeting modern sectors because traditional activities also get a boost in profits. Second, undervaluation acts not only as a subsidy on tradable production, but also as a domestic tax on the consumption of tradables (the undervaluation raises the relative price of imported goods), which works against the increase in output but not of net exports. The negative impact on consumption causes an excess supply of tradables, which further contributes to the trade surplus.

Annex VI

Impact of Higher Prices of Commodity Inputs on Firms[107]

Abstract: This note analyzes the short-run impact on Indonesian firms of an increase in the price of commodity inputs. This effect has been often overlooked in the literature despite its importance. The analysis shows that this impact is not negligible in terms of costs, profits, exit and employment. The spike in commodity prices hit mostly sectors that have a high commodity input intensity such as metal products, as well as those that experienced a sharp increase in the costs of their raw materials such as rubber and plastic products – even though they have lower commodity input intensity. For instance, transport costs for firms are estimated to have increased 3 percent as a result of the 30 percent fuel increase. Furthermore, the analysis shows that the impact across and within industries is highly asymmetric, even at a very disaggregated industry level. This has important implications from a redistributive perspective. This asymmetric effect is explained by the great heterogeneity in efficiency and in factor intensity within a same industry. For example, differences in terms of energy efficiency across firms producing cement are a staggering 200-300 percent. The increase in commodity input costs causes the most inefficient or more commodity input intensive firms to run out of business creating job losses in the short run. The impact of the inputs cost shock on firm exit is overall adverse as it increases by 3 percentage points the number of exiting firms. However, this effect varies substantially across industries; in the most affected industries (i.e. basic metals and fabricated metal products) more than one in four firms is likely to exit. This would have an important impact on employment as inefficient firms employ a significant amount of labor. For instance, a simulated exit of 10 percent of inefficient firms across industries would result in an 8 percent fall in manufacturing jobs.

A. Introduction

The effect of commodity price shocks on manufacturing firms has been overlooked in the past despite its importance. Most research analyzing the impact of commodity price shocks has traditionally focused on the impact that these shocks have on households[108]. The impact of increasing commodity prices on firms has been largely overlooked by the literature mostly because of the lack of available information on detailed inputs used at the firm-level.

Increases in commodity prices affect firms' costs directly because they raise the cost of commodity inputs. This impact differs across firms. As firms are heterogeneous in terms of which inputs they use, their input intensity and efficiency, the impact on firm costs is likely to be asymmetric. Therefore some producers will be hit harder than others. This implies that there will be distributional consequences in terms of job losses and firm exit that have important policy implications. Being able to identify which firms are more likely to be most affected is important to decide if and what support policy would be appropriate. This is especially important if we are concerned with the employment consequence of these shocks. Furthermore, in a situation of imperfect financial markets some firms may be unable to access credit and upgrade their production facility in order to become more efficient, and this could compound the negative impact of this shocks.

107 This Annex was written by Leonardo Iacovone and Enrigre Aldaz-Carroll

108 See for example Maros and Martin (2008).

Our results are based on a very comprehensive dataset that includes virtually the entire universe of Indonesian manufacturing plants in 2005. In this analysis we used data from the 2005 Statistik Industri that includes 20,729 plants (see Annex Table 6.1 for a detailed break-down number of plants by sector). The basic information in Statistik Industry includes the number of workers, sales, investment, and value of inputs. Furthermore, this information was complemented with detailed information on each of the individual inputs used by the firm.[109]

Annex Table 6.1: Number of plants and workers by sector

Sector	Number of Plants	Total Number of Workers	Average Number of Workers
Food products and beverages	4.722	636.625	135
Textiles	1.934	567.042	293
Wearing apparel	1.922	451.975	235
Furniture and manufacturing n.e.c.	1.865	260.766	140
Other non-metalic mineral products	1.523	165.056	108
Rubber and plastic products	1.477	334.345	226
Wood products of wood except furniture and plainting materials	1.325	312.193	236
Chemical and chemical products	1.011	208.621	206
Fabricated metal products, except machinery and equipment	859	123.349	144
Tobacco	858	272.343	317
Publishing, printing, and reproduction	545	49.371	91
Tanning and dressing of leather	491	208723	425
Paper and paper products	413	119.469	289
Machinery and equipment n.e.c.	410	78.847	192
Other transportation equipment	297	58.923	198
Motor vehicles, trailers, and semi-trailers	262	72.382	276
Electrical equipments	252	81.251	322
Basic metal	211	56.411	267
Electronics, radio, television, and communication apparatus	191	139.715	731
Recycling products	55	2.743	50
Oil processing	52	5.203	100
Medical Precission, optical instruments, watches and clocks	47	17.521	373
Office, accounting and computing machinery	7	3.698	528
TOTAL	**20.729**	**4.226.572**	**204**

Source: 2005 Statistik Industri.

109 This information is normally not part of the information included in the Statistik Industri survey but has been provided to the World Bank to be used under strict confidentiality.

Based on the ISIC classification at 2 digits we can group the inputs used by the firms into 3 main groups: (a) commodities, (b) directly derived from commodities, and (c) non-commodities (see Annex Table 6.2).

This note is structured as follows. Section A, this section, describes the motivation for the analysis and the data. Section B examines the impact the commodity price increases between 2005 and 2007 on firms' total input costs. Section C assesses the impact of the increased commodity input prices on firms' profits. Section D estimates the potential exit of firms and their employment impact. Section E concludes.

Annex Table 6.2: Sectors that produce commodities or process them

Group A: Commodities		Group B: Directly derived from commodities	
Isic Code	**Description**	**Isic Code**	**Description**
01	Agriculture, hunting and forestry	15	Food products and beverages
02	Forestry, logging and related	16	Tobacco products
05	Fishing	20	Wood products
10	Coal and lignite	21	Paper and pulp products
11	Petroleum and gas	23	Coke, petroleum and nuclear fuels
12	Uranium and thorium	25	Rubber products and plastic products
13	Metal ores	27	Basic metals products
14	Other mining and quarrying	28	Fabricated metal products

Source: World Bank staff calculations.

B. Impact of increased prices of commodity inputs on firms' total input costs

This section assesses the impact of the commodity price increases between 2005 and 2007 on firms' total input costs.[110] As shown in Annex Table 6.3, the price increase for commodity inputs (defined as commodities and products directly derived from commodities which are used as inputs by firms, see Groups A and B in Annex Table 6.2) ranged between 20 and 95 percent.

The impact of the increase in the price of commodity inputs on a firm's total input cost varies by industry. Annex Table 6.4 shows very large differences between industries. The industries that are particularly hit are those making use of metal derived inputs (i.e. producing fabricated metal products, and basic metals, machineries end equipment, automotive and auto-parts, other transportation equipment, electrical equipments, medical instruments) and those using agricultural inputs as food products and beverages as well as tobacco, furniture and wood products. The least affected products are textiles, clothing, plastic and chemical products.

The increase in the price of commodity inputs affects firms' total input costs asymmetrically because of three main reasons: (a) product differences, (b) technology differences, and (c) efficiency differences. First, different firms rely on different inputs because of the nature of their products. For instance, a producer of shoes will rely on leather while a furniture producer will rely on

110 Availability of price data forces us to consider the price changes until end of 2007.

Annex Table 6.3: Price shocks between 2005 and 2007

Isic code	Sector in SI	Sector used for price changes	source	Price Increase (%)
27	Basic metal products	Copper and Tin	World Bank DECPG	95
28	Fabricated metal products	Copper and Tin	World Bank DECPG	95
25	Rubber products and plastic products	Rubber (US and Singapore)	World Bank DECPG	51
10	Coal and lignite	Coal Australia	World Bank DECPG	38
12	Uranium and Thorium	Iron Ore	World Bank DECPG	30
13	Metal ores	Iron Ore	World Bank DECPG	30
14	Other mining and quarrying	Iron Ore	World Bank DECPG	30
5	Fishing	Food prices	UNCTAD	29
15	Food products and beverages	Food prices	UNCTAD	29
1	Agriculture, hunting and forestry	Agricultural raw materials	UNCTAD	28
20	Wood products	Sawn wood meranti and plywood	World Bank DECPG	24
2	Forestry, logging and related products	Logs meranti, logs Sapelli	World Bank DECPG	23
21	Paper and pulp products	Wood pulp	World Bank DECPG	21
11	Petroleum and gas	Crude Petroleum and Gas (USA, Europe) and Natural	World Bank DECPG	19
16	Tobacco products	US Tobacco	World Bank DECPG	19
23	Coke, petroleum and nuclear fuels	Crude Petroleum and Gas (USA, Europe) and Natural	World Bank DECPG	19

Source: World Bank staff calculations using World Bank DECPG and UNCTAD data.
Note: In the table we report nominal price changes between 2005 and 2007 as obtained by the original data sources.

wood. Therefore, the effect of a price shock on these two firms will depend on what is the relative price shock of wood versus leather. A key reason why sectors using metal-derived inputs see their total input costs increase so much is because of the very large increase in the price of metal-derived inputs relative to other commodity inputs. Second, even if two firms produce the same product, they may differ in terms of their input intensity[111] because they may use different technologies. For example, one firm may use just wood to produce office desks, while the other may use partly wood and partly metal parts. Annex Table 6.5 shows that firms in different sectors have very different commodity input intensity (defined as the share of inputs under Group A in Annex Table 6.2 in total intermediate inputs used by the firm).[112] Finally, even two firms that produce exactly the same product (e.g. office desk) and that use the same technology may be affected differently when the commodity input costs increase because they differ in terms of their efficiency in input usage.

111 Input intensity refers to the importance of specific inputs over the total intermediate inputs that a firm uses, not including factors of production (labor, capital, etc).

