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ABSTRACT

We use data from the Kazakhstan Labor Force Survey (KLFS) for the period 2006–2011 to examine causal factors that determine informal self-employment. In addition, the paper expands the analysis to consider gender differences in informality and examines the response of informality propensities to the recent global crisis. Our decomposition analysis shows that education, work hours and tenure in self-employment are particularly important determinants of business formalisation.

Key words: Informality; Gender; Ethnicity

JEL classification: P29; O17

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INTRODUCTION

Research has long focused on the informal sector, and it is now well understood in economics that this sector affects macroeconomic stability (Fiess et al. 2010), poverty alleviation (World Bank, 2013) and even job satisfaction (Perry et al. 2007). In recent years, research has shown a great deal of interest in women's informal employment in developing countries that arises from the reliance of millions of women on the informal sector as a major source of employment and income (ILO, 2012) and from its potential impact on women's economic empowerment, gender equality and family well-being (Kantor, 2001; Chen, 2012).

International evidence has consistently revealed gender differences in informality rates, observed in both developed and developing countries, and interest in explaining these differences has increased. The International Labour Organization (ILO) argues that the informal sector is generally 'a larger source of employment for women than for men in the developing world' (ILO, 2002, p. 7). Hazans (2011) reported that female workers are more likely to be informal in Western Europe and parts of Eastern Europe, as well as in the southern peripheries of the European Union. More recently, the World Bank's *World Development Report* asserted that women worldwide are overrepresented in the informal sector (World Bank, 2012, p. 200).¹ Although many empirical studies have examined informal employment in transitional economies (see, for example, Rutkowski, 2006; Lehmann and Pignatti, 2007; Lehmann et al. 2012), relatively little is known about informal self-employment in these countries, especially in relation to gender.

One such interesting case is Kazakhstan, where forced self-employment observed throughout the 1990s has persisted well into the 2000s and around half of all workers in the informal sector are self-employed, mainly as own-account workers (Verme, 2001; Allen et al. 2007; Rutkowski, 2011). There was also a sharp rise in the number of own-account workers during the crisis of the late 2000s², suggesting that self-employment correlates positively with economic downturns, and those working in the informal sector in Kazakhstan, mostly women, were the most vulnerable to a descent into poverty (Gavrilovic et al. 2009).

¹ Several explanations for the documented gender gap in informality have been proposed, often focusing on motivational differences, such as necessity and choice (Adom and Williams, 2012), gender disparities in access to credit markets (IFC, 2011) and differences in labor market attachments and household-level structures such as dependent children, marital status and husband's employment status (Perry et al. 2007; World Bank, 2012).

² The number of own-account workers rose by 19.2% over the period of 2007 to 2009 (KAS, 2012, *Main Indicators of Small Businesses, 1999-2011*).

In this study, our objective is to identify causal factors that shape the informality decision amongst the self-employed workers. It is also important to evaluate the extent of informality changes in recessionary times. We perform this analysis by estimating the choice between formal and informal self-employment using data from the Kazakhstan Labor Force Survey (KLFS) for 2006, 2009 and 2011. Our decomposition analysis provides a nuanced perspective on what matters for the transition to formalisation. The paper proceeds as follows. In Section 2, we provide descriptive analysis of issues related to the persistence of informal self-employment. Section 3 introduces the methodology. Section 4 describes the data set and defines the variables used in the analysis. We present empirical results in Section 5 and Section 6 concludes.

BACKGROUND

Macro-economy and self-employment

As can be seen in Table 1, real GDP growth averaged 10% during the 2001-2007 commodity boom, but fell sharply through the period of global crisis beginning in 2008. Unemployment rates fell throughout the recovery period despite the recession, and non-agricultural self-employment rose during 2001-2011. The rise in female self-employment rates was moderate, but the gender gap in self-employment had widened during the 2000s. Table 1 also reveals that the share of registered businesses decreased during the crisis and the negative trend for females continued when growth resumed in 2010 (col. 5), but then rose sharply in the following year.³

³ According to the *Kazakhstan Labor Force Survey*, self-employment status is self-assessed and consists of the following groups: employers, own-account workers, unpaid family members, members of producers' cooperatives and subsistence farmers.

