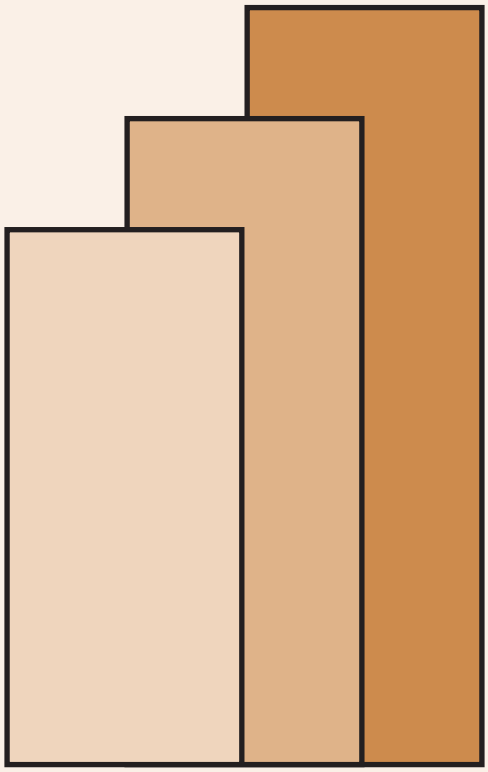
Philippine Institute for Development Studies
Surian sa mga Pag-aaral Pangkaunlaran ng Pilipinas

Rebooting Philippine Telecommunications Through Structural Reform

Ma. Kristina P. Ortiz, Ramonette B. Serafica, and Jose Carlos Alexis C. Bairan

DISCUSSION PAPER SERIES NO. 2017-19



May 2017

For comments, suggestions or further inquiries please contact:
The Research Information Staff, Philippine Institute for Development Studies
18th Floor, Three Cyberpod Centris – North Tower, EDSA corner Quezon Avenue, 1100 Quezon City, Philippines
Tel Numbers: (63-2) 3721291 and 3721292; E-mail: publications@mail.pids.gov.ph
Or visit our website at http://www.pids.gov.ph

Rebooting Philippine telecommunications through structural reform

By Ma. Kristina P. Ortiz, Ramonette B. Serafica, and Jose Carlos Alexis C. Bairan[1]

Abstract

The quality of the Philippine telecommunication/ICT regulatory environment is significantly below what is considered international best practice. Using a scoring system developed by the International Telecommunications Union (ITU) where 100 points represent the best possible scenario, the Philippines is only midway towards the ideal with a score of 52.50. This is the second lowest in a group of seven ASEAN members. A package of structural reforms is needed to improve regulatory quality and support the efficient functioning of ICT markets. While the regulatory regime (or specific rules) and the competition framework are essential elements, they will only work if an effective regulatory authority with the right mandate is in place. Therefore, this should be prioritized in the reform agenda. Last but not least, universal access/service is an important goal that needs to be pursued. We should learn from our own and other countries' experience in crafting a new strategy.

Keywords: telecommunications, ICT, broadband services, regulatory environment, structural reform

[1] The authors are Research Specialist, Research Fellow, and Research Analyst, respectively, of the Philippine Institute for Development Studies (PIDS). The authors are grateful to the following for their assistance: Engr. Imelda R. Walcien, Head of the Regulation Branch of the National Telecommunications Commission; Ms. Cara T. Latinazo and Atty. Johannes Benjamin R. Bernabe, Technical Assistant and Commissioner, respectively, of the Philippine Competition Commission; Mr. Jerome Carlos M. Macatangay, Senate Legislative Officer, and Dr. Michael Ralph M. Abrigo, PIDS Research Fellow. The authors are responsible for any remaining errors.

Background

The Senate Committee on Economic Affairs together with the Committee on Trade, Commerce and Entrepreneurship initiated Senate Resolution No. 213, an inquiry on the present model of operation and regulation of the telecommunications industry to formulate the necessary legislation consistent with the Philippine medium-term plan and long-term vision.

The Philippine Development Plan 2017-2022 seeks to provide the foundation for a more inclusive growth, a high-trust society, and a globally competitive knowledge economy. This is in line with the long-term vision for the Philippines to be a *"prosperous, predominantly middle-class society where no one is poor; our peoples will live long and healthy lives, be smart and innovative, and will live in a high-trust society"* by 2040 and the President's 0+10-point Socioeconomic Agenda. Recognizing the role of ICT in achieving the country's development goals, the government has committed to ensure that "the country's ICT infrastructure and services are available, accessible, reliable, trusted and affordable" (NEDA 2017, page 19-26).

Unlike other countries[2], telecommunications service in the Philippines has always been provided largely by private companies. Due to the immense dissatisfaction with performance of the sector, the government introduced competition in the early 1990s and adopted rules to influence investment in basic telephone infrastructure. Policy guidelines on interconnection (EO 59) and policy guidelines on universal access (EO 109) were issued by President Ramos in 1993 and the Public Telecommunications Policy Act of the Philippines (RA 7925) was signed in 1995. The Philippines was ahead of other countries in Asia in introducing competition in the local, long distance and international fixed-line service segments (Fink et al. 2001). As a condition for allowing entry in the lucrative cellular and international toll services, service obligations in unserved and underserved areas were imposed by the government. Today, service coverage has improved (i.e. cellular mobile at 99.38 percent and broadband internet at 76.44 percent of cities and municipalities) but in terms of quality and affordability the Philippines pales in comparison with competing economies in Asia. The country's broadband download speed is among the slowest at 4.3 megabits per second (Mbps) vis-à-vis ASEAN-5 average of 9.6Mbps in 2016, while the cost of fixed broadband as a percentage of Gross National Income (GNI) is at 7.53 percent, significantly above the 5.0 percent affordability threshold (NEDA 2017).[3]

Thus, under the Plan, the government will expand the deployment of ICT infrastructure and address the gaps in digital connectivity, continue to enhance the country's e-government system as a vital tool for good governance, and pursue "significant reforms in the policy and regulatory frameworks, including strengthening the roles of DICT and the National Telecommunications Commission (NTC) in upholding competition in the ICT market, and promoting the innovative use of ICT, such as in education and human capital development" (NEDA 2017, page 19-27). Amendments to the 1995 Public Telecommunications Policy Act will be pushed to strengthen DICT and NTC and make the law "more responsive to the technology advancements and changes in the market landscape, considering convergence of technologies" (NEDA 2017, page 19-32). Also part of the legislative agenda are amendments to the Public Service Act (to limit the coverage of 'public utility' and effectively remove constitutional restrictions on foreign ownership in telecommunications and other public services) as

[2] With the exception of the United States.

[3] See also Albert et al. (2016) for other trends in Philippine ICT.

well as the adoption of an open access policy in various segments of the telecommunications market on a non-discriminatory basis and publish prices to introduce effective competition in the broadband or telecom market. To expand economic opportunities in industry and services sectors, "structural reforms to create more open, well-functioning, transparent, and competitive markets" will also be implemented (NEDA 2017, page 9-8). These strategies are articulated in the chapters on Infrastructure (Chapter 19) and Industry and Services (Chapter 9). Additionally, the chapter on Competition Policy (Chapter 16)) is also relevant to telecommunications. Under the Plan, anti-competitive practices will be diminished and barriers to entry as well as limits to entrepreneurship will be reduced. A priority for this period is enhancing competition in services, "especially telecommunications and power" (NEDA 2017, page 16-7).

As a contribution to SRN 213 and the strategies identified in the Plan, this paper will examine the regulatory environment and provide recommendations for regulatory reform within the broader framework of structural reform. Understanding the regulatory environment of telecommunications and how it could be improved through structural reform is appropriate because of the policy path that the Philippines has taken (from private monopoly to full competition[4]).

[4] And today, a de facto duopoly.

Structural reform and sector performance

Structural reform consists of improvements made to institutional frameworks, regulations and government policy which helps foster an economic environment that supports the efficient functioning of markets and ultimately enhances living standards (APEC EC 2006). The efficient market that structural reforms create can produce the following benefits: lower prices and wider product variety for consumers, higher profits for firms from lower costs, and more efficient allocation of resources in the economy. Increased competition also encourages innovation and productivity gains.

Regulatory reform is an important element of structural reform. As discussed in Llanto (2015) in the Philippine setting, regulation covers (a) laws enacted by the legislature (b) regulations normally issued by government or a governmental regulatory body to implement a law enacted by Congress, and rules and administrative formalities, and (c) local government permits and licenses. Citing Gill (2014), Llanto (2015) explains that a regulation is a legal instrument to give effect to a government policy intervention. Furthermore, regulation covers both the rules *("authoritative set of rules")* and the means *("mechanism")* or the regulatory body that ensures compliance with those rules (Baldwin et al. 1998). As such, in discussing regulatory reform, well-designed and appropriate regulatory instruments as well as capable and qualified regulatory institutions are necessary in establishing effective regulatory structures. Similarly, Brown et al. (2006) believe that a proper assessment of the effectiveness of a regulatory system requires a review of both the governance and the substance (or content) of regulation. By governance they mean the '*how*' of regulation and covers "the institutional and legal design of the regulatory system and is the framework within which decisions are made" (page 19). This includes for example, the independence and accountability of the regulator as well as the transparency of decision-making. Substance refers to the '*what*' of regulation or "actual decisions, whether explicit or implicit, made by the specified regulatory entity or other entities within the government, along with the rationale for the decisions" (page 20). This would include for example, decisions on tariff structures, network access conditions, and quality of service standards.

The terms structural reform and regulatory reform are sometimes used interchangeably (APEC EC 2009). In some instances, a government initiated change may be both a regulatory reform and a structural reform (e.g. regulation that applies competitive principles to government service providers competing with private sector providers). However, other reforms to regulation may not equal structural reform (e.g. a change to government regulation concerning taxation). Findlay (2011) argues that effective structural reform requires two things. The first requirement is a commitment to the entrenchment of well-functioning markets and to letting market competition determine economic outcomes in all circumstances where competition is appropriate. The second requirement is for good regulations to guide economic outcomes when competition is not effective.

For telecommunications in particular, Blackman and Srivastava (2011) explain that the need for regulation varies depending on the conditions of the marketplace. They describe three waves of sector reform based on the general pattern undertaken globally. The first wave, which is the privatization stage or a shift from public monopoly to private monopoly, requires the creation of a regulator. The second wave of liberalization is when the government starts to open up the industry. Generally, this stage involves the modification of the licensing framework to allow the entry of the new players. Complementary rules and regulations to allow operators to participate in the marketplace are also introduced. The third wave of liberalization occurs when the incumbent operator's exclusivity period

ends and full competition can be introduced. They note that, the role of the regulator actually increases particularly during the early stages of transition to ensure effective competition. While the design of the regulatory framework may differ, there are critical elements that are needed for creating an enabling environment for the sector to grow and increase consumer welfare. These include the functional aspects of the regulatory authority; decision-making processes; accountability; consumer protection, dispute resolution and enforcement powers.

Interestingly, not all policies that have been adopted in the liberalization process promote competition. Armstrong and Sappington (2006) explain that there are policies that are actually anti-competitive (e.g. excluding foreign investors, vague or incomplete rules on the incumbent's obligation to supply access to rivals as well as failure to establish a timely, functional dispute resolution process). In contrast, policies that enhance competition include reducing customer switching and search costs, having adequate monitoring and data reporting, rebalancing tariffs to better reflect costs (i.e. avoiding pricing structures that embed cross-subsidies), ensuring downstream competitors are not disadvantaged, establishing appropriate access prices, and increasing anti-trust scrutiny and enforcement.

Fink et al. (2003) provide empirical evidence of the linkage between structural reforms and improved sector performance. Using a panel data set for 86 developing countries over the period 1985-1999, they found that both privatization and competition lead to significant improvements in basic telecommunications. Moreover, the combination of a comprehensive reform program and an independent regulator resulted in the largest gains compared to years of partial and no reform. Their results also suggest that delays in introducing competition after privatization may adversely affect performance even after competition is eventually introduced. Another study by Gutierrez (2003) examined how regulatory governance affected sector performance in 22 Latin American and Caribbean countries during the period 1980-1997. He used three measures of reform, namely: regulatory development, privatization, and competition. The main variable is an index of the regulatory framework which has three dimensions: separation between operating and regulatory activities, independence of the regulatory agency, and legal mandate. He found that sound regulatory governance in telecommunications has a positive impact on network expansion (main lines per 100 inhabitants) and efficiency (main lines per employee). Openness of markets to competition and divestment of former state-owned telco operators also contributed positively to sector performance.

Based on a sample of 143 developing countries over the 1990 to 1999 period, Mohammed and Strobl (2011) examine whether good governance (in terms of the structural and functional independence of the regulator) affects basic telecommunications infrastructure deployment. They found that functional independence has a positive impact on mainline penetration. This explanatory variable was measured using a dummy variable to represent whether the regulator was vested with a range of functions (i.e. issuing license and controlling of license requirements, authorization of interconnection charges of the incumbent/dominant operator, dispute arbitration, regulation on tariffs, regulation on quality of service, or, a numbering). In contrast, statutory independence, which covers operational separation of the regulator from the government and from those it regulates, was not significant. It is possible, as the authors suggest, that the indicator used (a simple dummy variable to indicate whether there is a regulatory authority or not, regardless of its separation from political power) was inadequate in capturing independence in the real sense of being able to implement policy without

undue interference from politicians and industry lobbyists (Melody 1997 as cited in Mohammed and Strobl 2011).