112 Electricity is being excluded from the intermediate inputs.

Annex Table 6.4: Percentage increase in total input costs due to the increase in the price of commodity inputs

Sectors	Mean (%)	Median (%)
Fabricated metal products, except machinery and equipment	74	91
Basic metal	73	94
Machinery and equipment n.e.c.	60	79
Other transportation equipment	55	64
Motor vehicles, trailers, and semi-trailers	50	47
Electrical equipments	38	32
Food products and beverages	27	29
Medical Precission, optical instruments, watches and clocks	27	12
Tobacco	25	28
Furniture and manufacturing n.e.c.	23	23
Wood products of wood except furniture and plainting materials	22	24
Other non-metalic mineral products	22	30
Electronics, radio, television, and communication apparatus	18	0
Publishing, printing, and reproduction	16	18
Paper and paper products	16	19
Oil processing	14	15
Tanning and dressing of leather	13	5
Rubber and plastic products	11	0
Chemical and chemical products	7	0
Recycling products	4	0
Wearing apparel	4	0
Textiles	4	0
Office, accounting and computing machinery	0	0
TOTAL	**23**	**23**

Source: World Bank staff calculations by using the 2005 Statistik Industri survey and World Bank DECPG and UNCTAD price data.
Note: The occurrence of non available values in the third column is due to missing values.

The firm survey reveals that even within the same industry, firms can differ drastically in terms of their efficiency. To illustrate this, we compare firms producing a homogenous product, cement, and look at their use of a homogeneous input, electricity. The reason for using a product and an input that are homogenous is driven by the fact that when efficiency is measured using values instead of physical quantities, there is the risk of misinterpreting differences in quality with differences in efficiency. Annex Figure 6.1 shows the energy inefficiency distribution of firms producing cement, which is calculated as the ratio between energy expenditures and value added, or in other words how much energy (in value terms) a firm needs to produce one unit of cement (in value terms). Efficiency differences between firms in the cement industry are in the order of 200-300 percent.

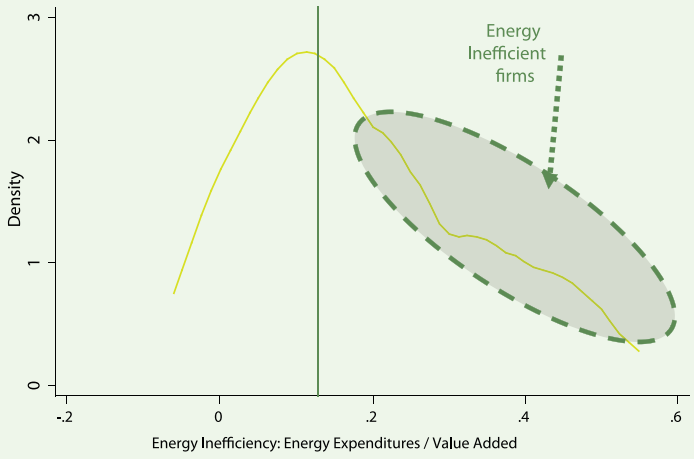
The impact of an increase in the price of commodity inputs on a firm's sale price for the final product varies by industry because of the different weight of commodity inputs in total

Annex Table 6.5: Commodity input intensity per industry

Sectors	Average weight of commodity inputs intensity (%)
Rubber and plastic products	81
Wood products of wood except furniture and plainting materials	78
Tobacco	77
Textiles	76
Other non-metalic mineral products	75
Food products and beverages	68
Paper and paper products	50
Furniture and manufacturing n.e.c.	49
Motor vehicles, trailers, and semi-trailers	48
Publishing, printing, and reproduction	48
Chemical and chemical products	47
Oil processing	46
Tanning and dressing of leather	45
Medical Precission, optical instruments, watches and clocks	31
Electrical equipments	29
Other transportation equipment	22
Wearing apparel	21
Machinery and equipment n.e.c.	15
Basic metal	14
Fabricated metal products, except machinery and equipment	8
Electronics, radio, television, and communication apparatus	1
TOTAL	**68**

Source: World Bank staff calculations by using the 2005 Statistik Industri survey.

Annex Figure 6.1: Energy efficiency differences among firms producing cement



Source: World Bank staff calculations by using the 2005 Statistik Industri survey.

Annex Table 6.6: Weight of commodity inputs over sales

Sector	Mean (%)	Median (%)	p75/p24 (%)
Basic metal	58	58	228
Tobacco	51	55	202
Rubber and plastic products	51	54	204
Food products and beverages	51	53	219
Textiles	52	53	204
Wood products of wood except furniture and plainting materials	50	52	218
Oil processing	48	52	241
Paper and paper products	49	50	329
Recycling products	49	50	281
Fabricated metal products, except machinery and equipment	50	50	228
Tanning and dressing of leather	47	49	209
Wearing apparel	47	47	215
Electrical equipments	48	46	210
Furniture and manufacturing n.e.c.	43	45	229
Publishing, printing, and reproduction	65	42	341
Other transportation equipment	43	42	247
Motor vehicles, trailers, and semi-trailers	41	41	351
Medical Precission, optical instruments, watches and clocks	37	38	360
Chemical and chemical products	41	38	317
Electronics, radio, television, and communication apparatus	42	30	na
Machinery and equipment n.e.c.	38	28	501
Other non-metalic mineral products	26	21	270
Office, accounting and computing machinery	21	0	na

Source: World Bank staff calculations by using the 2005 Statistik Industri survey.

production costs. Industries in which input costs have a higher incidence are on average affected more negatively by the increase in commodity input prices. Annex Table 6.6 shows the weight of total commodity input costs over revenues to highlight how important commodity input costs are in each sector. Indeed, we confirm the existence of very important differences between sectors, but even greater differences between firms.

C. Impact of increased prices of commodity inputs on profits of firms

This section simulates the short-run first-order impact on profits of the increase in the price of commodity inputs. It is important to stress that this analysis focuses only on the short-term first-order impact. A simple model of pass-through is assumed where second-order effects and behavioral responses from firms and consumers are not included.[113]

113 A possible extension that would take into account second order effect could be done by incorporating into the simulations the consumers' reactions to this increase in price and, using some price elasticities, to simulate what would be the drop in demand. It could be possible then to impose that the firms would be affected by this demand drop even further.

The following assumptions are made. First of all, the profits of firm *i* at time *t* (pre-shock) are defined in Equation 1. Second, it is assumed that firms maintain their output constant and only change their prices (p) as a consequence of the increase in their input costs (c^v). Third, it is important to determine what will be the new price or how much the increase in input costs affects the final output price. The assumption done here is that the change in the output prices is driven by the median firm within each industry.[114] The median firm will adjust its price to a level such that its profits remain unchanged. Therefore, the price change in each industry is determined by the price change of the median firm *m* from p_{mt} to p_{mt+1}, which satisfies Equation 2.

Equation 1: Profits

$$\pi_{it} = q_{it}p_{it} - m_{it}C^{v}_{it}$$

Equation 2: Price setting condition

$$\pi_{mt} = q_{mt}p_{mt} - m_{mt}C^{v}_{mt} = q_{mt}p_{mt+1} - m_{mt}C^{v}_{mt+1} = \pi_{mt+1}$$

Annex Table 6.7: Impact of commodity input price shock on profits

Sector	Mean (%)	p25 (%)	p75 (%)
Basic metal	535	-117	64
Chemical and chemical products	422	-29	42
Electrical products	290	-94	59
Electronics, radio, television, and communication apparatus	284	-20	2
Fabricated metal products, except machinery and equipment	91	-1	0
Food products and beverages	62	-20	6
Furniture and manufacturing n.e.c.	56	-36	12
Machinery and equipment n.e.c.	20	-24	10
Medical Precission, optical instruments, watches and clocks	0	0	0
Motor vehicles, trailers, and semi-trailers	-1	0	0
Office, accounting and computing machinery	-2	-3	0
Oil processing	-2	-1	0
Other non-metalic mineral products	-3	0	0
Other transportation equipment	-3	-5	5
Paper and paper products	-8	0	0
Publishing, printing, and reproduction	-14	-13	2
Recycling products	-17	-30	40
Rubber and plastic products	-18	-65	5
Tanning and dressing of leather	-46	-25	10
Textiles	-47	-44	3
Tobacco	-80	-20	3
Wearing apparel	-745	-34	24
Wood products of wood except furniture and plainting materials	-977	-68	18
Total	**63**	**-15**	**6**

Source: World Bank staff calculations using the 2005 Statistik Industri survey.

Note: Output and demand are assumed not to change.

114 Industry is defined at the most disaggregated level, i.e. ISIC 5 digits.

As firms differ in terms of input efficiency the impact on their profits will be different. Some firms will see their profits fall while others will rise. Given the assumption previously discussed, it is possible to determine the change in profits at firm-level by plugging for each firm the new set of prices and costs. In such a scenario, the firm-heterogeneity will emerge in the following way. Some firms will experience an increase in their costs that is larger than the increase in their revenues (firms that are below the median firm in terms of either their inefficiency or input intensity). These firms will experience increasing profits. Other firms, the ones above the median firms in terms of either their inefficiency or input intensity, will experience an increase in costs that is smaller than the increase in their revenues, therefore will see their profits go down. These results are presented in detail in Annex Table 6.7, which shows that the differences between firms within the same industry can be very large (compare top and bottom quartile in third and fourth column). Therefore, it is important not to focus only on the impact on mean profits at the industry level because this average impact tends to hide a large heterogeneity.

There are winners even in industries that are most adversely hit by the increase in commodity input costs. This counterintuitive result is explained by the fact that the price of their final products increases more than the costs of intermediate inputs due to the great firm heterogeneity in that industry. This is for example the case of basic metals, food product and beverages (Annex Table 6.7).

D. Estimation of potential exits and employment impact

Having calculated the impact of the commodity price shock on profits, we now simulate the impact on firm exit and job losses. To identify the potential exiting firms we determine a "minimum profit threshold" for each industry [115] below which a firm will decide to exit.

Based on the exit patterns during the period 2000-05 it is reasonable to assume that every year about one tenth of the Indonesian firms decide to exit. Given that there is a negative relationship between profitability and exit, we identify the potential exitors as those firms with profits below the bottom decile at an industry level. In this way we can fix a minimum profit threshold, within each industry, that a firm is willing to accept before exiting. Having identified the "exit threshold" and calculated the profits before and after the shock, we compare the post-shock profit for each firm with its industry "exit threshold" and if this is below the threshold we identify the firm as a "potential exitor".