	GDP	GDP	Self-emp	oloyment	Unemplo	yment
	(%)	(per capita)	(*	%)	(%))
			Men	Women	Men	Women
2001	13.5	6146	15.7	14.3	8.9	12.0
2002	9.8	6748	14.6	13.1	7.5	11.2
2003	9.3	7351	16.5	15.0	7.2	10.4
2004	9.6	8001	17.8 (56.3)	16.3 (53.9)	7.0	9.8
2005	9.7	8699	17.7 (59.5)	15.7 (58.6)	6.7	9.6
2006	10.7	9529	18.2 (57.2)	16.0 (56.7)	6.4	9.2
2007	8.9	10259	18.6 (59.2)	16.3 (56.6)	5.9	8.7
2008	3.3	10469	18.4 (55.7)	15.8 (53.9)	5.3	7.9
2009	1.2	10318	19.1 (56.0)	16.3 (54.3)	5.6	7.5
2010	7.3	10916	19.1 (54.1)	16.4 (50.8)	4.9	6.6
2011	7.5	11568	20.0 (56.2)	16.8 (54.3)	4.6	6.2

Table 1. Macro-economy and the labour market, 2001–2011

Notes: GDP (col. 2) = annual growth rate of GDP at market prices based on a constant tenge. *GDP per capita* (col. 3) = GDP per capita in constant 2005 US\$ (based on PPP). Source: World Bank (*World Development Indicators 2013*). *Self-employment* (cols. 4-5) = self-employed workers, as % of the total employed. Figures in parentheses indicate registration rates. We excluded subsistence farmers from the estimates in cols. 4 and 5. Weighted by KLFS sampling weights. Source: KAS (2001-2011 Kazakhstan Labor Force Survey). Unemployment (cols. 6-7) = unemployment rate, as % of the total labor force. Source: World Bank (*World Development Indicators 2013*).

It is also useful to compare Kazakhstan's self-employment rates with those of other Asian economies, where the share of self-employed workers often exceeds half of the workforce (e.g. Indonesia and Thailand). It appears, as Figure 1 illustrates, that the Kazakh experience is not markedly different: firstly, we find that more than half the self-employed women work in subsistence farming, as in many developing countries; secondly, we observe that the level of subsistence farming in Kazakhstan has a negative relationship with per capita income, but the gender gap continues to persist; and finally, we also find that self-employed men tend to work on their own account. Overall, own-account self-employment among men has moderately expanded, whilst the female trend initially lagged, remained constant in the late 2000s but fell slightly in 2011.



Evidence also reveals that women in Kazakhstan are forced into self-employment, as in many regions of the developing world (e.g. IFC, 2011, p. 43). According to Allen et al. (2007, p. 15), roughly 40% of women start a business out of necessity. Duban (2012) also reported that forced self-employment more often explains women's self-employment in Kazakhstan, raising concerns about a causal link between self-employment and the inclination towards informality.

Informality

Numerous common criteria define informal employment and, at the practical level, the results vary by definition (Henley et al. 2009; Kanbur, 2011). However, for our purpose, informality is measured as lack of compliance (i.e. registration) among the non-agricultural own-account workers. These self-employed workers may work alone (e.g. self-employed professionals or labourers) or hire occasional employees (e.g. owners of microenterprises), including family workers, outside the purview of the state regulation.