Another study by Lee, et al. (2010) investigates the relationship between telecommunications performance and structural reform initiatives (in the form of 'market entry and non-discrimination' and 'pro-competition regulations') in APEC economies. In the case of fixed-line and mobile services, they found that the two policy indices did not have any significant impact. A possible explanation according to the authors could be that APEC economies have already implemented a market liberalization policy for over a decade such that structural reform and pro-competition regulations played a less critical role in refining market performance in 2009 (the period covered in the study). For the relatively new development of fixed-line broadband however, the results were consistent with expectation. The policy variables had strong explanatory power indicating that limitations on market entry and weaknesses in pro-competition policy regimes negatively affect broadband development. They note that fixed-line broadband requires significantly higher investment that is sunk and thus, investment uncertainties make it particularly sensitive to the policy environment.

Econometric Analysis

In this section, we utilize data produced by the Telecommunication Development Bureau of the International Communication Union (ITU). It includes four major regulatory indicators namely, 1) regulatory authority; 2) regulatory mandate; 3) regulatory regime; and 4) competition framework (see Appendix A for details). These indicators aim to track and measure the changes in the formal regulatory landscape in the telecommunication/ICT sector across more than 150 countries worldwide. We also focus on fixed broadband services, which is now considered essential to achieving the UN Sustainable Development Goals and will help ensure participation in knowledge societies[5]. We want to find out if there exists a relationship between those regulatory indicators and the extent of fixed broadband subscription across countries over time. In addition to providing insights that could have wider application, the results of the econometric analysis will be useful in the next section where we assess the Philippines' regulatory environment based on the same set of indicators.

Brief description of the data and summary statistics

The number of countries that was covered reached 154 and these were observed from 2007 to 2013 using the same questionnaire. From this, we created a panel data that is strongly balanced. We control for certain time-varying factors present in each country that may intuitively affect the dependent variable, i.e. FBS, such as the GDP per capita ("GDPC") and population density ("POPD"). The former reflects income while the latter is a proxy for the cost of providing the service. We expect both to be positively related to the dependent variable. Table 1 below shows the summary statistics of the variables that are included in the model.

Table 1. Summary statistics of the variables used

Variable		Mean	Standard Deviation	Minimum	Maximum
Dependent Variable					
FBS "Fixed Broad-band Subscription"	Overall	3715879	1.60e+07	54	2.77e+08
	Between		1.49e+07	669.33	1.53e+08
	Within		5291142	-8.29e+07	1.28e+08
FBS (in natural log)	Overall	12.01	2.98	3.99	19.44
	Between		2.96	5.35	18.76
	Within		0.74	8.22	15.41
Regressors					
AUT "Regulatory Authority"	Overall	14.85	5.29	0	20
	Between		4.81	0	19.86
	Within		2.23	1.13	26.70
MAN "Regulatory Mandate"	Overall	15.39	4.90	1	22
	Between		4.00	2.71	21.5
	Within		2.85	2.24	29.95
RGM "Regulatory Regime"	Overall	15.77	7.02	0	30
	Between		6.16	1	27.43
	Within		3.46	.63	27.20
COM "Competition Framework"	Overall	17.36	8.80	0	28
	Between		8.31	0	28
	Within		3.05	3.94	29.36
TOT "Total Score"	Overall	62.60	22.52	0	95.33
	Between		19.91	7.29	90

[5] ITU-UNESCO Broadband Commission for Sustainable Development.

	Within		10.64	5.45	96.6
GDPC "GDP per Capita"	Overall	16346.17	24645.76	209.81	193648.1
	Between		25292.83	330.92	165114.1
	Within		2999.96	-3583.64	44880.18
POPD "Population Density"	Overall	353.89	1664.83	1.67	18764
	Between		1668.87	1.75	18292.43
	Within		46.35	-415.54	825.46

Note:

1. The GDPC and POPD were transformed into their natural logarithmic form although their summary statistics were not included in this table.
2. The *within* variation (across time variation) refers to how varied a country's regulatory score is at any particular year from its own mean: $(x_{it} - \bar{x})$ where *i* represents country and t for time.
3. The *between* variation refers to how varied, on the average, a country's regulatory score is from the sample mean (cross-sectional variation).

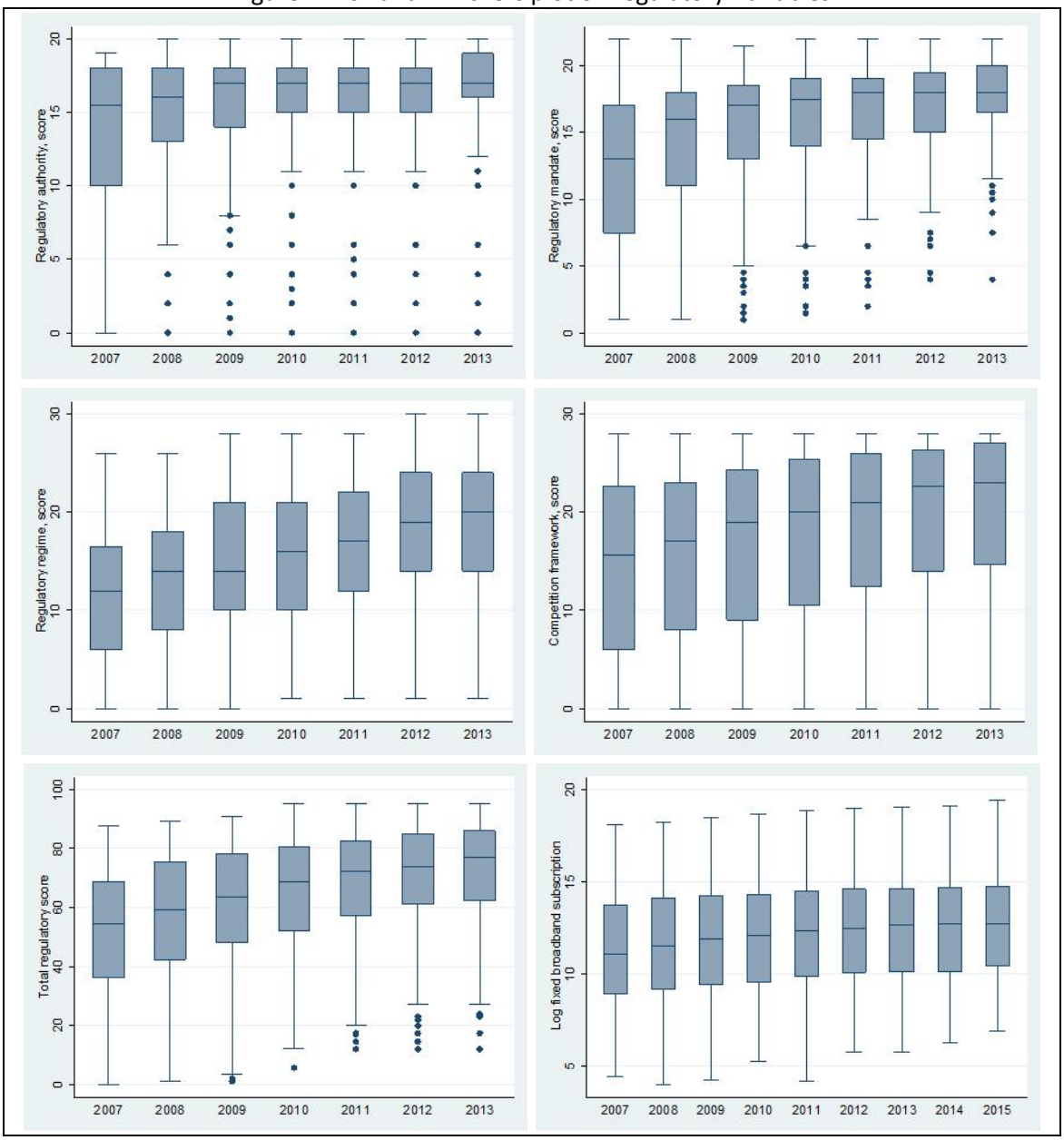
Sources of raw data: International Telecommunication Union's ICT Regulatory Tracker; World Bank's World Development Indicators

In the table above, we see that each x_{it} is dissected into a between (across countries) and within (within each country) variation. This means that, for instance, the fixed broadband subscription *overall* varies between 54 and 277 million. The range, 669 to 153 million, presents the minimum and maximum values of *between* (across countries) variation which refers to how varied, on the average, a country's number of fixed broadband subscription is from the sample mean. Meanwhile, the within variation (within each country and across time variation) refers to how varied a country's number of fixed subscription is at any particular year, y_{it}, from its own mean, $\bar{y}$. Meanwhile, the range of *within* variation of FBS is from -82.9 million to 128 million subscriptions. The negative value means that a certain country has a recorded within variation lower by 82.9 million than the global mean, which is around 3.72 million. The standard deviation shows how deviated the observations are from the mean.

Figure 1 provides a glimpse as to how the regulatory landscape in the ICT / Telecommunication sector has evolved in a span of six years. Examining the box plots of the Total Regulatory score of the countries, it is evident that on the average, there have been significant improvements across the years. In 2013, fifty percent of the countries fall at shorter middle quartile range in comparison to that of in 2007. This indicates that there are fewer countries that has total regulatory score lower than 23; whereas in 2007, the lowest regulatory score was less than 1. The total scores of 50 percent of the countries were recorded at around 53 and has increased to almost 70 in 2013. Examining the four regulatory indicators, it seems that all of them have had increasing medians as well as lowest value, which means that there have been relative gains in these regulatory areas. Note that the Regulatory Authority showed drastic improvement as indicated by the shorter and higher range of the box plot in 2013, i.e. from 0 in 2007 to around 14, in 2013 except for a few outliers[6]. As for the fixed broadband subscription, there have been increases in the average number across countries over time.

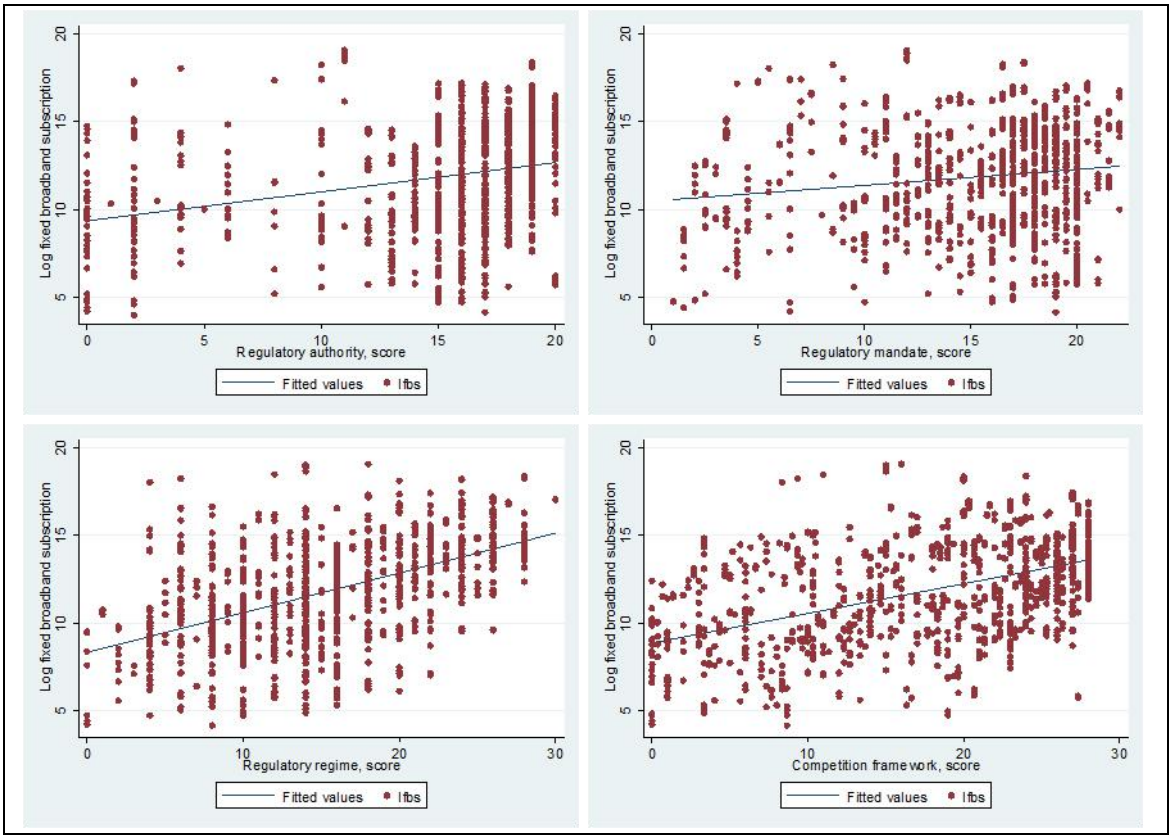
[6] Antigua and Barbuda, Belarus, Cuba, Myanmar – 6; Andora, Azerbaijan, Micronesia (Fed. States of), Monaco – 4; Kuwait – 0; Niger - 2

Figure 1. Box and Whiskers plot of Regulatory Variables



Meanwhile, the two-way linear prediction plot illustrates the prediction for fixed broadband subscription from a linear regression of the dependent variable on each of the regressors (i.e. four regulatory indicators). All observations across years are plotted in this graph. As shown in Figure 2, most of the indicators are positively associated with log fixed broadband subscription (FBS). The Regulatory Regime seems to be the one with the strongest correlation with log FBS if we plot the scores of all countries across the years.