The increase in the price of commodity inputs increases the number of exiting firms by 3 percentage points. However, this effect varies substantially across industries. In the most affected industries more than one in four firms is forced to exit (i.e. basic metals and fabricated metal products). Annex Table 6.8 presents the number of exiting firms and the "exit incidence" by industry. Consistent with the previous findings on the profit impact of the shock, it is clear that the industries most affected are basic metals, fabricated metal products, electrical equipment, motor vehicles, medical instruments, other transportation equipment, rubber and plastic products. In these industries between 16 percent and 30 percent of firms are forced to exit.

It is important to understand the underlining changes that explain the change in the number of firms that exit the market. The "net exit" can be decomposed into three types of firm: (a) firms that before the shock were not exiting but are forced to exit after the input costs increase (*new exit*); (b) firms that before the shock would have been forced to exit but after the increase in inputs costs are able to escape exit (*escape exit*), and (c) firms that would exit under both scenarios with or without any input cost shock (*stay exit*).

115 We do so at the most disaggregated possible level, i.e. five digits.

Annex Table 6.8: Exiting firms and exit incidence by industry

Sector	Total Firms	Exiting Firms	Percentage
Basic Metal	208	64	31
Fabricated metal products, except machinery and equipment	849	221	26
Other transportation equipment	286	60	21
Electrical equipments	246	51	21
Motor vehicles, trailers, and semi-trailers	260	53	20
Medical Precission, optical instruments, watches and clocks	45	9	20
Rubber and plastic products	1455	238	16
Tanning and dressing of leather	479	71	15
Machinery and equipment n.e.c.	404	59	15
Furniture and manufacturing n.e.c.	1837	247	13
Food products and beverages	4713	621	13
Tobacco	820	105	13
Publishing, printing, and reproduction	542	67	12
Oil processing	52	6	12
Textiles	1841	212	12
Paper and paper products	412	47	11
Wood products of wood except furniture and plainting materials	1259	135	11
Chemical and chemical products	1001	103	10
Electronics, radio, television, and communication apparatus	175	18	10
Wearing apparel	1810	182	10
Other non-metalic mineral products	1522	151	10
Recycling products	54	5	9
Office, accounting and computing machinery	7	0	0
TOTAL	**20277**	**2725**	**13**

Source: World Bank staff calculations by using the 2005 Statistik Industri survey.

Annex Table 6.9 presents the exit pattern at a disaggregated level and conveys three main messages. First, the net exit is hiding a lot of underlying churning with less than 50 percent of the exiting firms being firms that would have exited in the absence of the shock. Among the post-shock exiting firms, most of them are firms that would have survived in the absence of the shock and are negatively affected by the increase in their input costs. Second, the industries that are more negatively affected by the adverse inputs shock are also those where the number of "new exitors" relatively to "escaping exitors" is much larger. Third, even in industries adversely affected by the shock there are firms that are better off in the post-shock scenario as they are able to escape exit.

Annex Table 6.9: Exit dynamics after shock

Sector	New Exit	Escape Exit	Stay Exit
Basic Metal	55	7	9
Fabricated metal products, except machinery and equipment	172	30	49
Other transportation equipment	40	4	20
Electrical equipments	35	4	16
Motor vehicles, trailers, and semi-trailers	35	6	18
Medical Precission, optical instruments, watches and clocks	8	0	1
Rubber and plastic products	116	17	122
Tanning and dressing of leather	29	2	42
Machinery and equipment n.e.c.	38	6	21
Furniture and manufacturing n.e.c.	165	95	82
Food products and beverages	494	317	127
Tobacco	83	57	22
Publishing, printing, and reproduction	17	1	50
Oil processing	4	0	2
Textiles	45	3	167
Paper and paper products	28	17	19
Wood products of wood except furniture and plainting materials	77	61	58
Chemical and chemical products	24	7	79
Electronics, radio, television, and communication apparatus	2	0	16
Wearing apparel	3	0	179
Other non-metalic mineral products	45	34	106
Recycling products	0	0	5
Office, accounting and computing machinery	0	0	0
TOTAL	**1515**	**668**	**1210**

Source: World Bank staff calculations using the 2005 Statistik Industri survey.
Note: The second column "new exit" identifies those firms that were not exiting before the shock and that are now exiting because of the adverse impact of the shock. The third column "new exit" identifies those firms that after the shock are able to escape exit because their total revenues increase more than total costs. Finally, the fourth column "stay exit" identifies those firms that would exit under both scenarios with or without the increase in their total input costs.

The difference between industries is even more dramatic in terms of job losses than for firm exits. The impact of the increased input cost appears even larger when measured in terms of negative employment effects, especially in those industries that are more adversely affected such as basic metals and fabricated metal products. The differences between industries previously highlighted on the basis of Annex Table 6.8 appear to be amplified when looking at the employment consequences of the input costs shocks. In particular, the firms producing basic metals products shed about 48 percent of its total workers when the negative impact for the entire manufacturing industry implies only a reduction of about 13 percent of total manufacturing employment (Annex Table 6.10).

Annex Table 6.10: Overall employment impact

Sector	Total Employment	Employment Affected	Percentage (%)
Basic Metal	56.411	27.300	48
Fabricated metal products, except machinery and equipment	123,349	31.755	26
Oil processing	5.203	1.318	25
Electronics, radio, television, and communication apparatus	139.715	28.826	21
Electrical equipments	81.251	16.236	20
Motor vehicles, trailers, and semi-trailers	72.382	14.288	20
Food products and beverages	636.625	121.944	19
Medical Precission, optical instruments, watches and clocks	17.521	3.023	17
Wearing apparel	451.975	76.122	17
Publishing, printing, and reproduction	49.371	7.892	16
Other transportation equipment	58.923	8.816	15
Rubber and plastic products	334.345	48.360	14
Total	4.226.572	569.313	13
Machinery and equipment n.e.c.	78.847	10.235	13
Tobacco	272.343	29.828	11
Furniture and manufacturing n.e.c.	260.766	28.373	11
Wood products of wood except furniture and plainting materials	312.193	30.724	10
Textiles	567.042	44.844	8
Other non-metalic mineral products	165.056	11.531	7
Recycling products	2.743	188	7
Tanning and dressing of leather	208.723	11.820	6
Paper and paper products	119.469	6.158	5
Chemical and chemical products	208.621	9.732	5
Office, accounting and computing machinery	3.698	0	0
Total	8.453.144	1.138.626	13

Source: World Bank staff calculations by using the 2005 Statistik Industri survey.

Finally, in Annex Table 6.11 we decompose the net employment flows based on our definition of net exits. Particularly important are the new exitors that are job losses caused by firms forced to exit as a consequence of the increase in their input costs that would not have closed down in the absence of the negative shock to their commodity inputs.

Annex Table 6.11: Negative employment impact due to "new exitors", positive employment impact due to "escaping exit", and Negative employment impact due to "stay exitors"

Sector	Total employment	"New exitors"		"Escaping exit"		"Stay exitors"	
		Employment Affected	Percentage (%)	Employment Affected	Percentage (%)	Employment Affected	Percentage (%)
Basic Metal	56.411	25.234	44,7	566	1	2.066	3,7
Chemical and chemical products	208.621	2.871	1,4	164	0,08	6.861	3,3
Electrical equipments	81.251	12.334	15,2	185	0,23	3.902	4,8
Electronics, radio, television, and communication apparatus	139.715	4.235	3	0	0	24.591	17,6
Fabricated metal products, except machinery and equipment	123.349	25.131	20,4	1.652	1,34	6.624	5,4
Food products and beverages	636.625	91.976	14,4	12.996	2,04	29.968	4,7
Furniture and manufacturing n.e.c.	260.766	18.438	7,1	6.354	2,44	9.935	3,8
Machinery and equipment n.e.c.	78.847	6.269	8	216	0,27	3.966	5
Medical Precission, optical instruments, watches and clocks	17.521	2.992	17,1	0	0	31	0,2
Motor vehicles, trailers, and semi-trailers	72.382	11.626	16,1	238	0,33	2.662	3,7
Office, accounting and computing machinery	3.698	0	0	0	0	0	0
Oil processing	5.203	1.199	23	0	0	119	2,3
Other non-metalic mineral products	165.056	3.649	2,2	937	0,57	7.882	4,8
Other transportation equipment	58.923	5.610	9,5	225	0,38	3.206	5,4
Paper and paper products	119.469	4.053	3,4	515	0,43	2.105	1,8
Publishing, printing, and reproduction	49.371	2.367	4,8	47	0,1	5.525	11,2
Recycling products	2.743	0	0	0	0	188	6,9
Rubber and plastic products	334.345	32.046	9,6	1.131	0,34	16.314	4,9
Tanning and dressing of leather	208.723	3.716	1,8	59	0,03	8.104	3,9
Textiles	567.042	12.965	2,3	72	0,01	31.879	5,6
Tobacco	272.343	14.908	5,5	1.562	0,57	14.920	5,5
Wearing apparel	451.975	481	0,1	0	0	75.641	16,7
Wood products of wood except furniture and plainting materials	312.193	22.717	7,3	2.632	0,84	8.007	2,6
Total	**4.226.572**	**304.817**	**7,2**	**29.551**	**0,7**	**264.496**	**6,3**

Source: World Bank staff calculations by using the 2005 Statistik Industri survey.

E. Conclusion

This note analyzed the short-run impact on Indonesian firms of an increase in the costs of inputs resulting from the increase in commodity prices that took place between 2005 and 2007. This effect has been often overlooked in the past mostly because of data limitations. The analysis showed that this impact is not negligible in terms of costs, profits, exit and employment. Furthermore, the analysis showed that this impact is highly asymmetric and therefore there are importance redistributive consequences that should be taken into account.

A commodity price shock affects firms' input costs asymmetrically because of three main reasons: differences in the input intensities of products, technological differences, and efficiency differences. The firm survey shows that firms in different industries have very different input intensities. Sectors such as basic metals, rubber and food products are very commodity input intensive since more than 50 percent of their sales revenues are spent on commodity input costs. In contrast, the median firm in industries such as office and computing equipment, or machinery equipment spend less than 30 percent of their revenues to purchase commodity inputs.