We now present the percentage of male and female own-account workers operating informally. Table 2 reports a negative trend in informality rates during the recent financial crisis, after which they remained below the pre-crisis levels. The disaggregated data also exhibits little variation between male and female informality rates, except for 2011. The data also reveals variations in the characteristics of men and women with respect to education in that year. In the pre-crisis period, roughly 66% (61%) of men (women) in informal self-employment reported vocational education (or less) as opposed to 46% (47%) of men (women) in formal self-employment. Overall, we find differing dynamics in the distribution of informality at technical and degree level of qualifications. That is, over the period 2006-2011, the percentage of women with technical education in informal self-employment rose (28% to 37%) whilst it was relatively stable in the formal sector.⁴

Table 2. Informality distribution by gender and education level, 2006–2011											
		Panel A.	Total inf	ormality	rate (%)						
	20	06	20	09	2011						
Men	0.5	25	0.4	146	0.463						
Women	0.5	07	0.4	1 61	0.427						
	Pan	el B. Dist	ribution l	by educati	ion level ((%)					
Men											
	Formal			Informal							
	2006	2009	2011	2006	2009	2011					
\leq Secondary/Vocational	0.46	0.45	0.41	0.66	0.61	0.58					
Technical/Incomplete Higher	0.34	0.34	0.38	0.26	0.26	0.31					
Higher	0.20	0.21	0.21	0.08	0.12	0.11					
			Wo	men							
		Formal			Informal						
≤ Secondary	0.47	0.38	0.38	0.61	0.49	0.47					
Technical/Incomplete Higher	0.36	0.38	0.39	0.28	0.33	0.37					
Higher	0.17	0.24	0.22	0.11	0.18	0.17					

Source: Authors' estimates based on KLFS data (4th quarter).

Note: Weighted by KLFS sampling weights.

In explaining the patterns of informal self-employment, we also need to examine ethnic variations. As Table 3 demonstrates, the largest percentage decrease in rates of informality across ethnic groups was for Europeans. Whilst informality rates fell for Kazakh and European women over the period, it rose from 48% in 2006 to 53% in 2009 among minority women as a consequence of the severe recession. Informality declined among Kazakh men (57% to 49%) but

⁴ We must mention that following the economic transition, the quality of schooling deteriorated, particularly in rural areas (UNDP, 2004, p. 26). A survey by Ernst & Young (2012, p. 14) found that the younger generation lacks the necessary practical and technical skills and therefore cannot replace the retiring Soviet-trained specialists.

rose among minority ethnic men (46% to 49%). Overall, the ethnic dimension of selfemployment indicates the dominance of formal self-employment among European ethnicities. Moreover, it demonstrates that Kazakh women have similar informality rates to those of non-European ethnicities (mainly Uzbeks and Asian minority groups), and that minority women have markedly higher informality rates in time of recession.

Table	Table 3. Informality rates by gender and ethnicity, 2006–2011										
		Men									
	2006	2009	2011	Δ 2006–2011 (%)							
Kazakh	57.4	48.1	49.4	-14							
European	45.5	36.3	35.8	-21							
Minority	46.4	46.1	49.4	6							
		Women		Δ 2006–2011 (%)							
	2006	2009	2011								
Kazakh	53.6	49.5	47.0	-12							
European	46.4	38.2	33.3	-28							
Minority	48.4	52.6	41.7	-14							

Source: Authors' estimates based on KLFS data (4th quarter).

Note: Weighted by KLFS sampling weights.

Government policy

In December 2012, the government announced its intention to double the SME sector's contribution to GDP by 2030, embedded in the 'Kazakhstan 2050' long-term development strategy.⁵ However, we argue that for the initiative to be effective, the government must implement policies with a major impact on informality levels, such as removing exclusionary factors related to the institutional environment, preventing entry into the formal sector.⁶ The government can also achieve effective reduction of informality by addressing internal heterogeneity of the informal sector, and therefore designing a broader set of measures that extend beyond labour market rules and regulations.

⁵ The number of small and medium-sized enterprises (SMEs) rose sharply during the recovery period, but their economic importance, measured as contribution to GDP, fell from 17.8% to 17.5% over the period 2005-2011 (KAS, 2013). We must also note that the economically active SMEs as a percentage of registered businesses averaged less than 70% between 2007 and 2009 and fell to 53% in 2010 (KAS, 2012, *Small and Medium Enterprises in the Republic of Kazakhstan, 2007-2011*, p. 19).