Figure 2. Two-way Linear Prediction Plots of LFBS on the Regressors



We further test for correlation among the four regulatory indicators using Pearson's Correlation Test which gives us a glimpse of the direction and strength of relationship that is present between two continuous variables. The table below shows the results of the test.

Table 2. Pearson Correlation Test

	AUT	**MAN**	**RGM**	**COM**
AUT	1.000			
	1,078			
MAN	0.7574*	1.0000		
	1,074	1,074		
RGM	0.5541*	0.5549*	1.0000	
	1,035	1,035	1,035	
COM	0.5544*	0.4432*	0.6286*	1.000
	1,073	1,073	1,035	1,703

Note: * denotes significance at 5 percent level

Coefficients with asterisks indicate statistically significant relationship between the two variables at 5 percent significance level. Noticeably, all sets of tests between two variables show positive and significant correlation. This may imply that in the model that will be discussed later, the magnitude of the coefficients may be pulling strength from each other which means that certain aspects of one regulatory indicator may be similar or related with that of the other indicators. For instance, the effect of regulatory authority may be stronger if we do not take into account other regulatory variables, e.g.

regulatory regime; but if we put both of them in the model, they could be sharing effects from one another to the dependent variable.

A brief description of the model and methodology

Cameron and Trivedi (2005) cite three key advantages of using panel data. First, it produces more precise estimates owing to the pooling of several time periods for each observation (e.g. country). Second, panel data can allow us to have consistent estimates using the fixed effects (FE) model if the unobserved effects are believed to be correlated with the regressors. This unobserved effect is assumed to be time-invariant (e.g. territorial area / size), otherwise, it must be included in the model to produce consistent estimates under the fixed effects model. Third, panel data provides us more information on the dynamics of each observation's behavior than what we can gather from using a single cross-section data.

With this, we can examine how fixed broadband subscription is related to the quality of ICT/Telecommunication regulatory landscape taking into account the unobserved effects across time and countries. Nonetheless, we need to control for possible correlation of errors per country over time (i.e. serial correlation), as well as possible heteroskedasticity, which means non-constancy of residuals across all observations.

For this paper, we tested four models using the full sample, namely: 1) pooled ordinary least squares (OLS); 2) fixed effects (clustered sandwich estimator[7]); 3) random effects (clustered sandwich estimator); and 4) fixed effects model (Driscoll-Kraay estimators). The fourth model is basically the same with the fixed effects model (3), only that the standard errors are also heteroskedastic-consistent and robust to cross-sectional correlation or spatial dependence and temporal dependence (Driscoll & Kraay, 1998).

Upon conducting the fixed and random effects models, we tested for the consistency and efficiency of the random effects estimator using Hausman's specification test. The Hausman test can be used to "test the null hypothesis that the extra orthogonality conditions imposed by the random effects estimator are valid". After the test, the fixed effects estimator was deemed to be the more appropriate model as it provides consistent estimates. This stage is important because the assumption on the unobserved effect and how they are treated differs between those two types of models. It is also worth noting that most modern econometrics literature give emphasis on fixed effects model (Cameron and Trivedi 2005).

Fixed effects model[8]

In the fixed effects model, the u_i serves as the unobserved random variable per country that is assumed to be correlated with the regressors, X_{it}. In this model, our regressors include the variables listed in Table 1, in addition to the time dummy variables (i.e. 2007 to 2013). The inclusion of time dummy variables allows us to control for events or shocks that could have affected many, if not all, countries in a specific year; an example would be the global financial crisis of 2007-2008. The ε_{it} are

[7] As specified in Stata 14, clustered sandwich estimator means that the standard errors allow for intragroup correlation ("within" estimator). For instance, a certain unobserved factor/event occurred in t_1 also influenced the behavior of the country in the succeeding years. This creates correlation within countries. The clustering of standard errors addresses this problem.

[8] Cameron and Trivedi (2005) was the main reference used in the discussion of this section.

the so-called idiosyncratic errors which varies across time, denoted by *t,* as well as across *i* (See Appendix B for the derivation of the model).

The assumption of the fixed effects model is contrary to that of the random effects model which treats the unobserved effects as uncorrelated with the regressors. As such, in the fixed effects model, only the marginal effects (i.e. coefficient) of the time-varying regressors may be estimated and not those of the time-invariant ones, e.g., size of the country; this model swipes away the effects of variables that are constant over time for all countries. The fixed effects approach also allows us to determine causation albeit under weaker assumptions than those of cross-section analysis; one of which is the need for the unobserved effects to be time-invariant. Meanwhile, a pooled OLS is only suitable if the random effects are deemed appropriate; hence, if fixed effects are present, estimators under the pooled OLS model is considered to be inconsistent.

After executing the third model, we test for presence of serial correlation in the idiosyncratic errors of the model. We use the test developed by Wooldridge (2002) and found that our fixed effects model (model 3) has serial correlation. Therefore, we run the fixed effects model using the Driscoll and Kraay estimators as mentioned earlier. In the discussion of the results, model 4 is highlighted since it is deemed to have the most robust estimators as these control for both heteroskedasticity and serial correlation. Additionally, we conducted the First Differences model (see Appendix C) to check if the results are consistent with that of the fixed effects model once the trend is taken out.

Assumptions and limitations

One of the primary limitations of this study is that omitted variable bias may not have been completely eradicated from the model. There might have been other unobserved factors (e.g. public infrastructure spending) that vary over time across countries that we failed to include in the model, because as mentioned earlier, only the time-invariant unobserved factors are swept away by the fixed effects estimators. Also, the regulatory scores only capture the formal environment (i.e. based on laws and regulations) but not what is practiced on the ground. This limitation is mitigated by having several clusters (which in turn are based on a number of sub-indicators) to capture the whole regulatory environment.

Discussion of results

Using the fixed effects model with Driscoll and Kraay standard errors, we found that Regulatory Authority has significant and positive effect on fixed broadband subscription. Model 4 shows that for every unit increase in the score of the Regulatory Authority, we would expect an increase in fixed broadband subscription by 5.1 percent over time, holding other variables constant. Interestingly, the Regulatory Mandate is negatively associated with fixed broadband subscription at 10 percent significance level. In particular, for every unit increase in the score of Regulatory Mandate, there would be a corresponding 1 percent decrease in fixed broadband subscription. In Model 3, however, the fixed effects model shows that Regulatory Mandate does not have a significant relationship with fixed broadband subscription. The rho, which is the intraclass correlation, in Table 3 under models 3 and 4 show that 97.5 percent of the variation in fixed broadband subscription (in natural log) may be attributed to the individual-level effects or the unobserved time-invariant effects, u_i. This confirms the suitability of the FE model since it controls for unobserved time-invariant effects, by assumption.

Table 3. Results of the Panel Data Analysis with Year Effects

	Pooled OLS Model (s.e.)	**Random Effects Model (s.e.)**	**Fixed Effects Model (s.e.)**	**Fixed Effects Model (Driscoll-Kraay s.e.)**
	(1)	**(2)**	**(3)**	**(4)**
Constant	3.092** (1.406)	1.463 (1.438)	-2.644 (4.75)	-2.641** (0.936)
Regulatory authority	0.111** (0.05)	0.061** (0.027)	0.051* (0.027)	0.051** (0.009)
Regulatory mandate	-0.185** (0.049)	-0.022 (0.017)	-0.01 (0.012)	-.01* (0.005)
Regulatory regime	0.127** (0.035)	0.003 (0.012)	-0.003 (0.013)	-0.003 (0.006)
Competition framework	0.067** (0.025)	0.012 (0.011)	-0.003 (0.012)	-0.001 (0.006)
GDP per capita (in natural log)	0.712** (0.141)	1.017** (0.143)	0.95** (0.292)	0.95** (0.161)
Population density (in natural log)	0.137 (0.114)	0.211 (0.153)	1.385 (0.855)	1.385** (0.512)
R-squared (overall)	0.4697	0.3771	0.1782	0.1782
R-squared (within)		0.502	0.5075	0.5075
Rho		0.953	0.975	0.975

Note:

1. Estimates of the pooled OLS, fixed, and random effects model (columns 1-3) are clustered sandwich estimators with standard errors that allow for intragroup correlation (i.e. observations may be correlated within groups).
2. ** - denotes 5% significance level; * - denotes 10% significance level

Other control variables that were found to be significant at 5 percent significance level are GDP per capita and population density which is consistent with expectation. GDP per capita is positively associated with fixed broadband subscription since the higher per capita income means higher affordability and demanding for it. Also, population density was found to be positively associated with fixed broadband subscription as this lowers cost of providing the service. More specifically, for every one percent increase in the population density, there will be a 1.38 percent increase in the fixed broadband subscription.

As mentioned earlier, we have also conducted First Differences (period-to-period change) model which measures the relationship between country-specific one-period changes in regressors, as well as in the dependent variable. This model becomes trend-stationary. Similar to the results of the fixed effects model, the Regulatory Authority is the only area that was significant (at 5 percent level) and has positive relationship with the dependent variable. The GDP per capita and population density were also statistically significant. See Appendix C.

Notice that the other regulatory clusters such as Regulatory Regime and Competition Framework were not significant determinants of fixed broadband subscription. Does it mean that these factors do not matter?

Table 4 below shows the results of the fixed effects regression (Driscoll and Kraay s.e.) under different specifications of the model. In Model 5, we limited the test to cases where the Regulatory Authority scores were greater than 14.85 (recall from Table 1 that this is overall mean). Notice that Regulatory Regime became significant at 5 percent level with a coefficient of 4.6 percent. Also, Competition Framework became statistically significant at 10 percent level with a coefficient of 2.1 percent. Regulatory Authority was still statistically significant at 5% level but with a coefficient of 10.3 percent, which is higher than the 5.1 percent in the original model. These results suggest that the Regulatory Regime and Competition Framework matter (i.e. their effect kicks in) only when high Regulatory Authority has been established. Indeed, the existence of a Competition authority is one of the sub-indicators under the Regulatory Authority cluster.

When we remove Regulatory Mandate (Model 6), the variable Regulatory Authority was still statistically significant at 5 percent level but with a smaller coefficient becoming 4.8 percent. Deleting the Regulatory Regime (Model 7) would make Authority still significant but with a much smaller coefficient (i.e. 3.4 percent); Mandate at 2.5 percent; and Competition Framework at 1.3 percent. Intuitively, it makes sense that the mechanism (authority) would have a higher impact when there are rules (the regime) to be administered. Also, note that the Regulatory Mandate became positively associated with fixed broadband subscription. A possible explanation is that increase/decrease in Regulatory Mandate (i.e. mandate over interconnection, licensing, pricing) must be accompanied with increase/decrease in Regime (i.e. specifics of interconnection, licensing, pricing) which means that they are possibly correlated with each other. By merely increasing Mandate (or expansion of regulatory functions) without corresponding increase in Regime (or presence of specific regulations) will not lead to an increase in fixed broadband subscription, rather its effect will be negative.

Meanwhile, deleting the Competition Framework (Model 8) does not have any substantial effect on the original value and significance of Authority, however, it made the Mandate insignificant and the Regime significant at 5 percent level with a positive coefficient of 3.9 percent. As Model 5 suggests however, the combination of Competition Framework (along with the other variables) *and* high Regulatory Authority has the most impact on the growth of fixed broadband services among the models.