The results confirm the intuition that industries where commodity input costs have greater weight in total sales are on average affected more negatively by an increase in commodity input prices. For example, the simulation shows that one of the industries most adversely hit is basic metals, where nearly one third of firms exit the market after the shock, while electronics and office or computing equipment are much less affected.

The estimated overall impact of the commodity input cost shock is an increase in firm exit by 3 percentage points. However, this effect varies substantially across industries. In the most affected industries (basic metals and fabricated metal products) more than one in four firms is forced to exit by the inputs cost shock in the simulation. The exit of firms can have an important impact on employment as inefficient firms employ a significant amount of labor. For instance, a simulated exit of 10 percent of inefficient firms across industries would result in an 8 percent fall in manufacturing jobs.

However, the survey also reveals that within the same industry, impacts differ drastically across firms. This is explained by their significant differences in input intensity and efficiency. For example, differences in terms of energy efficiency across firms in the cement sector are a staggering 200-300 percent. As firms within an industry differ in terms of input intensity and efficiency, the impact on their profits also differs. The simulation shows that some firms will see their profits fall while others will rise, and that differences between firms within the same industry can be very large. Hence in our simulation some firms from industries that are not significantly hurt by the increase in commodity input prices are forced to exit, while others are able to "escape exit".

Annex VII. Trade Development Technical Notes

1. "Price matters for export growth: using decomposition analysis to set realistic export targets", August, 2007
2. "How International Price Shocks Impact Indonesian Food Prices", July 2008
3. "Public-Private Dialog Promotes Change in Oil, Gas and Mining Investment Climate", August 2008
4. "Who are the exporters and what can be done to promote exports?", September 2008
5. "Quick wins to improve logistics workshop recommendations for the short term and planning for the long term", June 2008

Trade Development
Technical Note

BANK DUNIA | THE WORLD BANK

Issue 1, August 2007

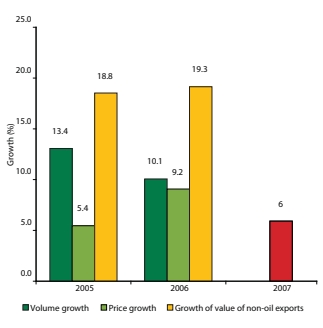
Price matters for export growth:
using decomposition analysis to set realistic export targets[1]

Significance:
Trade reports in Indonesia tend to overlook volume and price growth when examining export growth performance. It is therefore not possible to discern how much export growth on a given year was caused by price growth as opposed to volume growth. Such distinction is important because it informs policy makers of changes in global market demand and changes in domestic supply at the sector and product level. Such analysis can also help the government set export growth targets in line with price forecasts. The analysis below suggests for instance that a recent 20 percent export target proposed by sections of government would be difficult to meet given price forecasts.

Analysis

The drivers of Indonesia's non-oil export growth have changed from 2005 to 2006. A decomposition of non-oil export value growth into volume and price effects (see Figure 1) shows that the 18.8 percent non-oil export growth in 2005 was mostly driven by a large domestic supply growth (volume growth). In contrast, the 19.3 percent non-oil export growth in 2006 was driven to a similar extent by domestic supply growth (volume growth) and world net demand growth[2] (price growth). Volume growth slowed down in 2006, making up only 10.1 percentage points of growth in non-oil export value, with price growth accounting for the remaining 9.2 percentage points of growth in non-oil export value.

Figure 1. Decomposition of Non-Oil Export Growth into Volume and Price Effects



Source: World Bank staff calculations using BPS data.
Note: Data for 2007 is a forecast.

The change in the drivers of non-oil export growth is not due to a change in just one sector, but in all sectors. The upper part of Table 1 shows the growth decomposition at the sector level and the lower part at the product level. Domestic supply growth slowed down in all sectors except forestry from 2005 to 2006, and price growth rose in agriculture and forestry over the same period. This increased the relative weight of price growth as a driver of export value growth in all sectors.

The manufacturing sector is losing ground as an engine of non-oil export growth to the agriculture sector (see last column in Table 1). This is caused by the lower growth of domestic supply and prices in the manufacturing sector.

Indonesia's non-oil export growth in 2005 and 2006 is strongly concentrated in a few products. Five products in each of the years made up more than 58 percent of non-oil export growth, three of which are the same in both

Table 1. Decomposition of export growth into volume and price growth

	Share in non-oil exports 2005 (%)	Export value growth 2005	Percentage points of value growth due to price growth 2005	Percentage points of value growth due to volume growth 2005	Share to non-oil growth 2005 (%)	Share in non-oil exports 2006 (%)	Export value growth 2006	Percentage points of value growth due to price growth 2006	Percentage points of value growth due to volume growth 2006	Share to non-oil growth 2006 (%)
TOTAL EXPORTS		20	11	9			17	11	6	
Oil and Gas		23	32	-9			10	19	-9	
Non-oil and Gas	100	19	5	13	100	100	19	9	10	100
Agriculture Commodities	19	15	-2	17	15	20	27	15	12	26
Mining and Mineral Commodities	18	55	27	28	40	21	41	24	17	38
Forestry Products	10	5	2	2	3	9	15	10	6	8
Manufactured Products	54	14	3	11	42	50	10	2	8	29
Products ranked by contribution to non-oil growth 2005-06:										
Copper	7	78	41	36	18	8	40	48	-8	14
Rubber	4	18	11	7	4	6	67	51	17	14
Coal	7	58	33	25	15	8	40	-1	40	14
Palm Oil	6	9	-10	19	3	6	28	11	18	8
Textiles and Footwear	16	12	1	11	11	14	10	2	8	8
Chemical Materials	6	8	2	6	3	6	23	11	12	7
Transport Equipment	2	70	-22	92	6	3	49	16	33	5
Iron and Steel	1	19	-8	27	1	2	74	0	74	5
Paper and Paper Products	3	5	4	0	1	4	23	3	20	4
Machinery	3	26	-2	28	4	3	19	-10	29	3
Nikel	2	28	26	2	2	2	35	44	-9	3
Gold	0	-4	12	-17	0	1	153	45	108	3
Plywood	3	-12	2	-14	-2	2	14	19	-5	2
Alumunium	1	22	1	21	1	1	47	29	18	2
Pulp and Waste Paper	1	58	0	57	3	1	21	10	11	2
Construction Material	1	8	8	0	1	1	23	6	17	1
Cocoa	1	23	-1	24	1	1	28	-2	31	1
Tires and Rubber Products	1	18	14	4	1	1	23	12	10	1
Fresh Fish and Shrimp	2	4	-2	6	1	2	8	4	4	1
Plastic Products	1	17	-1	18	1	1	12	5	6	1
Coffee	1	71	40	32	2	1	17	25	-8	1
Sawn Wood	1	-14	1	-15	-1	1	26	50	-24	1
Food Products	2	13	-2	16	1	1	6	5	1	0
Motor Cycles and Bicycles	0	13	0	13	0	0	21	-4	25	0
Palm Kernel Oil	1	17	1	15	1	1	5	-15	20	0
Furniture	3	12	6	5	2	2	1	3	-2	0
Fruits and Vegetables	0	30	-2	33	1	0	6	-11	17	0
Tin	1	49	-8	57	3	1	1	17	-16	0
Kitchenware (porcelain, glass, stainless)	1	9	7	2	0	0	-2	3	-4	0
Copra Oil	1	56	-9	65	1	0	-35	-6	-29	-1
Electronics and Computers	15	11	10	1	10	12	-6	-3	-3	-5

Source: World Bank staff calculations using BPS data.

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2 There are two possible reasons for an increase in international prices: an increase in world demand or a decrease in world supply. The term world net demand growth in this note captures both.

years: copper, coal, and textiles and footwear. The other two products are electronics and transport equipment in 2005 and rubber and palm oil in 2006.

The most dramatic switch in the drivers of growth is in copper, transport equipment and electronics. Copper switched from having a 36 percent volume growth in 2005 to a negative volume growth in 2006. Transport equipment experienced a dramatic drop in volume growth and a reversal from negative to positive price growth. Electronics moved from being one of the five key contributors to exports in 2005, to experiencing one of the worst product performances in 2006. Electronics contributed 11 percent of non-oil export growth in 2005 thanks mainly to an increase in its price, but experienced negative export growth in 2006 due to a fall in price and in domestic supply in 2006.

Statistical challenge:

Decomposing export growth into volume and price growth can provide useful information to the government if attention is paid to the quality of volume data. The decomposition can help assess the extent to which export growth is led by domestic supply growth or global net demand growth and identify the main sectors and products experiencing these changes. But the accuracy of such growth decomposition depends on the quality of the volume data. There is clear room for improvement in this area. The volume data presented probable measurement errors in 565 products out 7,296 (HS 9 digit). For instance, data for other refined copper shows an improbable volume growth of 8,628 percent in 2005. Had values for this product not been cleaned, the price growth of non-oil exports would have appeared to contribute -12.5 percentage points to non-oil export growth rather than 5.4 percentage points. Given the illustrated potential use of volume data to inform policy, it is hoped the government will continue monitoring it regularly and ensuring its quality.

Forecasting export growth:

Forecasts of future prices and domestic supply capacity can help policy makers set export growth targets. In this note we take price forecasts for available products from World Bank (DEC Dept.) and Bloomberg. Price forecasts for remaining products are predicted applying a linear trend to past prices. The resulting price growth for non-oil exports in 2007 is estimated at six percent (see Figure 1). Such low price growth is explained by forecasts of negative price growth for key products like rubber (-11 percent vs. 51 percent in 2006) and copper (-3 percent vs. 48 percent in 2006), which more than compensate the price growth in coal (10 percent vs -1 percent in 2006) and palm oil (34 percent vs. 11 percent). These four products alone made up 27 percent of non-oil exports and about half the non-oil export growth in 2006.