⁶ See, for example, Perry et al. (2007) for the discussion of exclusionary factors and motivations for participation in informal self-employment.

A number of factors can reduce or discourage entry into formal self-employment. Access to finance may act as a barrier overall, but especially in meeting the costs of formal sector registration. Rutkowksi (2011) found that insufficient access to credit markets was of particular concern to small firms in Kazakhstan, similar to what was reported for many developing countries in Central and East Asia, where women work largely in small and low-growth firms and thus find themselves prevented by financial constraints from exploiting growth opportunities (IFC, 2011, Figure 1.5). In addition, Duban (2012) found that female shuttle traders in Kazakhstan encounter borrowing constraints that impede their entry into formal self-employment.

Against this background, however, we find no evidence suggesting that formal SMEs, especially those woman-owned enterprises, have greater access to SME assistance programmes, delivered by the Damu Fund (Entrepreneurship Development Fund). Table 4 shows that targeted loans totalled US\$ 3.93bn in the two years between 2009 and 2011, but men were the primary loan recipients, and self-employed women were excluded from leasing finance and access to the regional funding systems. In any of the financial support programmes with women borrowers, the percentage of women loan recipients does not exceed 30%, except for the women-only lending programme (row 4). We must also emphasise that these loans covered only 547 women who borrowed, on average, around US\$ 30000.⁷ At the start-up level, Gurevich (2010) reported that only 2% of surveyed SMEs in 2010 used government-backed loans.

⁷ According to the BISAM's report (2010), there appear to be low levels of awareness of the lending schemes amongst self-employed workers – over half of the surveyed self-employed workers (56%) were unaware of the *Business Road Map 2020* programme.

Tuble II Coverniterit Turaca programmes, 2009–2011										
	<u>Aggregat</u>	e Recipients	Wome	n Recipients						
	Clients	Volume	Clients	Volume						
Programmes:		(US\$)		(US\$)						
(1) Stabilisation Programme	9057	\$3.21 bn	2382	\$252.06 m						
(2) Regions	1555	\$391.62 m	368	\$29.42 m						
(3) Manufacturing	222	\$296.79 m	22	\$3.60 m						
(4) Women Entrepreneurship	547	\$16.19 m	547	\$16.19 m						
(5) Leasing Finance	49	\$8.68 m	0	0						
(6) Zhanaozen	22	\$1.31m	6	\$150788						
(7) Regional Funding	17	\$7.31m	0	0						
Total lending	11469	\$3.93 bn	3325	\$301.42 m						

Table 4. Government-funded programmes, 2009–2011

Source: Damu Fund, 2011 Chairperson's Report.

Notes: We converted the volumes of loans, denominated in domestic currency (as of 1 August 2011), using the official exchange rate for July 2011 (\$1 = 145.90 tenge). Estimates for the female recipients are shown in the last two columns, as reported in the data source. The Zhanaozen programme was initiated following the outbreak of industrial conflict in the town.

The general conclusion that emerges from this section is that targeted policies are needed within government's strategy to escape the middle-income trap and expand the SME sector. For example, we find that government interventions in credit markets were not broad-based (e.g. favouring large firms), making it difficult for even registered businesses to obtain loans, and that there is great urgency for financing strategies for microenterprises.⁸ A second important finding is that minority women have markedly higher informality rates, especially during a recession. Thirdly, women from all ethnic groups may be further disadvantaged by non-financial barriers. Therefore, we argue that cultural environment impinging on women in different ethnic groups represents another area of concern that government has not yet addressed. In particular, informal institutions often shape gendered norms and values, and these gender-specific perceptions strongly affect entrepreneurship decisions (Terrell and Troilo, 2010). In Kazakhstan, multiple barriers associated with the resurgence of traditional and religious customs and social norms (e.g. restrictions on mobility and domestic responsibilities) might play a part in imposing restrictions on women's self-employment activities outside of the informal sector.