Table 4. Other specifications of the Fixed Effects model with Driscoll-Kraay standard errors

	(5) Score of Regulatory Authority is above the mean	**(6) Regulatory Mandate is not included**	**(7) Regulatory Regime is not included**	**(8) Competition Framework is not included**
Constant	-10.844** (1.445)	-14.768** (0.894)	-19.663** (0.651)	-15.54** (1.131)
Regulatory authority	0.103** (0.014)	0.048** (0.009)	0.034** (0.011)	0.052** (0.014)
Regulatory mandate	-0.019 (0.004)		0.025** (0.011)	-0.003 (0.006)
Regulatory regime	0.046** (0.004)	0.035** (0.006)		0.039** (0.005)
Competition framework	0.021* (0.012)	0.01 (0.008)	0.013** (0.006)	

GDP per capita (in natural log)	0.952** (0.209)	1.25** (0.219)	1.498** (0.257)	1.266** (0.224)
Population density (in natural log)	2.82** (0.672)	3.255** (0.63)	3.972 (0.618)	3.429 (0.633)
R-squared (within)	0.4009	0.4337	0.4278	0.4328

Note: ** - denotes 5% significance level; * - denotes 10% significance level

As a robustness check, we conducted regressions of the same models but with time dummy variables. The necessity to include the year effects arises when the unobserved effects that may have happened simultaneously across countries are significantly related to the regressors and vary over time[9]. A possible example is technological improvement. If it can be assumed that technological improvement is correlated with the quality of the regulatory environment as measured by the scores, then it would be important to include the time dummy variables as technological improvement is also time variant. With this, it is equally important to examine the magnitude of effects of the regulatory scores when we control for the year effects.

Table 5. Other specifications of the Fixed Effects model with Driscoll-Kraay standard errors, with Year Effects

	(9) Score of Regulatory Authority is above the mean	**(10) Regulatory Mandate is not included**	**(11) Regulatory Regime is not included**	**(12) Competition Framework is not included**
Constant	0.734 (1.388)	-3.441** (0.734)	-5.212** (0.651)	-3.458** (0.613)
Regulatory authority	0.088** (0.017)	0.048** (0.009)	0.036** (0.011)	0.051** (0.014)
Regulatory mandate	-0.017 (0.015)		-0.002 (0.011)	-0.010** (0.005)
Regulatory regime	-0.00002 (0.007)	-0.004 (0.007)		-0.002 (0.005)
Competition framework	0.011 (0.012)	-0.002 (0.006)	-0.011** (0.005)	
GDP per capita (in natural log)	0.755** (0.168)	0.938** (0.158)	1.014** (0.257)	0.950** (0.162)
Population density (in natural log)	0.686 (0.653)	1.384** (0.511)	1.692** (0.618)	1.365** (0.439)
Year = 2008	0.184** (0.014)	0.148** (0.016)	0.161** (0.023)	0.152** (0.016)
Year = 2009	0.473** (0.021)	0.483** (0.020)	0.505** (0.009)	0.490** (0.024)
Year = 2010	0.548** (0.023)	0.594** (0.026)	0.625** (0.017)	0.599** (0.030)
Year = 2011	0.696** (0.025)	0.703** (0.032)	0.714** (0.030)	0.705** (0.035)
Year = 2012	0.799**	0.815**	0.822**	0.814**

[9] It is important to remember that the fixed effects model only covers for the correlated unobserved effects that are time-invariant.

	(0.024)	(0.036)	(0.025)	(0.038)
Year = 2013	0.858** (0.027)	0.894** (0.041)	0.901** (0.026)	0.894** (0.042)
R-squared (within)	0.4009	0.4337	0.4278	0.4328

Note: ** - denotes 5% significance level; * - denotes 10% significance level

It can be gleaned from Table 5 that, indeed, the Regulatory Authority variable is a strong predictor of fixed broadband subscription. However, the inclusion of year effects has resulted to changes in the statistical significance and direction of magnitude of the other regulatory variables. The case of Model 11 suggests that more competition without specific regulation has a negative effect on sector performance while Model 12 implies that adding more regulatory functions (i.e. the Mandate) is also counterproductive when the level of competition is not taken into account.

The discussion above showed varying results conditional on the specifications of the regressors. This suggests that there are scenarios where these regulatory indicators work together conditional on the status of some of those indicators. The indices used to represent the regulatory components could have also been exposed to measurement errors or failed to completely capture the existing regulatory environment in certain countries. According to ITU[10], the ICT Regulatory tracker is based on self-reported data and gathered information through their internal research. Furthermore, a "look back" procedure is applied in cases where specific questions were left unanswered or when the survey itself was not accomplished by a specific country. This means that the latest available data was used for that corresponding indicator.

Future research could explore other proxies aside from regulatory indices to investigate the effects of the regulatory / policy environment in the ICT sector. In addition, the inclusion of various relevant factors such as technological improvement and spending on infrastructure may also be helpful in gaining a better understanding on the drivers of fixed broadband subscription, or growth of the ICT sector, in general. Future research may also opt to examine country-specific situations.

Previous studies have provided evidence of the linkage between structural reform and sector performance. New econometric analysis conducted in this paper confirm as well that the development of telecommunications, measured here in terms of the growth in broadband subscription, can be significantly facilitated by improvements in the regulatory environment especially the Regulatory Authority. Specific interventions (the regulatory regime) and liberalization (the competition framework) are important contributors but they will only work when an effective regulatory authority with the right mandate is in place. Although the Philippines was not part of the sample, the results are also applicable in its case since the model controlled for GDP per capita and population density and other time-invariant country-level effects. In the next section, we evaluate the Philippines' regulatory environment using the same set of indicators.

[10] Source: http://www.itu.int/en/ITU-D/Regulatory-Market/tracker/Pages/disclaimer.aspx

Benchmarking the Philippine ICT regulatory environment

As discussed in the previous section, the ITU ICT Regulatory Tracker covers various elements that make up an effective regulatory environment. Its scoring system can reveal how far off a given country is from international best practice. Since the Philippines is currently not included in the database, we attempt to assign a score following the guidelines described in the Tracker so we can better understand the country's position, particularly in the ASEAN region[11]. Based on the assessment of the gaps, priorities for structural reform are identified.

Regulatory Authority

The first cluster examines the institutional set-up, which recommends a separate regulatory authority that is independent and with sufficient enforcement powers. It is also considered best practice to conduct public consultations before making decisions, especially on issues that may significantly impact the market and/or end users. This cluster also looks into the different sanctions and penalties that the regulator may impose on operators that commit violations. The presence of an authority for competition and a clear dispute resolution system are important as well. See Appendix D for the list of indicators, the description of best practice, and the current situation in the Philippines.

Based on the evaluation of the formal environment, the Philippines scores 13 over 20 points in terms of regulatory authority. The score of the Philippines is second lowest to Myanmar with 6 points while Thailand is the highest with full points.

Table 6. Scores of ASEAN members for Cluster 1: Regulatory Authority

Indicator	*PH*	KH	MY	MM	SG	TH	VN
Separate telecom/ICT regulator	***0***	2	2	0	2	2	2
Autonomy in decision making	***2***	2	2	-	2	2	2
Accountability	***2***	1	1	-	0	2	0
Percentage of diversified funding	***0***	2	2	-	2	2	2
Public consultations mandatory before decisions	***1***	2	2	0	1	2	2
Enforcement power	***2***	2	2	2	2	2	2
Sanctions or penalties imposed by regulator	***0***	2	2	2	2	2	2
Dispute resolution mechanism	***2***	2	2	0	2	2	2
Appeals to decisions	***2***	2	2	2	2	2	2
Existence of Competition authority	***2***	0	2	0	2	2	2
Total for cluster 1 (Maximum possible: 20)	***13***	17	19	6	17	20	18

Note: PH – Philippines, KH – Cambodia, MY – Malaysia, MM – Myanmar, SG – Singapore, TH – Thailand, and VN – Viet Nam.
Source: Except for the Philippines, the scores are for the year 2013 from ITU ICT Regulatory Tracker (Rev2014 version retrieved on March 11, 2017 from http://www.itu.int/en/ITU-D/Regulatory-Market/tracker/Pages/default.aspx). For the Philippines, the scores are for 2017 and were assigned by the authors based on the guidelines in the ITU ICT Regulatory Tracker.

Although the Philippines has a separate regulator, the National Telecommunications Commission (NTC) is not independent "in terms of finance, structure, and decision-making from the operator(s) and the sector Ministry" as required. According to Brown, et al. (2006, p. 215), independence for a regulatory agency means that it should be "free of any constraints from either the government or the

[11] Scores for Brunei Darussalam, Indonesia, and Lao PDR are not included in the database.

private sector in exercising its authority, except for those constraints written in the constitution, law, or other document (for example, a concession contract) that set forth on a prospective basis the rules and policies the regulator is obliged to follow." As noted in Appendix D, the NTC has no fiscal autonomy and the Commissioners do not have fixed terms. Brown, et al. (2006) suggest several mechanisms to protect the independence of the regulator (Box 1).

Box 1. Specific mechanisms for safeguarding independence

1. Regulatory agencies should be created by law as such legal standing enhances its independence by precluding any legal interference.
2. Powers and characteristics that regulatory agency should possess:
    a. Decision-making by a board of commissioners (vs. a single regulator)
    b. Have a stable and reliable source of revenue for their operations
    c. Can offer competitive compensation packages and career opportunities including training and education
    d. Have the power to establish the administrative structure of the agency and make all relevant personnel decisions
    e. Have the authority to set rules and polices needed to carry out responsibilities
    f. Have the authority to promulgate a code of ethics applicable to its personnel and to those who conduct business at the agency
    g. Be able to retain the services of independent experts as needed and justified
    h. Participate in relevant professional, research, and educational groups, as well as regional and international cooperative regulatory organizations.
3. Regulatory agency commissioners or directors should be appointed to fixed terms of office and their terms of office should not coincide with the terms of governments and legislature

Source: Brown, et al. (2006)

Brown, et al. (2006) further explain that independence is not the only key principle of regulatory governance. Equally important principles that lead to improved sector outcomes include: accountability, transparency and public participation, predictability, clarity of roles, completeness and clarity of rules, proportionality, having the requisite powers, ability to consistently perform professionally and competently, and integrity. Note that these are not inconsistent with the other indicators identified in the Tracker.

The diversity of the source of funding is another area where the Philippines obtained zero because the sole funding source of the NTC is government appropriation. According to the ITU, having multiple sources of funds is in line with international best practice since funding sources may impact autonomy, efficiency, and competence of the regulator. Other sources of funding could include award/auction of mobile or other license, license fees, numbering fees, and spectrum fees. In Singapore, for example,

the regulator's budget is sourced from the following: License fees (66%), Numbering fees (2%), and Spectrum fees (32%)[12].

In terms of sanctions or penalties, although the NTC can revoke licenses and impose fines, the sanctions are weak. On the one end, revocation of a license will only happen in extreme cases (and the decision can be challenged in courts since the NTC is a quasi-judicial body). On the other end are the unrealistically low fines that were set some 80 years ago. As noted in Cabarios (2015), RA 7925 does not have a penal provision. Thus, the fees that the NTC could impose are based on the Public Services Act of 1936 (Commonwealth Act 146) which sets the fine at not more than PhP 200 per day.

As the econometric analysis reveals, regulatory authority is crucial to broadband growth. The regulatory regime and competition framework will not be effective unless a high level of regulatory authority with the right mandate has been established. Thus, in terms of the sequencing of structural reforms, strengthening regulatory authority should be prioritized. This would include restructuring the NTC to ensure its independence, diversifying its sources of funding, and allowing the NTC to set higher, more appropriate fines to deter bad behavior. Improving governance also means that public consultations are conducted on issues that are likely to have a significant impact on the market especially consumers.

Regulatory Mandate

This cluster looks at the various regulatory functions of the regulator based on its traditional mandate as well as its expanding mandate in a converging digital world. Traditional functions cover service quality monitoring, licensing, interconnection, and price regulation, among others. New functions cover regulation of the internet, IT, and broadcasting content. See Appendix E for the list of indicators, the description of best practice, and the current environment in the Philippines.

Of the seven ASEAN members, the Philippines ranks as the second lowest with 10.5 next to Myanmar with 7.5 out of a possible 22 points. The best practice in the region with respect to Regulatory Mandate is Malaysia with full points (Table 7).

Table 7. Scores of ASEAN member countries for Cluster 2: Regulatory Mandate

Indicator	*PH*	KH	MY	MM	SG	TH	VN
Traditional mandate: entity in charge of quality of service obligations measures and service quality monitoring	***2***	2	2	0.5	2	2	2
Traditional mandate: entity in charge of licensing	***1***	2	2	1	2	2	2
Traditional mandate: entity in charge of interconnection rates and price regulation	***1***	2	2	1	2	2	1.5
Spectrum: Entity in charge of radio frequency allocation and assignment	***2***	2	2	1	2	2	2
Entity in charge of Spectrum Monitoring and Enforcement	***2***	2	2	1	2	2	2
Entity in charge of universal access/service	***0***	2	2	0	2	2	2

[12] Country profile of Singapore (2015).

New mandate: entity in charge of broadcasting (radio and TV transmission)	***2***	1	2	1	1	2	2
New mandate: entity in charge of broadcasting content	***0***	1	2	1	1	2	2
New mandate: entity in charge of Internet content	***0***	1	2	0	1	1	1
New mandate: entity in charge of IT	***0***	1	2	1	2	1	2
Consumer issues: entity responsible for comparative tariff information, consumer education and handling consumer complaints	***.5***	2	2	0	2	2	
Total for cluster 2 (Maximum possible: 22)	***10.5***	18	22	7.5	19	20	18.5

Note: PH – Philippines, KH – Cambodia, MY – Malaysia, MM – Myanmar, SG – Singapore, TH – Thailand, and VN – Viet Nam.
Source: Except for the Philippines, the scores are for the year 2013 from ITU ICT Regulatory Tracker (Rev2014 version retrieved on March 11, 2017 from http://www.itu.int/en/ITU-D/Regulatory-Market/tracker/Pages/default.aspx). For the Philippines, the scores are for 2017 and were assigned by the authors based on the guidelines in the ITU ICT Regulatory Tracker.