The 20 percent export target will be difficult to meet given expected prices. Data on expected supply capacity, which would have helped estimate volume growth, was not available at this time. Nevertheless, the six percent price growth forecast already suggests that the 20 percent export target proposed by sections of government will be difficult to meet, as it would require a 14 percent rise in non-oil export volume (a volume growth 40 percent higher than in 2006). This is unlikely to be met unless one or more main export products experiences very high volume growth rates to compensate for the slow price growth in non-oil exports. For instance, assuming that export volume growth for other products remains the same as in 2006 (10.1 percent), copper volume growth (which was negative in 2006) would need to dramatically increase to 58 percent (almost one and a half times the volume growth in 2005), or palm oil to 53 percent, to meet the 20 percent export growth target. Volume growth of these two products for the first three months of 2007 suggests such high volume growth will not be reached.

Further reading:

- Bloomberg website:http://www.bloomberg.com/apps/news?pid=20602013&sid=a5hMAojxUaTY&refer=commodity_futures
- Rosner, Peter L. (2000) "Indonesia's Non-Oil Export Performance During the Economic Crisis: Distinguishing Price Trends from Quantity trends," Bulletin of Indonesian Economic Studies, Vol 36 No 2, August, pp. 61–95.
- UN manual on price and volume indexes: http://unstats.un.org/unsd/sna1993/toclev8.asp?L1=16&L2=3
- World Bank Commodity Forecasts: http://web.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTDECPROSPECTS/EXTGBLPROSPECTS/ 0,,contentMDK:20722183~menuPK:627723~pagePK:2904583~piPK:2904598~theSitePK:612501,00.html

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Appendix: Statistical Methodology

The two most commonly used indices to measure price and volume changes are the Laspeyres and Paasche indices. The Laspeyres price (volume) index is the ratio of the value of exports at period t and period 0 holding volume (price) constant at its base value: period 0. The Paasche index is defined as a Laspeyres index using period t rather than period 0 as the base period.

$$L_p = \frac{\sum p_t q_0}{\sum p_0 q_0} \quad (1) \qquad L_q = \frac{\sum p_0 q_t}{\sum p_0 q_0} \quad (2)$$

$$P_p = \frac{\sum p_t q_t}{\sum p_0 q_t} \quad (3) \qquad P_q = \frac{\sum p_t q_t}{\sum p_t q_0} \quad (4)$$

The Laspeyres and Paasche price (volume) indexes measure the proportional growth of prices (volumes) since they measure the weighted average of the proportional change in price (volume) since period 0, the weights being the values of the individual goods at the base period (footnote refer to page 1 of UN).

A shortcoming of these two indexes is that the product of the price index (the proportional growth of price) and the volume index (the proportional growth of volume) is not equal to the proportional change in the value, $\frac{\sum p_t q_t}{\sum p_0 q_0}$.

This shortcoming can be addressed by measuring the proportional growth of price with one type of index and the proportional growth of volume with the other type of index. The estimated proportional changes will then add up to the proportional change in the value:

$$P_p L_q = L_p P_q = \frac{\sum p_t q_t}{\sum p_0 q_0} \quad (5)$$

Following convention, we use the Laspeyres index for volume, L_q, and thus the Paasche index for prices, P_p. Since L_q and P_p measure the proportional change in volume and prices, respectively, we can derive the following equation from equation (5):

$$\sum p_t q_t = \sum P_p p_0 L_q q_0 = P_p L_q \sum p_0 q_0 \quad (6)$$

Applying logs to the previous equation and rearranging the terms we can decompose export value growth into growth resulting from price changes and growth resulting from volume changes:

$$\underbrace{\ln \sum p_t q_t - \ln \sum p_0 q_0}_{\text{growth of export value}} = \underbrace{\ln P_p}_{\text{growth explained by price changes}} + \underbrace{\ln L_q}_{\text{growth explained by volume changes}} \quad (7)$$

Dividing the first term (second term) in the right hand side by the term in the left hand side we get the share of growth of export value that is explained by price changes (volume changes).

The calculation assumes that changes in the price of a product category are caused by changes in the price of products exported within that product category. However, it could be caused instead by a change in the product mix exported within that product category from one year to another. To diminish the risk of this being the case, it is best to do the growth decomposition at the most detailed product level. The decomposition results in this note are estimated at the 9 digit level and then aggregated. The data on export values and volumes is taken from BPS, and prices are calculated as the residual.

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Trade Development
Technical Note

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How International Price Shocks Impact Indonesian Food Prices[1]

SIGNIFICANCE

The sharp increase in commodity prices represents both opportunities and challenges for natural-resource abundant countries like Indonesia. It represents an opportunity for producers to increase production and revenue. But it represents a challenge for consumers, as they face lower purchasing power and consumption, increasing the likelihood of falling into poverty. For producers to take full profit of this opportunity, Indonesian commodity markets need to be integrated into the world marketplace. This means that information flows freely between the international and domestic markets. It means that local farmers will know the relative value of their products and inputs in international markets, and so they are best positioned to benefit from rising world prices. In this way, they make the best use of their resources and maximize their incomes.

From a policy perspective, it is essential to understand the degree of integration of Indonesia with world markets, both to assess the potential supply response by producers and its geographical pattern, and to be able to design better compensating policies for consumers. It is also important to assess how closely linked different Indonesian provinces are within the country, and to understand what are the salient features of the provinces that seem to be 'disconnected' from the rest.

ANALYSIS

Indonesian provincial markets for maize, rice, soybeans, sugar and cooking oil are integrated with world markets. Even if there are some divergences when comparing world and domestic price monthly changes, these move closely together when we look at them over a longer period of time. Over a period of about one year, a one-percent increase in world prices leads to a one-percent increase in domestic prices.

However, the speed at which provinces adjust their prices after world price shocks varies significantly when looking across Indonesian provinces. That speed reflects how fast information flows, and is an important dimension of how integrated markets are. In the context of rice, for example, shocks to world markets have driven a wedge of about 250 dollars per ton between world and domestic prices. Under the assumption that the behaviour of the main actors in rice markets will remain unchanged, our estimates suggest that the province in which the adjustment to world prices will be faster is Jakarta, where half of the divergence will be corrected in about 5 months. In West Nusatenggara, half of the correction will take 9 months, while in West Kalimantan it could take about 25 months (figure 2).

Within Indonesia, rice and sugar markets show the highest degree of integration. In these markets, when looking at all possible pairs of provinces, between 60% and 83% of the pairs share a common long run trend: this means that prices move closely together. For maize and soybeans this only happens for about 40% of the possible pairs.

Less spatial integration across provinces means that at a given point in time, we will observe larger price differences. While in the maize and soybean markets prices differ across provinces, on average, by 22% and 16% respectively, in the rice and sugar markets the average difference is of 11% and 5% respectively.

Up to 70% of these differences can be explained by differences in the degree of remoteness, transport infrastructure, output of the commodity, land productivity and income per capita. One province that is remote will pay a higher price for the product than one that is centrally located. The effect of remoteness on the price depends, in turn, on the quality of transport infrastructure. For people in West Kalimantan, being remote implies paying about 133 Rp/kg more for rice than in the other provinces. In North Sulawesi, it implies paying about 24 Rp/kg more. Both provinces are similarly

Figure 1. Evolution of International Commodity Prices

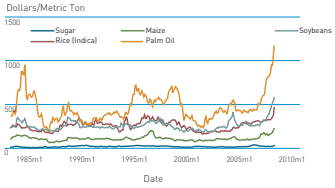

Figure 2. Adjustment to the International Rice Price

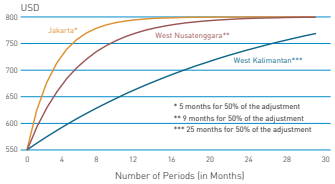

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Figure 3. Remoteness and Infrastructure Contributions

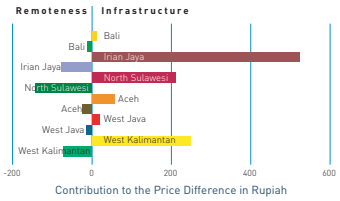

Figure 4. Comparison of Rice Price Volatility

remote, but the relatively better quality of transport infrastructure in North Sulawesi makes being remote less costly (figure 3 compares the remoteness and infrastructure effects on the price differences for six provinces). Another factor that explains price differences is whether the province is a surplus or deficit area in the production of the good considered. Considering rice again, the difference in the level of production in the provinces implies that people in Jakarta will pay 210 Rp/kg more than people in South Sulawesi.

For the five products considered, domestic price volatility is significantly affected by exchange rate volatility, while the transmission from world price volatility to domestic markets is less clear. In the sugar market, the link between domestic and world volatility is strong. For rice and cooking oil, though still significant, the link between world and domestic price volatility is much weaker and in the maize and soybean markets the two seem to be unrelated. Instead, the effect of exchange rate volatility on domestic price volatility is robust across the five products considered. Higher exchange rate volatility means higher domestic volatility because it implies more variability in the price paid by the consumer (if the good is imported), or received by the producer (if it is exported), but also because it affects the variability of the price of imported inputs.

The portion of volatility that is specific to each province, not being related to world prices or exchange rate volatility varies significantly by province. This specific portion appears to be related to remoteness. More remote provinces, which are less integrated, also exhibit higher volatility.

When comparing commodity price volatility with foreign markets, both consumer and producer rice prices seem to be more volatile domestically than internationally. The left panel of figure 4 shows retail rice price volatility for Jakarta and Hong Kong. The former market is subject to active intervention aiming at stabilising prices. Yet, it is significantly more volatile than the latter[2]. The right panel of figure 4 shows the comparison for producer's prices. Indonesian rice prices seem generally more volatile than Vietnam's or Thailand's

CONCLUSIONS AND POLICY RECOMMENDATIONS

- Indonesian markets of rice, sugar, cooking oil, maize and soybeans are integrated with world markets, but the speed at which provincial prices adjust to world price shocks varies by province.
- Within Indonesia, rice, sugar and cooking oil exhibit a high degree of spatial integration, while that degree is lower for soybeans and maize markets.
- For all markets considered, significant price differences across provinces arise.
- Across all products considered, provinces that are remote tend to be less integrated, face higher prices and be more volatile. The effect of remoteness on the price depends on the quality of the transport infrastructure. This means that logistic costs play an important role in the price level and in its volatility. Policies that focus on decreasing them will decrease the price that consumers pay without affecting the price that producers receive. At the same time, it will help reduce uncertainty.
- Differences in land productivity and on the level of production of each of the considered products are also significant determinants of price differences. If the scope of action in terms of transport infrastructure is limited, then, targeting technical assistance in remote provinces could be helpful to decrease price differentials.
- The market that exhibits widest integration is that of rice, where the government intervenes actively. However, both sugar and cooking oil also show high degrees of integration with little or no government intervention at all. As intervention is costly and resources are scarce, a cost-benefit analysis of government intervention in commodity markets seems to be necessary

[2] This is the case even when there is no exchange rate volatility in Indonesia, such as in the pre-crisis period (1993-1997).