⁸ According to KAS (*Men and Women in Kazakhstan 2013, Table 8.6*), this trend persisted over the period 2010-2012. In addition, Kalyuzhnova and Nygaard (2011) cast doubt on the ability of the government to identify the 'right' places to direct resources from the oil and gas revenues through the state financial vehicles.

METHODOLOGY

In the second half of the 20th century, economists developed a number of theoretical models that may serve in analysing worker participation in informal employment. These models can be distinguished by the underlying causes to which they attribute reasons for selecting informal sector employment. The traditional view argues that workers enter the informal sector because they do not have alternative sources of income (e.g. Fields, 1975). This is because "unemployment in the city is a distinct possibility" for workers excluded from formal sector employment (Fields, 1990, p. 50). This view effectively considers the informal sector a stepping stone (the "staging area hypothesis"), which rural migrants enter to earn income to finance their job search in the formal sector. Another strand challenges the segmentation view (Maloney, 1999) arguing that majority of workers in the informal sector have voluntarily chosen that sector and that the traditional dualistic view can become 'more relevant in the presence of deep recession and large labor distortions' (Maloney, 2004, p. 1173).

In seeking to explain the process of sector choice, it is natural to follow Hart's (1972, 1973) proposition that the informal (undocumented) sector is not intrinsically bad. Relying on the rational choice argument we can assume that workers may freely choose informal activity and that the decision to become an informal worker depends on the risk-adjusted relative awards. Indeed, informality in self-employment offers benefits - such as tax evasion - as well as the measurable uncertainty associated with the risk of detection. Therefore, a decision on whether or not to engage in informal self-employment activities can be seen as the outcome of random utility maximization based on the individual's perception of whether the utility stream from unregistered self-employment exceeds that of a legally registered activity.⁹ For example, Arabsheibani and Staneva (2012) have shown that in Tajikistan the average post-tax earnings in the informal sector are higher than in the formal sector. Additionally, Gimpelson and Kapeliushnikov (2013) have shown that informality carries an earnings premium among Russia's self-employed workers. This situation obviously creates incentives to choose informal selfemployment. Overall, we can treat the utility function as a black box, but in principle it reflects expected benefits (e.g. pension contribution evasion) as well as expected costs (e.g. maintained book of accounts). We also assume that switching between the two (legal and illegal) states is

⁹ It is, of course, possible that some workers may be displaced involuntary.

costly and that individuals demonstrate heterogeneous aversion to risk. For example, more riskaverse (e.g. more educated) individuals operate registered businesses.

For empirical specification, we approximate the utility function with the following 'latent' Eqn. (1):

$$I_i^* = X_i \gamma + \varepsilon_i \tag{1}$$

where I_i^* is the (unobservable) discrete choice variable indicating informality status for individual *i*. X_i is a set of explanatory variables, γ is the corresponding vector of coefficients and $\varepsilon_i \sim N(0,1)$ is the error term.

Since we do not observe I_i^* , the decision of whether to register is indicated by the binary outcome $I_i = (I_i^* > 0)$. However, if selection into self-employment is not random, then the relationship between the self-employment decision (selection equation) and informality (outcome) can be formed through observable and unobservable characteristics. And if these characteristics are correlated, this will generate an incorrect conclusion regarding the impact of the observable characteristics on the choice of informality.¹⁰ Thus, we apply the equivalent of Heckman's of selection model (the bivariate probit model with sample selection) to correct for the possibility of sample selection bias.¹¹

The selection equation is specified as follows:

$$S_i = Z_i \beta + u_i \tag{2}$$

where S_i is the binary choice variable indicating the endogenous selection process that determines the decision to enter self-employment. Z_i is a vector of the observed characteristics, β is the corresponding vector of coefficients and $u_i \sim N(0,1)$ is the error term.

The decision to enter self-employment is indicated by:

$$S = 1 \text{ if } Z_i \beta + u_i > 0 \quad (\text{self-employed}) \tag{3}$$

$$S = 0$$
 if $Z_i \beta + u_i \le 0$ (paid employment) (4)

From Eqs. (1) and (2), it is clear that Z and X have a bivariate normal distribution with

¹⁰ It is hardly plausible to assume that the self-employed have similar characteristics, both observable and unobservable, to the sample of salaried workers, including employers.