The low score of the Philippines can be attributed to a number of factors. For one, there is lack of regulatory mandate over interconnection rates and universal access/service. According to the ITU, an unbiased and independent regulatory authority should be in charge of interconnection rates. It should also be responsible for administering universal service/access given its expertise and independence. Based on RA 7925 however, interconnection rates should be negotiated between parties and the NTC only gets involved when parties fail to reach an agreement. Moreover, the interconnection rates must include provision for cross subsidy to local exchange carriers in line with UAS policy which is being implemented by telecom operators and not by the regulator.

Another factor is our licensing process. In the Philippines, obtaining the necessary authorization to provide telecommunications services is done at two levels. A license in the form of a franchise is first obtained from Congress and then a Certificate of Public Convenience and Necessity (CPCN) must be obtained from the NTC. Based on international best practice however, the first step is not necessary and an unbiased and independent regulatory authority with its knowledge and tools is in the best position to determine authorizations. In APEC which is composed of both developed and developing economies, the Philippines is the only member where legislative approval is required before one can apply for a certificate to operate from the regulator[13].

With respect to consumer issues, handling of consumer complaints is divided between the NTC and the Department of Trade and Industry (DTI) but there is no entity providing comparative tariff information. There is also no single body (a "converged regulator") with authority over ICT and media/broadcasting.

In this aspect of the regulatory environment therefore, specific areas for reform include giving the regulator the mandate over interconnection rates and universal access/service. Moreover, Congress should no longer be involved in granting franchises as the regulator should have the sole authority for licensing. Information that will be useful to consumers should be made available and the mandate of the regulator should eventually be expanded in line with the emergence of new services.

[13] See APEC Services Trade Access Requirement (STAR) (http://www.servicestradeforum.org/) for information on licensing and approval requirements in the region.

Regulatory Regime

The third cluster is the biggest component in the Tracker and looks at specific regulatory interventions. It covers the kind of targeted regulation needed to promote a healthy competitive environment. Examples of what the ITU considers as best practice include requiring quality of service (QoS) monitoring as well as publishing the Reference Interconnection Offer (RIO) and interconnection prices. Regulations that promote efficiency include infrastructure and site sharing, unbundling of the local loop, secondary trading of spectrum rights, and band migration. See Appendix F for the list of indicators, the description of best practice, and the current environment in the Philippines.

Of the four clusters, it is in the Regulatory Regime where the Philippines scored lowest with only 7 out of 30 points (23 percent). The country also ranks last among the ASEAN member states in the tracker (Table 8). In terms of the types of licenses available, the Philippines does not issue global/unified licenses which is considered optimal and reflects increased market liberalization. The Philippines like Myanmar does not compel operators to make information related to interconnection to be made publicly available. Myanmar however does require quality of service (QoS) monitoring whereas this is not the case in the Philippines, the only one in the group. Number portability, both in fixed line and mobile, is also not available. On the upside, infrastructure sharing for mobile operators and Voice over Internet Protocol (VoIP) services are allowed in the Philippines. A National Broadband Plan has also been developed by the newly created DICT.

Table 8. Scores of ASEAN member countries for Cluster 3: Regulatory Regime

Indicator	*PH*	KH	MY	MM	SG	TH	VN
Types of licenses provided	***1***	2	2	2	2	2	1
License exempt							
Operators required to publish Reference Interconnection Offer	***0***	0	2	0	2	2	2
Interconnection prices made public	***0***	2	2	0	2	2	2
Quality of service monitoring required	***0***	2	2	2	2	2	2
Infrastructure sharing for mobile operators permitted	***2***	2	2	2	2	2	2
Infrastructure sharing mandated	***0***	2	2	2	0	2	2
Co-location/site sharing mandated	***0***	0	2	2	0	2	2
Unbundled access to the local loop required	***0***	0	2	0	2	2	2
Secondary trading allowed	***0***	0	0	0	2	0	0
Band migration allowed	***0***	0	2	0	2	2	0
Number portability available to consumers and required from fixed-line operators	***0***	0	0	0	2	0	0
Number portability available to consumers and required from mobile operators	***0***	0	2	0	2	2	0
Individual users allowed to use VoIP	***2***	2	2	0	2	2	2
National plan that involves broadband	***2***	2	2	0	2	2	2
Total for cluster 3 (Maximum possible: 30)	***7***	14	24	10	24	24	19

Note: PH – Philippines, KH – Cambodia, MY – Malaysia, MM – Myanmar, SG – Singapore, TH – Thailand, and VN – Viet Nam.
Source: Except for the Philippines, the scores are for the year 2013 from ITU ICT Regulatory Tracker (Rev2014 version retrieved on March 11, 2017 from http://www.itu.int/en/ITU-D/Regulatory-Market/tracker/Pages/default.aspx). For the Philippines, the scores are for 2017 and were assigned by the authors based on the guidelines in the ITU ICT Regulatory Tracker.

As earlier discussed, in any liberalization process, specific rules are needed to promote competition and enhance consumer welfare (Armstrong and Sappington 2006). Regulations are especially needed when the conditions for perfect competition do not exist as in the case of telecommunications. Targeted interventions such as those that reduce customer switching and search costs, promote the efficient use of facilities, embed adequate monitoring and data reporting, and clearly specify obligations or rules of conduct of various market players are examples of optimal policies. As the econometric analysis suggests, an effective regulatory authority with the right mandate is necessary so that these rules can be credibly implemented and have significant impact in driving broadband growth.

Competition Framework

Maintaining a high and fair level of competition, as in most industries, is vital in keeping the market environment of the ICT sector healthy for both service suppliers and consumers. The fourth cluster of the tracker examines this aspect by looking at the competition regime (based on what is permitted by law) in different ICT services and the openness of a country to foreign investment. It also monitors if a country recognizes the legal concept of significant market power (SMP) or dominance and the criteria used. This is very important to avoid anti-competitive behavior as it allows the regulator or competition authority to identify operators who have SMP and specify rules beforehand (ex ante regulations) to prevent abuse of the dominant position. See Appendix G for the list of indicators, the description of best practice, and the current environment in the Philippines.

In our assessment, the Philippines scores 22 in this cluster, its highest among the four clusters (79 percent) (Table 9). The key limitation is the foreign equity restriction in telecommunications, which is considered a public utility[14].

Table 9. Scores of ASEAN member countries for Cluster 4: Competition Framework

Indicator	*PH*	KH	MY	MM	SG	TH	VN
Level of competition in local and long distance (domestic and international) fixed line services	***2***	2	2	0	2	2	2
Level of competition in IMT (3G, 4G, etc.) services	***2***	2	2	0	2	1	2
Level of competition in cable modem, DSL, fixed wireless broadband	***2***	2	2	0.3	2	1.7	2
Level of competition in leased lines	***2***	2	2	0	2	2	2
Level of competition in International Gateways	***2***	2	2	0	2	2	2
Status of the main fixed line operator	***2***	0	1	0	1	0	0
Legal concept of dominance or Significant Market Power (SMP)	***2***	0	2		2	2	2
Criteria used in determining dominance or SMP	***2***	0	2	0	2	2	1

[14] This assessment is based on the formal environment. According to the Foundation for Economic Freedom, "It is public knowledge that the current restrictions are being evaded through various means by foreigners who control mass media and advertising companies, public utilities, educational institutions, and even land and real estate companies. Indeed, these restrictions result in 'adverse selection,' leading to only those foreign investors who are willing to skirt our laws, pay dummies, and engage in graft and corruption, to come here to do business." (http://www.fef.org.ph/calixto-chikiamco/another-open-letter-to-the-president-2/)

Foreign participation/ownership in facilities-based operators	***1***	2	1		2	1	1
Foreign participation/ownership in spectrum-based operators	***1***	2	1		2	0	1
Foreign participation/ownership in local service operators/long-distance service operators	***1***	2	1		2	1	
Foreign participation/ownership in international service operators	***1***	2	1		2	1	
Foreign participation/ownership in Internet Service Providers (ISPs)	***1***	2	2		2	2	
Foreign participation/ownership in value-added service providers	***1***	2			2	1	2
Total for cluster 4 (Maximum possible: 28)	***22***	22	21	0.3	27	18.7	17

Note: PH – Philippines, KH – Cambodia, MY – Malaysia, MM – Myanmar, SG – Singapore, TH – Thailand, and VN – Viet Nam.
Source: Except for the Philippines, the scores are for the year 2013 from ITU ICT Regulatory Tracker (Rev2014 version retrieved on March 11, 2017 from http://www.itu.int/en/ITU-D/Regulatory-Market/tracker/Pages/default.aspx). For Philippines, the scores are for 2017 and were assigned by the authors based on the guidelines in the ITU ICT Regulatory Tracker.

The relatively good score of the Philippines in this cluster can be attributed to the major reforms earlier undertaken in this area. Further reforms are being considered. As mentioned, as part of the legislative agenda in the PDP 2017-2022 (NEDA 2017) amendments to the Public Service Act will be introduced to remove telecommunications under the definition of public utility thereby allowing higher foreign equity participation. Even with this proposed amendment however, there is still a remaining provision in the Constitution that severely limits the infusion of much needed capital, technology, and expertise to increase broadband penetration. A main platform for broadband services is cable modem technology, which provides broadband access over cable television networks. In order to provide broadband services, the cable television infrastructure needs to be upgraded to make two-way traffic (uploading and downloading) possible (Bouckaert, et al. 2010). However, cable TV is considered mass media, which is 100 percent nationalized under the 1987 Constitution. There is a need to remove the restriction so that, together with the PSA amendment, the most capable service providers will be allowed to provide a broad range of high quality ICT services at affordable prices.

As with the regulatory regime, for the competition framework to have a significant effect on broadband growth it is critical that an effective regulatory authority with the appropriate mandate is in place. The entity in charge of competition is part of regulatory authority as discussed previously.

Overall regulatory environment

Adding up the cluster scores, Philippines' total score is 52.5 points (Table 9).

Table 9. Total Scores of ASEAN Member Countries ICT Regulatory Tracker

Cluster	***PH***	KH	MY	MM	SG	TH	VN
Regulatory Authority (Maximum possible: 20 points)	***13***	17	19	6	17	20	18
Regulatory Mandate (Maximum possible: 22 points)	***10.5***	18	22	7.5	19	20	18.5
Regulatory Regime (Maximum possible: 30 points)	***7***	14	24	10	24	24	19
Competition Framework (Maximum possible: 28 pts.)	***22***	22	21	0.3	27	18.7	17
Total (Maximum possible: 100 pts.)	***52.5***	71	86	23.8	87	82.7	72.5

Note: PH – Philippines, KH – Cambodia, MY – Malaysia, MM – Myanmar, SG – Singapore, TH – Thailand, and VN – Viet Nam.

Source: Except for the Philippines, the scores are for the year 2013 from ITU ICT Regulatory Tracker (Rev2014 version retrieved on March 11, 2017 from http://www.itu.int/en/ITU-D/Regulatory-Market/tracker/Pages/default.aspx). For Philippines, the scores are for 2017 and were assigned by the authors based on the guidelines in the ITU ICT Regulatory Tracker.

Universal access and service

Before concluding it is important to touch on universal access and service policy. Although well-intentioned, the UAS scheme that was pursued under EO 109 and RA 7925 as part of the liberalization program had anti-competitive consequences. The service obligation imposed on new entrants (and how it was determined), the unequal treatment of operators, the lack of jurisdiction of the regulator as well as the lack of transparency in the setting of interconnection rates, and the unsustainable pricing structure all contributed to industry consolidation. Although the exit of firms is normal in a competitive environment, in this case it is possible that there were efficient service providers that could have survived if the scheme had not distorted market incentives.

There is an opportunity to design a suitable mechanism to pursue UAS given the government's commitment to have "available, accessible, reliable, trusted and affordable" ICT infrastructure and services in the country (NEDA 2017, page 19-26). Appendices H and I provide basic information on the UAS policies and strategies of ASEAN members. In terms of the scope of services, only the Philippines and Myanmar do not include internet services as part of their definition of universal service. This is worth noting because given the rapid exchange of information and availability of other services online, the internet must be considered and recognized as one of the basic telecommunications services provided nationwide. In fact, the Broadband Commission for Sustainable Development in 2011 declared broadband access as a basic human right and has pushed to make broadband policy universal, which means including broadband under each country's UAS definition, by 2015.

Countries have used different sources and measures to finance its implementation. Four ASEAN members have created a Universal Service Fund (USF) managed by their respective Ministries on Communication or Ministries of Finance. The USF is a system of subsidizing telecommunications services to promote expansion of access to ICT services in unserved areas of a country. Malaysia and Indonesia mandates all ICT-service operators to allocate a percentage of their total gross revenue to the USF. Other ASEAN countries adopt additional measures to finance the provision of their universal service policies.