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Public-Private Dialog Promotes Change in Oil, Gas and Mining Investment Climate

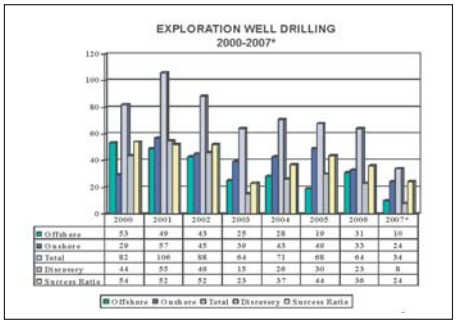
Summary
Indonesia is missing out on a global oil, gas and mining resource boom because its investment climate remains comparatively unattractive to international resource companies. Reduced investment in the oil, gas and mining sector harms the nation, as it means less economic growth, less government revenue, and a decline in energy security. A discussion[1] between resource firms and government sponsored by the World Bank and IFC identified twelve specific areas where rules and regulations were to varying degrees deterring new investment. In the half year since this event, there appears to have been forward movement on two-thirds of the issues raised during the discussion. This progress reflects the development of a healthy ongoing dialog between the private sector and the government.

Challenges
Despite a sustained worldwide commodities boom and excellent geological prospects, Indonesia is facing under-investment in oil, gas and mining. With respect to oil and gas, in the midst of a global scramble for energy, 22 of Indonesia's 60 oil and gas basins remain unexplored. Indonesia is now a net importer of oil and oil products, which creates a host of economic challenges for the nation. Indonesia has also missed opportunities for new minerals exploration. In the mineral sector, no new major investments have occurred over the past decade. World Bank mining expert John Strongman observes that, "Indonesia has missed out on as much as one billion dollars of mineral sector taxes over the past two to three years due to investment obstacles, and can probably expect to lose the same amount or more in the next two to three years so long as commodity prices remain strong, and much more in the next five to ten years."

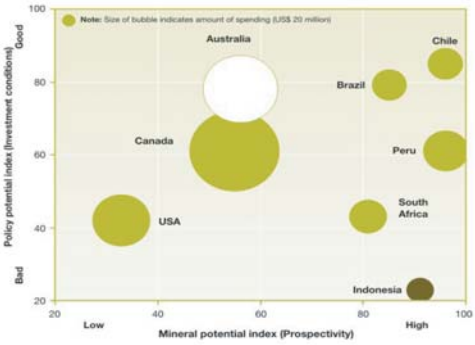
Solutions
Against the background of low oil, gas and mining investment, a half day discussion was organized by the World Bank and the International Finance Corporation on September 25, 2007. The discussion was attended by about 60 invited attendees consisting of company officials, government representatives and industry experts. Presentations and discussions pointed to key challenges that remain if the investment environment is to be improved so that new world class oil, gas and mining developments can begin to take place.

The government is faced with a choice. If it maintains the status quo, little increase in investment by international oil, gas and mining companies in large projects can be expected. However, if the government introduces reforms to establish more consistent, investment oriented polices then a substantial increase in large oil, gas and mining investments can be anticipated.

Surprisingly, there appears to have been some progress on two thirds of the recommendations offered by presenters and participants in the half year since the discussion took place. The table on the following page shows the problems identified by participants, the policy recommendations they offered, and what steps the government has taken with respect to these recommendations. The areas of the table colored green show where a substantial amount of progress has been made by government. Those colored yellow show where some progress has been made, although in some cases this progress is still of an uncertain nature, or has been accompanied by political backlash. Those colored red represent areas where no significant progress has been made.



This Ministry of Energy and Mineral Resources bar graph shows how the drilling of oil and gas exploration wells is diminishing each year.



This PriceWaterhouseCoopers chart shows that Indonesia is almost off the chart, both for its excellent minerals endowments but also for the anemic level of new mineral investment.

[1]The discussion was supported and financed by the Government of the Netherlands through the Trust Fund to Improve the Investment Climate and by IFC Advisory Services through IFC PENSA, a multi-donor initiative supported by the IFC and the governments of Australia, Canada, Japan, Netherlands, Switzerland and the Asian Development Bank. Funding from the UK DFID is also gratefully acknowledged.

Recommendations by discussion participants on how to overcome challenges in the oil, gas and mining sector

Key:
- Areas where a substantial amount of progress has been made by government.
- Areas where some progress has been made, although of an uncertain nature or accompanied by backlash.
- Areas where no significant progress has been made.

Challenges	Seminar recommendations	Recent actions
Oil & Gas: Lack of certainty over cost recovery.	Codify existing rules and regulations governing cost recovery, which have evolved over the past several decades, and continue to make additional refinements in them as audit findings are resolved.	**May 2008:** New Head of BP Migas Head pledges to define more clearly which "Petroleum Operations" costs will be recoverable in the future. New Head also announces that each department within the agency can now perform "self monitoring" where cost recovery is concerned.
Oil & Gas: Shrinking fiscal space from rising cost and volumes of oil imports.	Adoption of an automatic price adjustment mechanism, so that domestic prices track international prices somewhat more closely and fluidly.	**May 2008:** Although not willing to adopt an automatic price adjustment mechanism, the government did raise the prices of subsidized fuels by approximately 30 percent, and has thus saved Indonesian taxpayers Rp 65 trillion.
Oil & Gas: Slow issuance of permits by BP Migas.	Fewer and less complicated permits. Faster approval for those that remain.	**May 2008:** The new Head of BP Migas has promised to expedite the process for approval of Plans of Development (POD) and Put on Operation (POP) permits.
Oil & Gas: Uncertainties regarding whether VAT must be paid by PSCs issued between 1995 and 2001.	Harmonize contradictory approaches within Ministry of Finance, and between the Ministry of Finance, Ministry of Energy and BP Migas. Possible venue for such harmonization could be an Extractive Industries Transparency Initiative National Steering Group.	**May 2008:** A possible new venue for improved harmonization of oil and gas VAT issues may soon be available, with the recent signing of a Presidential Instruction requiring an MOU between the Minister of Energy and Mineral Resources and the Minister of Finance on the management of oil, gas and mining activities.
Mining: Uncertainty regarding the ability to establish new Contracts of Work, or even maintain old ones.	Under new Mining Bill, do not phase out existing Contracts of Work (CoW), and ensure that new "Special Licenses" emulate certain time-tested CoW mechanisms, like neutral binding arbitration.	**April 2008:** The Energy Commission of the National Legislature (DPR) continues to remain committed to the passage of a Mining Bill. One section of the bill on which work is still underway pertains to licensure for large mining projects.
Mining: Prohibition on surface mining in protection forests.	Proceed with efforts to issue a new regulation to relax this prohibition in some cases.	**February 2008:** Forestry issued, and the President signed, a new regulation allowing firms to operate inside protection forests. However, the public reaction has been negative.
Oil, Gas and Mining: Uncertainty regarding which taxes and royalties are owed, and to whom.	Better intra- and inter-agency coordination, possibly under the auspices of the Extractive Industries Transparency Initiative.	**May 2008:** A possible new venue for inter-agency coordination may soon be formed, in view of the recent signing of a Presidential Instruction requiring an MOU between the Minister of Energy and Mineral Resources and the Minister of Finance.
Oil, Gas and Mining: Difficulty in reforesting areas outside forest zone twice as large as concessions inside.	Proceed with efforts to issue a new regulation so that mines in the forest zone can pay a one percent royalty, instead of being required to reforest vast areas.	**February 2008:** The Ministry of Forestry issued, and the President signed, a regulation allowing firms to pay a royalty to operate inside of the forest zone. Forestry did not consult the regulation with the environmental community, or explain to them why such a regulation was needed. The office of the President also missed an opportunity to accurately explain the regulation to the public.
Oil & Gas: Lack of clarity regarding gas domestic market obligation requirements.	Clarify percentage of production that gas producers will be required to sell domestically, and the price at which they will be required to sell it.	No further clarification has been forthcoming about the Gas DMO. Meanwhile, in April 2008 a new spate of agreements which require gas producers to divert part of their production to state-selected firms at below market prices were entered into.
Oil & Gas: Land use conflicts by companies with villagers.	Use participative mapping as a conflict resolution tool.	Cepu, Indonesia's largest new oil discovery in a decade, faces challenges in getting its oil to the shoreline where it can be loaded onto ships.
Mining: District licensed mining permits that overlap with or are located inside national permits and/or which do not pay taxes to national government.	Erect better information systems regarding district permits (where they are located, who owns them, and whether they pay taxes to the national government), possibly under the auspices of the Extractive Industries Transparency Initiative.	The erection of a national information system to accurately describe the locations of, and the types of production taking place in, many thousands of quasi-legal district mines is still years away. As a result, large, legal nationally-licensed mines must strike individual deals with such local mines to avoid problems arising from co-location.
Oil, Gas and Mining: Uncertainty in having to renew five year temporary permits to operate in forest zone.	Provide temporary one-time-only permission to operate in the forest zone, for the length of the license.	Firms are still required to renew their temporary permits with the Ministry of Forestry each five years. Many firms elect not to apply for such permits, and operate illegally in this regard.