Under the PDP 2017-2022, the government will "explore the feasibility of creating a universal access fund (UAF), which may be used for the development of ICT infrastructure in the unserved/underserved areas" (NEDA 2017, page 19-26). Including broadband services in the UAF should be explored as well and a suitable scheme for the Philippines developed. According to OECD (1995), the following criteria can be useful in evaluating any mechanism for pursuing universal service: transparency, equity, efficiency, cost effectiveness, flexibility, incentive compatibility with a competitive environment, predictability, accountability, and low implementation and administrative cost.

Conclusion

More than two decades ago, the country embarked on a bold liberalization program which has produced significant benefits. The Philippines would not be a key player in the global IT-BPM industry today if the government had earlier failed to open up telecommunications to competition.

Further review of the regulatory framework however reveals that other aspects necessary to support the efficient functioning of telecommunications markets have not been given as much attention. At only 52.5 points out of a possible total of 100, the quality of the Philippine telecommunications regulatory environment is significantly below what is considered international best practice.

A package of structural reforms is needed to reboot the sector and truly make it an engine of economic development that will help achieve the national long term vision. The set of reforms will consist of significant improvements in both the governance and substance of the regulatory system. Specific rules or interventions and further liberalization are essential components but they will only work if an effective regulatory authority with the right mandate is in place. Therefore, this should be prioritized in the reform agenda.

An important concern is universal access/service. Indeed, market reforms will not be meaningful unless we achieve inclusive development as well. A key lesson from our own experience is to avoid using the same tool (e.g. competition) to directly address multiple objectives (e.g. efficiency and equity) all at once. We need to develop a better strategy and this should be aligned with a set of good practice criteria. There are possible models from around the world that we can learn from and adapt to the unique requirements of the Philippines.

References

Albert, J.R.G., R.B. Serafica, and B.T. Lumbera. 2016. Examining trends in ICT statistics: How does the Philippines fare in ICT? Discussion Paper Series No. 2016-16. Quezon City: Philippine Institute for Development Studies.

Armstrong, M. and D.E.M. Sappington. 2006. Regulation, competition, and liberalization. *Journal of Economic Literature* XLIV: 325–366.

Asia-Pacific Economic Cooperation Economic Committee (APEC EC). 2006. APEC economic policy report. Singapore: APEC Secretariat.

Asia-Pacific Economic Cooperation Economic Committee (APEC EC). 2009. APEC economic policy report. Singapore: APEC Secretariat.

Baldwin, R., C. Scott, and C. Hood. 1998. *A reader on regulation.* Ed. Oxford: Oxford University Press.

Blackman, C. and L. Srivastava. 2011. *Telecommunications regulation handbook - 10th anniversary edition*. Washington, D.C.: World Bank.

Brown, A.C., J. Stern, B. Tenenbaum, and D. Gencer. 2006. *Handbook for evaluating infrastructure regulatory systems*. Washington, DC: World Bank.

Bouckaert, J.M., T.V. Dijk, and F. Verboven. 2010. Access regulation, competition, and broadband penetration: An international study. Working Paper No. 2010-020.

Cabarios, E.V. 2015. Effective regulations for sustainable growth. Presented at the Policy Dialogue on Effective Regulations for Sustainable Growth, September 17, PIDS NEDA sa Makati, Makati City, Philippines.

Cameron, A.C. and P. K. Trivedi. 2005. *Microeconometrics methods and applications.* New York: Cambridge University Press.

Driscoll, J. C. and A. C. Kraay. 1998. Consistent covariance matrix estimation with spatially dependent panel data. *The Review of Economics and Statistics* 80: 549-560.

Findlay, C. 2011. "The impacts and benefits of structural reforms in the transport, energy and telecommunications sectors in APEC Economies." In *The Impacts and Benefits of Structural Reforms in the Transport, Energy and Telecommunications Sectors*: 1-30.

Fink, C., A. Mattoo, and R. Rathindran. 2001. Liberalizing basic telecommunications: The Asian experience. Paper presented at the Trade, Investment and Competition Policies in the Global Economy: The Case of the International Telecommunications Regime, January 18-19, Hamburg, Germany.

Fink, C., A. Mattoo and R. Rathindran. 2003. An assessment of telecommunications reforms in developing countries. *Information Economics and Policy* 15(4): 443-466.

Gill, D. 2014. Defining regulatory management systems. Regulatory coherence technical paper. A project of the Economic Research Institute for ASEAN and East Asia and the NZ Institute of Economic Research. Unpublished.

Gutierrez, L.H. 2003. The effect of endogenous regulation on telecommunications expansion and efficiency in Latin America. *Journal of Regulatory Economics* 23(3): 257-286.

Lee, R.C., H.C. Lee, and J. Ure. 2011. "Quantifying the impacts of structural reforms in telecommunications markets in APEC Economies." In *The Impacts and Benefits of Structural Reforms in the Transport, Energy and Telecommunications Sectors*: 179-208.

Llanto, G. 2015. "Reduce regulatory burden, improve regulatory quality." In *PIDS 2014 Economic Policy Monitor Effective Regulations for Sustainable Growth*. Makati City, Philippines: Philippine Institute for Development Studies.

Melody, W. 1997. On the meaning and importance of 'independence' in telecom reform. *Telecommunications Policy* 21(3): 195–199.

Mohammed, A.M. and E. Strobl. 2011. Good governance and growth in developing countries: A case study of regulatory reforms in the telecommunications industry. *Journal of Industry, Competition, and Trade* 11: 91–107.

National Economic Development Authority (NEDA). 2017. The Philippine Development Plan 2017-2022 (prepublication version retrieved on March 5, 2017 from http://pdp.neda.gov.ph/)

OECD. 1995. Universal service obligations in a competitive telecommunications environment. Committee on Information, Computer, and Communications Policy Report No. 38. Paris: OECD Publishing.

Wooldridge, J. 2002. *Econometric analysis of cross section and panel data.* Cambridge, MA: MIT Press.

Online database:

ITU Information Communication Technology (ICT) Regulatory Tracker. http://www.itu.int/en/ITU-D/Regulatory-Market/tracker/Pages/default.aspx (accessed March 11, 2017).

Appendix A. Methodology of the ITU Regulatory Tracker

Scope and purpose

The regulatory tracker covers over 150 countries for a period of 11 years, permitting assessments of the evolution of regulatory trends within the same country, regions or worldwide. It is based on self-reported data gathered yearly via ITU's World Telecommunication Regulatory Survey (hereafter TREG) and on compiled information via internal research. The number of indicators taken into consideration increases from 26 in 2003 to 50 in 2007 as new questions were added with time. The 50 indicators have remained the same since 2007.

Indicators

All indicators have been scored between 0 and 2. The reference for the scoring is what is considered the best possible scenario (based on the internationally recognized regulatory best practices adopted by the global community of regulators at the annual Global Symposia for Regulators).
Most indicators are based on a single question each, but 11 of them are the result of a combination of multiple questions from TREG. Please refer to the matrix for detailed scoring explanation on each of the indicators.
For years when specific questions were left blank or when the survey was not answered by a specific country, a look back procedure is applied. This procedure means that the latest available data for the specific indicator is retrieved. For the majority of the indicators, the questions that are not answered are not scored, thus having the scoring field in blank. There are, however, exceptions to this rule and they are explained in the matrix (see below).

Matrix

The ICT Regulatory Tracker file includes an explanatory matrix providing detailed information on the choice, composition and scoring of each indicator.

Clusters

The indicators are divided in 4 different clusters, each cluster is designed in order to take stock of the different areas of the regulatory analysis.
Cluster 1, ***Regulatory authority***, is composed of 10 indicators, scoring a maximum of 20 points. It contains indicators reporting on the entity in charge of regulation, its structure, decision and enforcement powers, autonomy and accountability, having a separate regulator to oversee the sector being internationally recognized as a good practice. Its score is taken into account when there is data for at least 3 indicators.
Cluster 2, ***Regulatory mandate***, is composed of 11 indicators, scoring a maximum of 22 points. It analyzes the distribution of the regulatory functions according to the different segments of the markets and taking into account the expanding mandate of the regulator in a converging digital world. Its score is taken into account when there is data for at least 3 indicators.
Cluster 3, ***Regulatory regime***, is composed of 15 indicators, thus scoring a maximum of 30 points. This cluster addresses the areas that are regulated and how. The purpose of this cluster is to examine the kind of regulatory intervention needed (targeted regulation) and not to foster more regulation. Its score is taken into account when there is data for at least 4 indicators.
Cluster 4, ***Competition framework***, is composed of 14 indicators, thus scoring a maximum of 28 points. The set of indicators was identified to assess the competitiveness of the sector by identifying the level of competition in the different markets (based on what is legally permissible), measures to

protect competition and openness to private and foreign investment and thus to innovation. Its score is taken into account when there is data for at least 4 indicators.

Source: Lifted from ITU (n.d.). "Methodology," available from http://www.itu.int/en/ITU-D/Regulatory-Market/tracker/Pages/Methodology.aspx. Accessed 11 March 2017.

Appendix B. Fixed effects model[15]

Cameron and Trivedi (2005) was the main reference used in the discussion of this section. Consider the simple model for each country *i*,

$$y_{it} = \beta_1 X_{it} + u_i + \varepsilon_{it} \quad i = 1,2,\ldots, N; t = 1,2,\ldots, T \quad (1)$$

For each country *i*, we get the average over time,

$$\bar{y}_i = \beta_1 \bar{X}_i + u_i + \bar{\varepsilon}_i \quad (2) \text{ where } \bar{y}_i = \sum_{t=1}^{T} y_{it} / T \text{ and so on.}$$

Subtracting (2) from (1) for each t, we will get,

$$\left(y_{it} - \bar{y}_i\right) = \beta_1\left(X_{it} - \bar{X}_i\right) + \left(\varepsilon_{it} - \bar{\varepsilon}_i\right)$$
$$\ddot{y}_{it} = \beta_1 x + \ddot{\varepsilon}_{it} (3)$$

where $\ddot{y}it$ = $(yit - \bar{y}i)$ is the time-demeaned data on the dependent variable. Same transformation is conducted for $\ddot{x}it$ and $\ddot{\varepsilon}it$. The general time-demeaned equation for each *i* is,

$\ddot{y}_{it} = \beta_1 \ddot{x}_{1it} + \beta_2 \ddot{x}_{2it} + \ldots + \beta_k \ddot{x}_{kit} + \ddot{\varepsilon}_{it}$, which serves as our main model for this analysis.

In the fixed effects model, the u_i serves as the unobserved random variable per country that is assumed to be correlated with the regressors, X_{it}. In this model, our regressors include the variables listed in Table 1, in addition to the time dummy variables (i.e. 2007 to 2013). The inclusion of time dummy variables allows us to control for events or shocks that could have affected many, if not all, countries in a specific year; an example would be the global financial crisis of 2007-2008. The ε_{it} are the so-called idiosyncratic errors which varies across time, denoted by *t,* as well as across *i*.

[15] The derivation of the general time-demeaned equation was lifted from the lecture (Statistics 280) of Dr. Dennis S. Mapa, Professor IV and Dean of the University of the Philippines School of Statistics.