Conclusion

The government of Indonesia appears to be making efforts to improve the oil, gas and mining investment climate. Out of twelve recommendations made by participants in the September 25, 2007 Oil, Gas and Mining Investment Climate Discussion, three showed substantial progress in the half year following the Discussion, and another five some progress, albeit with unanticipated political backlash in some cases. The fact that there has been forward movement on two-thirds of the recommendations is due not only to the fact that a discussion took place, but more importantly to the development of an ongoing industry-government dialog. Although it may not always be apparent to investors, the government is listening to the concerns of extractive industry firms and is making efforts to improve the oil, gas and mining investment climate in many areas. Nevertheless, despite progress there are still several changes needed, such as greater clarity on how much gas producers will be required to sell domestically and at what price. Implementation of these changes would have a substantial positive impact on investment.

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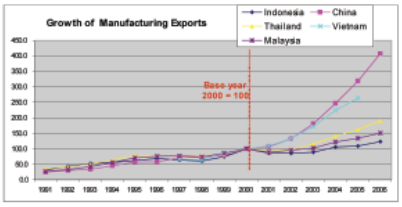
INDONESIA: WHO ARE THE EXPORTERS AND WHAT CAN BE DONE TO PROMOTE EXPORTS?

Jakarta, September 2008

Objective	Short-Term Measures	Responsible Stakeholder
Sector targeting of export promotion	Focus trade participation and image building campaigns on priority sectors	NAFED
Focus export promotion efforts on "threshold exporters"	Devise eligibility criteria for recipients of export promotion assistance	NAFED
Increase involvement of trade attachés and embassies	Create action plan based on consultations with private sector	Ministry of Foreign Affairs NAFED

Various recent studies show that countries able to diversify and increase the sophistication of their export structure tend to experience a faster economic growth (Hausmann et al. 2007). However, from the perspective of the single entrepreneur diversifying exports and increasing their sophistication is a costly and risky business because it involves substantial upfront costs and, often, limited private returns because of knowledge diffusion and imitation (Hausmann and Rodrik 2003). Hence ***to sustain diversification – the process of "export discovery" – the intervention of export promotion agencies is crucial***.

Greater export diversification and sophistication in developing countries can be achieved increasing the shares of processed primary good, manufacture and services exports. Compared with other countries in the region ***manufacturing export performance of Indonesia during the last 10-15 years has been disappointing***, both in absolute terms and relative to its GDP.



Who are the exporters?

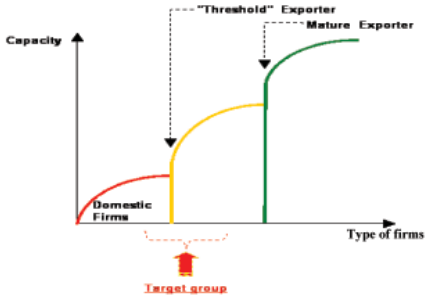
Exporters are special. A large body of literature examining exporting firms across the world, in both developed and developing countries, found that exporters are very different from other firms. They tend to be larger in terms of sales and employment, exhibit a higher productivity level, invest more and pay higher wages.

Only better performers can export, as only such firms are able to comply with requirements imposed by foreign buyers who are more demanding than domestic customers. What are the expectations of foreign buyers? Based on a survey of US buyers some of the principal requirements are:

- ✓ Delivering goods by the date promised
- ✓ Having a product marketable in the US (quality and price)
- ✓ Reliable shipping
- ✓ Good quality control facilities
- ✓ Ability to produce the required quantity

Just like their counterparts in other countries, ***Indonesian exporters are different from other Indonesian firms***. On average, they have 22% larger sales than non-exporters, 61% more capital, 18% higher productivity and 6% higher output growth.

In sum, both international and Indonesian experience suggests that ***not every firm can become an exporter***. Most firms are indeed satisfied with serving the domestic market or simply do not have the capacity to sell abroad. Supporting such firms or trying to "convince firms to become exporters" is unlikely to generate exports and will waste resources. In fact, international evidence suggests that ***the best results can be obtained if export promotion efforts focus on "threshold exporters"***.



A screening system could be set up to identify these "threshold exporters". The system could vary in terms of intensity and sophistication ranging from a written self assessment[1], to an interview performed by NAFED officers, representatives of sector associations or consultants; or to a more formal export audit by a professional consulting company[2].

The ***first criterion in selecting firms for export promotion support should be the manager's commitment to make improvements necessary to satisfy foreign buyers.*** Exporting requires making substantial improvements and investment in order to break into foreign markets, which involves additional financial and managerial effort. Not all firms are willing to take this step and face the risks involved.

Small firms are generally less likely to be in the threshold exporter group. Foreign buyers often want to procure large quantities which small firms are unable to provide. Moreover, the costs of entering foreign markets (gathering information, receiving

[1] For an example of such a questionnaire see the UK Trade and Investment Agency website https://www.uktradeinvest.gov.uk/ukti/bti/bti/quiz/index.html
[2] Such an audit was, for instance, used by the Czech Investment Promotion for their Supplier Development Program.

certifications, complying with foreign standards) may be high and may not make business sense for small firms with a limited production scale. However, as these costs vary by sector, there are some exceptions. For instance, in Indonesia, furniture and wood products are two sectors with a high prevalence of relatively small exporters.

What can be done to stimulate exports?

Successful export promotion can lower the costs of entering export markets. It can achieve this goal through four types of activities: ***image building, export support services, market research*** and ***policy advocacy***.

Targeting is the key to providing effective and cost-efficient export promotion services. The case studies and international experience strongly indicate that ***focusing export promotion efforts on specific sectors works better than trying to promote exports in general***. For instance, participation in specialized fairs and exhibitions generates more potential export relationships for the firms involved than attending general events.

Similarly, ***image building campaigns focusing on specific sectors or types of products will be more effective than a general campaign.*** A message stating that Indonesia is "a high quality producer of goods X, Y and Z thanks to its climatic conditions, long tradition of manufacturing the product or innovative designs" is more convincing than saying "all Indonesian products are high quality". Image building efforts are particularly important and Indonesia suffers from the perception that it is "a cheap producer". As put by an interviewed exporter:

"*Buyers not familiar with Indonesia often think of our products as similar to Chinese in terms of quality and expect to pay similar prices.*"

In terms of export support services, ***co-financing participation of non-exporting firms in international fairs*** is a worthwhile activity, as non-exporters may not understand the benefits of trade fairs and thus may be unwilling to invest in such activities. However, it is important to ***phase out the participation subsidies after 2-3 years.*** By that time firms either understand the benefits of the activity and are willing to cover the costs themselves or discover that they are not in a position to benefit from trade fairs.

"*How do I know that spending money to participate in a fair will benefit my business?*" (Indonesian non-exporter)

"*I don't need NAFED to pay for my participation…I know well the benefits of being there*" (Established Indonesian exporter)

Co-financing trade participation should be combined with information on how make it more effective. First-time participants often lack information on how to exhibit products in an attractive way, how many samples to bring, which employees should attend, etc. Organizing a workshop during which experienced participants give advice to first-time goers may be very helpful.

"New participants often bring too many samples to the fair not realizing that they could mail samples to interested persons later. They bring marketing employees who speak good English but are unable to discuss in detail product specifications and possible changes that can be made to them." (experienced Indonesian exporter)

Consistency in participation is crucial as attending the same fair year after year "puts the country on the map" and demonstrates to foreign buyers that Indonesia is a reliable player on the international market. Furthermore, it is important to ***strike a balance between the quality of participation and "quantity" or number of participants***. There is a trade-off between spending funds on the booth and financing exhibitors. Having a large number of participants in a less attractive booth may give a negative impression of the entire country and damage good exporters.

"*When you go to a fair you need to be present for several years so that potential buyers remember about your existence*" (successful Indonesian exporter)
"*The display of the Indonesian booth can be improved…it would be better to invite fewer firms and spend more funds on the booth*" (successful Indonesian exporter)

The quality of export training sessions could be improved by involving more practitioners and successful exporters as trainers. Furthermore, introducing activities such as "meet the buyer night" where foreign importers meet Indonesian firms and explain what they are looking for in an import product can be extremely useful to future or inexperienced exporters.

Support provided by trade attachés could be intensified. Some ideas that emerged during the interviews include:

- Assist exporters in cases of disputes with buyers – some exporters would be willing to pay for such a service
- Provide office space at the embassy where exporters could "stop by" while traveling abroad
- Provide detailed strategic information focused on specific sectors, based on face-to-face meetings with potential foreign buyers, rather than general listings of importers.

Providing market intelligence and detailed market research is crucial for new entrants. What is needed is not superficial information already available on the internet but detailed market briefs with data on importers, their main sources of imported goods, volumes, quality and type of products. Again such information should be gathered for priority sectors, as it is too costly to do it for all industries. Firms could be charged for access to such briefs.

Strengthen NAFED's relationship with the private sector and its policy advocacy role. NAFED should actively involve the private sector in its strategic decisions (e.g. what fairs to attend). ***NAFED should be the champion for exporters*** raising their concerns related to international regulations, existing non-tariffs barriers as well as domestic business conditions.[3]

Finally, it should be noted that ***export promotion cannot only be a task of NAFED as it requires the coordination of various Ministries and departments*** to improve logistics, infrastructure, financial sector, education and skills development, and administrative regulations.

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[3] This trade note is based on research case studies performed by Beata Javorcik and Leonardo Iacovone. For further information contact Leonardo Iacovone Liacovone@worldbank.org & Enrique Aldaz-Carroll ealdazcarroll@worldbank.org

INDONESIA: QUICK WINS TO IMPROVE LOGISTICS

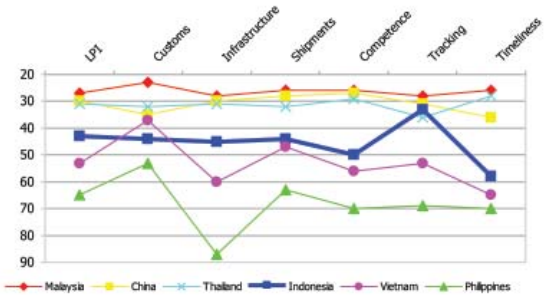
WORKSHOP RECOMMENDATIONS FOR THE SHORT TERM AND PLANNING FOR THE LONG TERM

Jakarta, June 19, 2008

Objective	Short-Term Measures	Responsible Stakeholder
Reduce congestion in the Jakarta port	1. Align working hours across port stakeholders (open 24/7) 2. Allow movement of containers within the port to be determined by terminal operators and not Customs, once container is cleared 3. Allow terminal operators to charge steep penalty fees (in a revenue neutral way) to discourage importers from overusing the terminal storage once container is cleared 4. Move empty container depots from the port to a place closer to the industrial area 5. Issue clear regulations to implement the shipping law 6. Plan for the "jump" to build a new port in a greenfield	1. Customs, banks, terminal operators, etc. 2. Customs 3. Port Authority, M.of Transport 4. Container depot owners (shipping lines) 5. M. of Transport 6. M. of Transport, Trade & Industry
Improve hinterland connections	1. Finish JORR, but encourage truck movement during night time 2. Finish the construction of the last kilometer of railway from Bandung inland container depot to the port terminal 3. Create a railway subsidiary of Persero for freight services 4. Construct a road link from the railway to the industrial area	1. M. of Public Works 2. M. of Transport 3. Persero 4. M. of Transport
Improve efficiency and quality of trucking services and freight forwarding, especially to cater to medium size exporters	1. Create an escrow account to facilitate loans to trucking industry so they can expand in size and do long-term contracting 2. Provide certification for improved service, possibly with FIATA	1. Trucking association and banks 2. Association of freight forwarders
Set up an efficient Logistics Team	1. Issue a ministerial decree and top – level backing 2. Create a core dedicated team and provide budget 3. Coordinate with other logistics-related Team (e.g., NSW)	1. P/VP or Ministers of Ekuin/Trade 2. Ekuin / Trade, PEPI 3. Ekuin-Customs

Indonesia's logistics performance is average compared to other countries in the region, but it ranks low on ***competence*** of the local logistics industry (both private and public logistics service providers such as road transport operators and customs brokers) and ***timeliness*** of shipments in reaching destination. A three-pronged approach to reduce these bottlenecks in the short term include: (i) reducing port congestion; (ii) improving hinterland connections; and (iii) improving the efficiency of trucking and freight forwarding services. A National Logistics Team would need to be set up to develop an action plan.

Ranking of Logistics Performance Index (LPI) out of 150 countries



Reducing congestion at the Port of Tanjung Priok

Customs should better coordinate with and not interfere in the operations of container operators once the containers are cleared. Customs do not inform operators of the time containers are cleared, thus extending their stay in the terminal before they are collected by the consignee or moved by the terminal operator to off-dock container depots. Customs also regulates the level of container storage occupancy that must be reached (85%) before a container can be moved to another bonded area, and even to which bonded area they can be moved. The acceptable yard occupancy rate is an operational matter that should be the sole responsibility of the container terminal operator.

Restructure penalty measures for container storage. The scale of charges for container storage is determined by regulation. The current scale is not high enough to persuade enough owners to remove their containers as soon as they are cleared. The storage tariff should be restructured to increase penalty on long stay containers, while being revenue neutral for the terminal operator.

Align operational hours of principal stakeholders in the port terminal. The typical peak flows across the container terminal (daily and weekly) are partly due to the opening hours of facilitators—in particular Customs and banks—which close in the evenings and weekends, while port operations are open 24/7. As is practiced in most ports around the world, all stakeholders at the port (including Customs and banks) should open 24/7.

Clarify the real implications of the new 2008 Shipping Law. There is ambiguity with respect to various key issues:

- Will the Law introduce the globally preferred Landlord Port Management model (whereby the public sector is responsible for infrastructure and the private sector is responsible for superstructure, stevedoring, and other port services)
- The 'Port Authority' mentioned in the Law appears to be the ***nautical*** authority in the port executed by Pelindo (IPC). Which entity will then execute the other overall management functions such as port planning, provision of operational infrastructure (e.g., quay wall and facilities), environmental management, and marketing?
- Will the IPCs remain the principal container terminal operators in the 'Gateway ports'?
- Will a private operator, in case of a joint venture concession with an IPC, remain limited to maximum 49% of the shares?
- Will a private operator be allowed to (co-)invest in new port infrastructure (such as BOTs)?
- Will domestic shipping continue to be executed exclusively by Indonesian vessels?

Such uncertainties would need to be removed quickly to improve the image and reputation of the Indonesian Port and Maritime Transport Sector, and to increase the possibility of increased private participation.

Improving hinterland connections

Finish JORR but restrict truck movement to night time. Road access to the container terminal will be improved when the Outer Ring Road (JORR) is completed. However, access from the JORR and its extension to the new toll road close to the Cikarang industrial area in eastern Jakarta will still be difficult given the growth in truck traffic. Moreover, the containers entering and leaving the port are not equally spread through the days of the week—there are currently peaks on Fridays and Mondays. If this peaking continues, truck movements could reach 4 million/year with about 15,000 trucks/day using the access road into the industrial area. This would be an unbearable addition to the other traffic using the access road. One partial solution would be to encourage trucks to move at night time. To ease transit at night the road would need to be clear of obstructions such as parked vehicles. A parking restriction would be needed perhaps from 1900hrs. Security along the road might also need to be enhanced.

Extend the rail tracks into the port terminal. The tracks of a rail service for containers from an inland container depot at Bandung to the port through the Cikarang industrial area—which account for 55% of container traffic into the port—end 1 km before reaching the port container terminals. Containers have to be unloaded into trucks for that part of their journey, making rail freight ineffective and underused. Extending the tracks into the container terminal would make rail transport more competitive and reduce road congestion.

Create a subsidiary of PT Kerata Api for freight. The railway operating company (PT Kerata Api) is focused on passenger rather than on freight services. For the container train service to operate successfully it should be operated by a separate company. If this is not possible in the near future, creation of a wholly owned subsidiary would be an acceptable compromise. The subsidiary would be financially independent and have its own locomotives, wagons and staff, but use PT Kerata Api's tracks under a contract arrangement.

Create depots for empty containers near the industrial area and away from the port area. Most empty containers (owned by shipping lines) are stored close to the port terminals. Companies that need a container have to contract a truck to go to the port to collect one. The heavy road congestion often results in the container arriving at the factory too late for it to be loaded the same day. So the truck leaves and returns when the container is stuffed (which could take up to 2 days). This leads to in unnecessary truck movements. Locating depots for empty containers closer to the industrial areas would reduce truck movement and free up space near the port terminal that could be used for more essential purposes, such as the storage of loaded containers awaiting collection after clearance by Customs.

Improving efficiency of trucking and freight forwarding

The trucking industry is characterized by a few companies with several hundred trucks and many companies with very few trucks. There are very few medium-size companies that have fleet sizes compatible with the needs of medium-size manufacturing companies. The small companies tend to operate small two-axle trucks that are the most easily overloaded and least efficient to operate. They also engage mainly in last-minute, short-term contracts which is inefficient and not widely practiced in other countries.

Special schemes could be put in place to increase access to and lower risk/cost of loans to small truck companies. Instead of relying purely on the credit risk of the individual company, innovative, non-market distorting schemes could rely on the contribution by the borrowers to an escrow account to which the lending bank has automatic access should there be a default in loan payments. When the loan is paid off the escrow funds are returned to the borrower. The commercial banks providing the loans often contract with the trucking association to manage the short listing of borrowers and for the collection of loan amortization payments. This scheme can also be used to bring about a restructuring of the trucking industry—through mergers—if the borrower must meet conditions of minimum financial asset, managerial competence, maintenance facilities and driver training. A trucking industry with more medium-size companies would better address the needs of manufacturing/exporting industries.

Introduce a voluntary certification scheme for freight forwarders. The structure of the freight forwarding industry is similar to that of the trucking industry—a very small number of large companies (many with minority foreign shareholding) and a very large number of small companies that lack management skills and financial resources. Medium and small size trading companies that cannot afford the reliable services of the few large companies have difficulty in selecting a reliable and competent small company. A voluntary certification scheme would allow freight forwarding companies that satisfy minimum standards, including having staff who have passed the examinations of the International Association of Freight Forwarders (FIATA) to obtain certification for higher standards, and small trading companies to have more confidence in their choice of freight forwarder. Forwarders who are found by Customs to repeatedly submit incomplete and fraudulent documentation would lose their certification. Such a scheme is currently being implemented in countries of the East African Economic Community.

Planning ahead

Plan for a new port now. Tanjung Priok and other existing ports in Indonesia can improve their efficiency further within their present locations with reforms of processes and relatively minor investments. This would allow the ports to cover their capacity needs only for the next 5-10 years. Indonesia would soon need to decide to make a jump to building a new port (it typically takes 10 years to build a new port). The port should be a deep sea port to reduce the (feeder) dependence on Singapore and Malaysia, and thus reduce time and transport costs.

Investigations to develop a new, state-of-the-art port would need to start now. The new port should be developed in a greenfield location, in concert with the requirements of a modern port complex in terms of water depth, space, hinterland connections and other facilities. Such a port complex may be combined with industrial and value-added facilities.

Bojonegara (which has been earmarked already) is a possible location for the northern coast line of Java. Its disadvantage is the longer distance to the industrial centre of Java, South East of Jakarta. Other potential locations might be in the vicinity of Cirebon and even further East. An offshore port island connected to the shore by a bridge or causeway could be constructed to satisfy the requirement of having a deep water (20-meter) port.

Design and implement a national logistics strategy. The objectives of the logistics strategy should include: (i) ensuring capacity and quality of services; (ii) promotion of domestic freight transport; (iii) facilitation of bi-national and regional transport; (iv) support to SMEs and logistics operators; and (v) streamlining foreign trade documentation and inspection processes.

The following actions could be taken to strengthen the National Logistics Team: (i) obtain ministerial or vice-presidential backing for the Team; (ii) create and fund a core dedicated team; (iii) extend the National Logistics Team's membership to the private sector, especially end users; (iv) coordinate with other logistics-related teams (e.g., NSW); (v) conduct a formal audit of the current state of the logistics sector; (vi) express a vision in terms of the service standards that the Strategy is aimed to achieve; (vi) provide an action plan including quick wins with immediate impact; (vii) set a monitoring system with benchmarks and indicators.

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