Appendix C. Results of the First Differencing Model

```
note: D.year omitted because of collinearity

Random-effects GLS regression                   Number of obs     =       828
Group variable: idc                             Number of groups  =       147

R-sq:                                           Obs per group:
     within  = 0.0250                                         min =         1
     between = 0.0558                                         avg =       5.6
     overall = 0.0360                                         max =         6

                                                Wald chi2(6)      =     25.97
corr(u_i, X)   = 0 (assumed)                    Prob > chi2       =    0.0002

                                  (Std. Err. adjusted for 147 clusters in idc)
------------------------------------------------------------------------------
             |               Robust
      D.lfbs |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         aut |
          D1. |   .0333521   .0152525     2.19   0.029     .0034579    .0632464
             |
         man |
          D1. |   .0032588   .0076905     0.42   0.672    -.0118144     .018332
             |
         rgm |
          D1. |  -.0061018   .0076735    -0.80   0.427    -.0211416    .0089381
             |
         com |
          D1. |   .0061816   .0070055     0.88   0.378    -.0075489    .0199122
             |
       lgdpc |
          D1. |   .4049687   .1142891     3.54   0.000     .1809663    .6289711
             |
       lpopd |
          D1. |   1.488448   .7023758     2.12   0.034     .1118165    2.865079
             |
        year |
          D1. |          0  (omitted)
             |
       _cons |   .1737305   .0183626     9.46   0.000     .1377404    .2097206
-------------+----------------------------------------------------------------
     sigma_u |  .12876626
     sigma_e |  .39382792
         rho |  .09657872   (fraction of variance due to u_i)
------------------------------------------------------------------------------
```

Appendix D. Regulatory Authority

Indicator	Description of best practice	Philippines (2017)
Separate telecom/ICT regulator *Does a separate (independent in terms of finance, structure, and decision making from the operator(s) and the sector Ministry) Regulatory Authority exist for Telecommunication or Information and Communication Technology (ICT)?*	Having a separate Regulatory Authority (i.e. independent in terms of finance, structure, and decision-making from the operator(s) and the sector Ministry) is in line with international best practices. Independence heightens the effectiveness of a regulator, with regards to both procedural matters and easier maneuver of funding and actions to achieve the desired social and economic goals. Separation from other governmental agencies/ministries and service providers is generally seen as a factor that enables decisions to be taken in an impartial, fair and transparent manner. This does not negate, however, that in particular circumstances regulators that are not separate may be effective.	A separate regulator exists - the National Telecommunications Commission. However, it has no fiscal autonomy and the Commissioners have no security of tenure.
Autonomy in decision making *Is the Regulatory Authority autonomous in decision-making?*	Autonomy is relevant to both the accountability and independence of the regulatory authority. It ensures that decisions are made consciously and with impartiality. As the specialized body with knowledge of the market, autonomy grants the regulatory authority with the tools to increase its efficiency and serve as a neutral broker in the market.	Yes
Accountability *What are the reporting requirements of the Regulatory Authority?* *Who is responsible for approving the budget of the regulator?* *Who appoints the Members and the Head?*	Notwithstanding the need of independence, the regulatory authorities should be accountable for their actions to ensure effectiveness in legislation and enforcement of rules as well as impartiality in decision making. Having different governmental bodies deciding over the regulatory authority's structure and funding, in addition to the Head or the Board of the regulatory authority, avoids concentration of power and influence from one of the branches of the government over the regulatory decision. Particularly with regard to financial resources, appointment of the head of the regulator and reporting requirements, it is important to have another branch of the government reviewing the regulator's decisions. By doing so, the government will be implementing a system of checks and balances that is likely to prevent a regulator from, on one hand, over-spending (or over-charging the regulated entities) as well as, on the other hand, from conflicts of interest and lack of accountability. Although such controls may be seen as diminishing the regulator's ability to independently make decisions, it will result in the regulator implementing policies and programs needed by the telecommunications sectors and regulated	Reporting Requirements: Annual report to the sector Ministry (DICT) Budget: DBM recommends while it is Congress that approves. Appointment of head and members: The President appoints.

	entities are likely to feel a sense of regulatory security and transparency.	
Percentage of diversified funding *With regards to the last financial year, please indicate the sources of the Regulator's annual budget and the percentage of annual budget financed from each source.*	The funding sources can directly impact the regulator's independence and political influence should be minimized to the extent possible. Having multiple sources of funding and not just financial sources from government appropriations is in line with international best practices. The funding sources and budgeting processes of regulators (i) may impact on independence, efficiency and cost of regulation and (ii) may directly impact the degree of a regulator's autonomy and competence when carrying out its responsibilities. Multiple sources of funding are generally associated with providing the regulator with more financial independence and greater autonomy in decision-making.	Government appropriation (100%)
Public consultations mandatory before decisions *Are public consultations mandatory before regulatory decisions are made? (Note: applies to regulatory decisions which are likely to have a significant impact on the market and/or end users)*	It is in line with international best practices for the law or regulation to generally require the regulator to conduct public consultations before issuing regulatory decisions. This requirement may specify that consultations are required for regulatory decisions likely to have a significant impact on the market and/or on end users. Public consultations allow for a democratic environment that takes into account in the decision-making process the opinions of consumer associations and individual consumers, the views of established or potential investors as well as other interested parties. They also increase the transparency of the regulatory authority's actions and decisions, and allow for a buy-in from all parties involved in the market.	Yes, for its quasi-legislative powers
Enforcement power *Does the Regulatory Authority have enforcement power? Particularly, the NTC has sufficient powers to* *(i) enforce procedures in place;* *(ii) enforce regulations and license conditions; and* *(iii) issue orders, directions to operators to carry out or cease certain activities, and* *(iv) impose sanctions, fines and other penalties for breach of legal/regulatory obligations.*	Granting the regulator sufficient enforcement powers under the law is in line with best regulatory practice. To avoid political interference and ambiguous decisions influenced by the interests of market players, the regulatory authority should be empowered to enforce its decisions and regulations and thus ensure compliance with the rules set, improve the predictability of the regulatory frameworks in place and grow a level-playing field. Particularly, regulators should have sufficient powers to (i) enforce procedures in place; (ii) enforce regulations and license conditions; and (iii) issue orders, directions to operators to carry out or cease certain activities, and (iv) impose sanctions, fines and other penalties for breach of legal/regulatory obligations.	NTC has sufficient enforcement power based on enabling laws (RA 7925, Act 3846, CA 146, EO 546, EO 125), and the rules and regulations it promulgates.

Sanctions or penalties imposed by regulator *What sanctions or penalties can the NTC impose?*	Empowering the regulator to enforce punitive measures, regulations or license conditions by imposing penalties or sanctions for violations is in line with international best practices. Providing the regulator with sufficient legal grounding to exercise its enforcement functions is a key factor to ensure the legality/validity of the regulator's actions and decisions and to provide legal certainty to the sector.	Administrative fines and penalties, and license revocation.
Dispute resolution mechanism *Does the regulatory framework set up a clear dispute resolution mechanism(s) to resolve disputes (e.g. on interconnection issues, customer complaints, etc.)?*	As the ICT sector continues to evolve and become increasingly competitive, it is necessary to establish an effective dispute resolution system. Failure to resolve disputes can quickly limit competition, cause delays in the introduction of new services and technologies, block or reduce investment in the sector, and impede liberalization and development of the sector. Establishing clear dispute resolution mechanisms is in line with international practice. These procedures are critical to guarantee timely and effective intervention from regulators and contribute to the efficient functioning of competitive ICT markets as well as to the protection of consumers' rights.	Yes
Appeals to decisions *Are appeals to the decision of the regulator allowed?*	Establishing clear and detailed procedures for appealing the regulator's major dispute resolution and enforcement decisions is consistent with good regulatory practices and is an important part of a comprehensive and effective regulatory framework. Allowing interested parties to appeal the regulator's decisions helps to ensure that the regulator is sufficiently accountable to stakeholders, including the state, service providers and consumers and affirms its credibility while providing the market players with the assurance of fairness and rule of law throughout the process.	Yes
Existence of Competition authority *Does your country have a Competition Authority?*	Competition authorities overlook multiple market segments in order to avoid anti-competitive actions taken by operators with significant market power, actions which would harm other market players, potential new entrants as well as consumers.	Yes. The Philippine Competition Commission was established in 2015.

Source: The indicator and description are from ITU ICT Regulatory Tracker (Rev2014 version retrieved on March 11, 2017 from http://www.itu.int/en/ITU-D/Regulatory-Market/tracker/Pages/default.aspx). The answers were initially provided by the authors and later validated by the NTC.

Appendix E. Regulatory Mandate

Indicator	Description of best practice	Philippines (2017)
Traditional mandate: entity in charge of quality of service obligations measures and service quality monitoring	Service quality monitoring is a tool to aid in decision in order to help customers make informed choices, to understand the state of the market (and help operators achieve fair competition), to maintain or improve in presence or absence of competition, and also to make interconnected networks work well together. It is equally as important to establish measures for controlling/monitoring quality of service to set achievable and appropriate targets. We consider that an unbiased and independent regulatory authority is the most capable body to be in charge of service quality monitoring.	Enforcement of quality of service obligations measures - NTC Service quality monitoring - NTC
Traditional mandate: entity in charge of licensing	Development and implementation of authorization policies determine the structure, adaptability and level of competition of ICT services. We consider that an unbiased and independent regulatory authority has the knowledge and tools to best allocate authorizations with the goal of maximizing market productivity and efficiency.	Congress (Franchise) and NTC (CPCN)
Traditional mandate: entity in charge of interconnection rates and price regulation	There is a consensus among economists and regulators that interconnection prices should promote economic efficiency, actively promoting competition, and additionally help achieve universal service. In the presence of market failures, price regulation is also important to avoid the exercise of market power, promote economic efficiency and competition and ensure that the prices are fair given the quality of service provided. We consider that an unbiased and independent regulatory authority is the most capable body to be in charge of interconnection rates and price regulation.	Interconnection rates - None. It is negotiated by the parties. Price regulation - NTC
Entity in charge of Spectrum Management - Radio frequency allocation and assignment (licensing)	Spectrum is a scarce resource and its efficient use can make an impact upon economic prosperity. Specific technical and service rules govern spectrum allocations and, as a result, they are crucial determinant of the structure and performance of industry and of institutions devoted to ensuring public safety, security and national defense. We consider that an unbiased and independent regulatory authority has the knowledge to best allocate spectrum authorizations.	NTC

Entity in charge of Spectrum Management - Monitoring and Enforcement	Spectrum monitoring aids spectrum managers to plan and use frequencies, avoids incompatible usage and identifies sources of harmful interference. Spectrum use planning and resolution of spectrum scarcity issues can be accomplished through study and analysis of spectrum occupancy data. We consider the regulatory authority to be the best suited body to deal with compliance regarding rules and regulations, interference issues, frequency use and occupancy.	NTC
Entity in charge of universal service/access	Telecommunications markets are dynamic, new technologies are constantly emerging and new services rapidly become popular and then indispensable. Thus, UAS aspirations rise over time and effective regulation could help fulfilling some of these aspirations. We consider the regulatory authority the body most suitable to be responsible UAS for its industry sector expertise and skilled technical, economic and financial staff; moreover it has a degree of independence perceived to be one step removed from politics and also holds credibility with the industry (the main partner in the implementation of UAS policy).	Operators
New mandate: entity in charge of broadcasting (radio and TV transmission)	Having a converged regulator with authority over ICT and media/broadcasting is in line with international best practices. Since a single authority is charged with regulating these services, the need for formal coordination processes between agencies/authorities is no longer present, often allowing for more efficiency at planning and introducing converged technologies and services to the market. Because of this, converged regulators are conducive to enabling market integration in a converged environment.	NTC
New mandate: entity in charge of broadcasting content	See above	Self-regulation (KBP).
New mandate: entity in charge of internet content	See above	Not regulated.
New mandate: entity in charge of Information Technology	See above	Not regulated.

Consumer issues: entity responsible for comparative tariff information, consumer education and handling consumer complaints *Is the Regulatory Authority responsible for:* *1a. Providing comparative tariff information* *1b. Informing consumers of their rights (consumer education)* *2. Handling consumer complaints*	If the regulator does not have the ability to demand information from operators, particularly incumbent operators, to assess overall market performance and/or investigate alleged violations, then service providers can engage in anti-competitive practices to the detriment of consumers. As a result, the entire regulatory system can be undermined, thus creating uncertainty and constraining market development. Regulators that have the ability to address consumer complaints, allowing consumers another avenue of redress for complaints that are not resolved directly with the operators, ensure transparency and increased social welfare.	Providing comparative tariff information – None Informing consumers of their rights (consumer education) - DTI Handling consumer complaints - NTC (for regulated services) and DTI.

Source: The indicator and description are from ITU ICT Regulatory Tracker (Rev2014 version retrieved on March 11, 2017 from http://www.itu.int/en/ITU-D/Regulatory-Market/tracker/Pages/default.aspx). The answers were initially provided by the authors and later validated by the NTC.

Appendix F. Regulatory Regime

Indicator	Description of best practice	Philippines (2017)
Types of licenses provided	Issuing service-specific licenses, which refer to a particular type of service over a specific type of network, is a customized and lengthy process that does not keep up with the innovations and developments of the ICT sector. Multi-service individual licenses represent a further although not optimal, step into dropping the barriers for service innovations. General, unified/global licenses stand for increased market liberalization and the application of equal conditions to all service providers, enabling a more competitive environment. It should be noted that issuing individual licenses for the radio spectrum authorizations remains a common practice throughout the world particularly where the demand for the use of a particular frequency band exceeds availability	Service-specific individual licenses - Yes Multi-service individual licenses - YES Unified/global licenses - No General authorizations - No Registration- Yes for Value Added Services and license -exempt equipment
License exempt	An open entry market allows for competitive behaviour and self-regulating, thus ever-adapting, market conditions. Without the licensing barrier to overcome, service providers can focus their investment into infrastructure building innovation and competitive services.	
Operators required to publish Reference Interconnection Offer (RIO)	When operators are required to publish RIO, new entrants have sufficient information about the network to allow for decision-making, thus reducing entry time, and to provide a baseline for negotiation. The publication of a standard offer, in the form of a RIO, narrows the scope for a dominant operator to discriminate among applicants for interconnection.	No
Interconnection prices made public	Making interconnection agreements public opens the discussion to other parties that might have issues at stake, it also ensures transparency for both the population and other market players about the interconnection.	No
Quality of service monitoring required	Measuring the quality of service of operators helps consumers make their choices considering not only pricing but also the service standards provided by the operator. Moreover, QoS monitoring helps portray the market standards in a realistic way and assists	No

	operators in achieving fair competition, especially in the case of secondary trading and infrastructure sharing.	
Infrastructure sharing for mobile operators permitted	Network-sharing agreements can optimize the use of the coverage for operators, generally reducing costs, thus being beneficial for both the service providers and the consumers. It can also serve as incentive to network deployment. MVNOs allow for other market players - operators - to resell existing products and services from another provider or even bulk-buying minutes and data, increasing the profitability of the market.	Yes
Infrastructure sharing mandated *Is infrastructure sharing mandated (towers, base stations, posts, ducts, etc.)?*	Infrastructure sharing between market operators or with other industries can decrease expenditures by the joint deployment and maintenance of facilities as well as increase productivity of the usage of scarce resources.	No. It is considered by NTC as a business decision of the operators.
Co-location/site sharing *Is co-location/site sharing mandated?*	Passive infrastructure sharing is aesthetically, environmentally and economically positive. It provides the opportunity for investment on the improvement of services, greater coverage and innovation due to reduced fixed costs.	It is encouraged by NTC.
Unbundled access to the local loop required	Unbundling reduces infrastructure deployment costs and avoids unnecessary duplication of sections of the incumbent's infrastructure. By reducing the amount of initial investment -fixed costs-, market entry is stimulated, driving competition forward.	No
Secondary trading allowed	Secondary trading promotes optimal, thus more economically productive, use of spectrum. It also helps to create a self-regulating environment given the more effective usage of the frequency bands, both by the new entrant and the network operator who already possesses the rights.	No
Band migration allowed	If band migration is allowed, the market participants can provide new services within their existing license. This increases incentives for innovation and more efficient use of the networks, as well as decreasing the cost of a new license.	No

Number portability available to consumers and required from fixed-line operators	Number portability increases competition and quality of services among service providers in order to retain their current clients (which are no longer held back by the imposition of a new telephone number).	No
Number portability available to consumers and required from mobile operators	Same as above	No
Individual users allowed to us VoIP	As an option to the traditional telephony, the VoIP services represent a different way of placing calls that has been improving over time and imposing competition on the historical market players. It stimulates traditional business models to become more efficient, innovative and reduce costs in order to keep their places in the market.	Yes
National plan that involves broadband	The adoption of a national plan that includes broadband reinforces the necessity of a consensus and coordination for both the infrastructure deployment and the regulation of the services to be provided. A more coordinated and accountable environment, in turn, accelerates innovation, boosts investment and raises productivity, all of which, along with the universal access goal of the broadband plan, contribute to higher penetration and competition.	Yes through DICT.

Source: The indicator and description are from ITU ICT Regulatory Tracker (Rev2014 version retrieved on March 11, 2017 from http://www.itu.int/en/ITU-D/Regulatory-Market/tracker/Pages/default.aspx). The answers were initially provided by the authors and later validated by the NTC.

Appendix G. Competition Framework

Indicator	Description of best practice	Philippines (2017)
Level of competition in local and long distance *Note: the question refers to what is legally permissible.*	International best practices favor competition over monopolies in the ICT market since competitive markets are known to increase consumer welfare by lowering prices, promoting innovation, improving consumer choice and raising the quality of services.	Local fixed line services - Full competition Domestic fixed line services - Full competition International fixed line services - Full competition
Level of competition in IMT (3G, 4G, etc.) services *Note: the question refers to what is legally permissible.*	See above	Full competition
Level of competition in cable modem, DSL, fixed wireless broadband *Note: the question refers to what is legally permissible.*	See above	DSL - Full competition Cable modem - Full competition Fixed Wireless Broadband - Full competition
Level of competition in leased lines *Note: the question refers to what is legally permissible.*	See above	Full competition
Level of competition in International Gateways *Note: the question refers to what is legally permissible.*	See above	Full competition
Status of the main fixed line operator	Both the regulatory authority and the incumbent being overseen by the same entity is not optimal as the decision-making process could be biased to lean towards the interests of the incumbent rather than promote market competition, quality of services and greater welfare for the population.	Fully privatized or private
Legal concept of dominance or SMP *Does your national anti-trust/competition law recognize the concept of "dominance" or Significant Market Power (SMP)?*	Defining the concept of Significant Market Power (SMP) is an important step to avoid anti-competitive behaviour. When operators are classified as having significant market power, it is possible for the regulator to impose ex ante regulations (i.e. mandatory publication of Reference Interconnection Offers) to avoid erroneous use of this power.	The term "dominance" is fully recognized in the Philippine Competition Act (Republic Act No. 10667) and its IRR. As stated in Rule 2 of the IRR, “Dominant position” refers to a position of economic strength that an entity or entities hold which makes it capable of controlling the relevant market independently from any or a combination of the following:

		competitors, customers, suppliers, or consumers".
Criteria used in determining dominance or SMP **"***Geographical"; "Market share"; "Control of essential facilities"; "Easy access to financial resources"; "Strength of the countervailing power of consumers"; "Economies of scale and scope"*	Because market share by itself does not imply significant market power, it is important to have multiple criteria contributing to the definition of SMP - thus increasing the chances of recognizing those operators with power enough to impose anti-competitive environment to other market players.	Rule 8, Section 2 of Philippine Competition Act's IRR. The criteria are listed as follows: (a) The share of the entity in the relevant market and the ability of the entity to fix prices unilaterally or to restrict supply in the relevant market (b) The share of other market participants in the relevant market (c) The existence of barriers to entry and the elements which could foreseeably alter both the said barriers and the supply from competitors (d) The existence and power of its competitors (e) The credible threat of future expansion by its actual competitors or entry by potential competitors (expansion and entry) (f) Market exit of actual competitors (g) The bargaining strength of its customers (countervailing power) (h) The possibility of access by its competitors or other entities to its sources of inputs (i) The power of its customers to switch to other goods or services (j) Its recent conduct (k) Its ownership possession or control of infrastructure which are not easily duplicated (l) Its technological advantages or superiority, compared to other competitors (m) Its easy or privileged access to capital markets or financial resources (n) Its economies of scale and of scope (o) Its vertical integration (p) The existence of a highly developed distribution and sales network

Foreign participation/ownership in facilities-based operators	Foreign investment facilitates the growth and development of the telecommunications sector, increasing access to capital for network development and modernization, and allowing for the transfer of technology and know-how leading to increased productivity, innovation, and competitiveness.	Minority interest
Foreign participation/ownership in spectrum-based operators	See above	Minority interest
Foreign participation/ownership in local service operators/long-distance service operators	See above	Local service operators - Minority interest Long distance service operators - Minority interest
Foreign participation/ownership in international service operators	See above	Minority interest
Foreign participation/ownership in Internet Service Providers (ISPs)	See above	Minority interest
Foreign participation/ownership in value-added service providers	See above	Minority interest

Source: The indicator and description are from ITU ICT Regulatory Tracker (Rev2014 version retrieved on March 11, 2017 from http://www.itu.int/en/ITU-D/Regulatory-Market/tracker/Pages/default.aspx). Except for the two indicators relating to SMP, the answers were initially provided by the authors and later validated by the NTC. Responses to the two indicators on dominance or SMP were provided by the Philippine Competition Commission.

Appendix H. Universal Service - services covered and operator obligations

	Definition of universal service/access exists	Universal access/service policy adopted	Voice services included in Universal service/access definition	Internet services included in Universal service/access definition	Other services included in Universal service/access definition	Operators under universal access/service obligation	Operators/service providers required to offer below-cost prices
PHILIPPINES (2017)	Yes	Yes	Yes	No	Yes. Other Services.	Only CMTS and international long distance service providers.	No
Brunei (2014)	No	No	- Fixed line private residential service as part of universal service definition - Fixed line public payphone service as part of universal service definition - Individual mobile cellular service as part of universal service definition - Public mobile payphone service as part of universal service definition		- Telecentres as part of universal service definition - Emergency services as part of universal service definition - Directory services as part of universal service definition	- All network/facilities-based operators - All service-based providers	No
Cambodia (2015)	Yes	No	Individual mobile cellular service as part of universal service definition	Broadband as part of universal service definition	Schools (primary, secondary, post-secondary)	None of the above - No obligation, due to non-adoption of USO yet	No
Indonesia (2015)	Yes	Yes	Voice telephony services	Broadband as part of universal service definition	- Telecentres as part of universal service definition - Schools (Primary, secondary post-secondary) - Services for impaired/elderly - Women and girls	All operators	No

Lao PDR (2014)	Yes	No	- Fixed line private residential service as part of universal service definition - Fixed line public payphone service as part of universal service definition - Individual mobile cellular service as part of universal service definition - Public mobile payphone service as part of universal service definition	- Dial-up internet access as part of universal service definition - Broadband as part of universal service definition	- Schools (primary, second, post-secondary) - Health centres - Emergency services as part of universal service definition	All operators	Yes
Malaysia (2015)	Yes	Yes	- Fixed line private residential service as part of universal service definition - Fixed line public payphone service as part of universal service definition - Individual mobile cellular service as part of universal service definition	Broadband as part of universal service definition	- Telecentres as part of universal service definition - Services for impaired/ elderly	None, obligations are allocated on a competitive basis	No
Myanmar (2012)	Yes	No	Fixed line private residential service as part of universal service definition		Telecentres as part of universal service definition	All operators	No
Singapore (2015)	Yes	Yes	- Fixed line private residential service as part of universal service definition - Fixed line public payphone service as part of universal service definition	- Emergency services as part of universal service definition - Directory services as part of universal service definition - Telecentres as part of universal service definition Explain: As part of IDA's Next Generation Nationwide Broadband Network (Next Gen NBN) initiative, IDA has required the appointed Next Gen NBN	- Incumbent fixed line operator(s) - None of the above, explain: Next Gen NBN NetCo and OpCO	No	

				operators to roll-out an ultra high-speed, all-fibre network to all homes and offices in Singapore by 1 Jan 2013.			
Thailand (2014)	Yes	Yes	- Fixed line public payphone service as part of universal definition - Individual mobile cellular service as part of universal service definition	Broadband as part of universal service definition	- Telecentres as part of universal service definition - Schools (Primary, secondary post-secondary) - Health centres - Services for impaired/elderly	Designated Universal Service Provider	No
Vietnam (2015)	Yes	Yes	- Voice telephony services - Fixed line private residential service as part of universal service definition - Individual mobile cellular service as part of universal service definition	- Broadband as part of universal service definition	- Schools (primary, secondary post-secondary): broadband access, - Health centres - Emergency services as part of universal service definition, - Telecentres as part of universal service definition -- Explain: marine communications	- All network/facilities-based operators - Fixed-line operators - Mobile operators	No

Source: The NTC provided the information on the Philippines. For other countries, the source is the respective Country Profile accessed on March 10, 2017 from ITU ICT-Eye: http://www.itu.int/icteye.

Appendix I. Financing of Universal Service activities and/or Universal Service Fund

	Means of financing operator(s) universal access/service obligations	Operational Universal Service Fund	If yes, when?	Operators/ service providers required to contribute to USF	Means of calculating USF contribution amounts	USF financed by other sources	USF budget financing by source	Regulator administrating USF	If No, name the entity responsible	Other financing mechanisms for the provision of Universal service	If yes, please explain
PHILIPPINES (2017)	Cross-subsidy is permitted on IGF and CMTS operators for LECs.	No						No			
Brunei (2014)	Universal service funds	No	No information available							No	
Cambodia (2015)	Other - No obligation, due to non adoption of USO yet	No	After the Telecom Law comes into effect							No	
Indonesia (2015)	Universal service funds	Yes		All operators	Percentage of total gross revenues (turnover) Percentage: 1.25%	No		No	Ministry of Finance (2004)	No	

Lao PDR (2014)	Other - Grant aid from Germany for rural telecom	No								No	Grant aid from donor countries. Fund transfer from donor to Lao PDR Ministry of Finance (MoF) then from MoF to the operator (Lao Telecom). Priorities are set by the government
Malaysia (2015)	• Universal service funds	Yes		All network/ facilities-based operators All service-based providers	Percentage of total gross revenues (turnover) Percentage: 0.6%,	No		Yes		No	
Myanmar (2012)	Direct subsidy from government	No				No		No		No	

Singapore (2015)	Other - IDA allows operators to price their services at economically sustainable prices. Next Gen NBN NetCo and OpCo are funded by Government for rollout targets	No								Yes	Government co-funds the development of the Next Gen NBN
Thailand (2014)	Universal service funds	Yes		All operators	Percentage of total gross revenues (turnover) Percentage: 3.75%	No	Proceeds from telecommunication license/concession payments percentage	Yes		No	
Vietnam (2015)	Universal service funds	Yes		- All network/facilities-based operators - Fixed-line operators - Mobile operators	Other indicate: 1.5% telecom service revenue	Yes	Funding from international agencies percentage	No	Ministry of Information and Communications (2012)	Yes	To exempt the operators and ISPs from VAT (2005)

Source: The NTC provided the information on the Philippines. For other countries, the source is the respective Country Profile accessed on March 10, 2017 from ITU ICT-Eye: http://www.itu.int/icteye.