¹¹ The solution was introduced for the first time by Van de Ven and Van Pragg (1981).

zero means and correlation ρ ($\rho \neq 0$) and that three types of observations exist, with the following probabilities:

$$\mathbf{S} = 0 \qquad \Pr(S_i = 0) = \Phi(-Z_i\beta) \tag{5}$$

$$S = 1, I = 0 \qquad Pr(S_i = 1, I_i = 0) = \Phi(Z_i\beta) - \Phi_2(Z_i\beta, X_i\gamma, \rho)$$
(6)

$$S = 1, I = 1 \qquad Pr(S_i = 1, I_i = 1) = \Phi_2(Z_i\beta, X_i\gamma, \rho)$$
(7)

where $\Phi(\cdot)$ is the cumulative bivariate normal distribution and $\Phi_2(\cdot)$ is the standard cumulative normal.

The model can be estimated by fitting maximum-likelihood probit models with sample selection. The correlation between the two residuals in the selection and outcome (informality) equations in the MLE estimation is not directly estimated. Instead, the inverse of the hyperbolic tangent is estimated as follows:

$$\operatorname{atanh} \rho = \frac{1}{2} \ln \left(\frac{1+\rho}{1-\rho} \right) \tag{8}$$

Conditions of the Heckman double probit model require at least one variable to be included in Z_i that does not also appear in X_i . Identification restrictions are required to achieve efficiency, and therefore we need a variable that we think affects selection into the sector, but not the informality choice. However, few candidates usually exist for the inclusion of additional variables in Z_i .

To decompose the predicted changes in informality, we use the non-linear decomposition technique proposed by Gomulka and Stern (1990) and Even and Macpherson (1993) for binary outcomes, in which counterfactual conditional expectations are computed and averaged across observations. The decomposition is expressed in terms of probabilities. Specifically, the univariate (marginal) predicted probability of success (I = 1) is estimated as the sum of probabilities in Eqs. (6) and (7) as follows:

$$\Pr(I_i = 1) = \Phi(X_i \gamma) \tag{9}$$

Using the second-stage probit coefficients, the average predicted probabilities of informality for an individual in group j (j = m, f), male or female, and time t (t = 0,1) is expressed as:

$$P(X_{jt}, \hat{\gamma}_{jt}) = (1/n_{jt}) \sum_{i=1}^{n_{jt}} \Phi(X_{ijt} \hat{\gamma}_{jt})$$
(10)

and the predicted change in informality rates between two periods (0 and 1) is then expressed as:

$$\Delta IGAP = \bar{I}_{j1} - \bar{I}_{j0} = P(X_{j1}, \hat{\gamma}_{j1}) - P(X_{j0}, \hat{\gamma}_{j0})$$
(11)

Using the baseline structure for period 0 as the reference, we can decompose a change in the predicted informality rates into explained and unexplained portions of the gap as follows:

$$EXP_{j\Delta_t} = [P(X_{j1}, \hat{\gamma}_{j0}) - P(X_{j0}, \hat{\gamma}_{j0})]$$
(12)

$$UNEXP_{j\Delta_{t}} = [P(X_{j0}, \hat{\gamma}_{j1}) - P(X_{j0}, \hat{\gamma}_{j0})]$$
(13)

where the change in endowments explains the difference in informality rates between the two periods in the explained component, attributed to the change in characteristics over time for a single group, whilst the unexplained component is caused by the change in the underlying structures determining informality between the two periods.¹²

Given that the explained component is a sum over the individual contributions, the contribution to the explained component (Eqn. 12) made by the r^{th} regressor is equal to:

$$EXP_{jr\Delta_{t}} = \left[P(X_{j1}, \hat{\gamma}_{j0}) - P(X_{j0}, \hat{\gamma}_{j0})\right] \left[\frac{(\overline{X}_{jr1} - \overline{X}_{jr0})\hat{\gamma}_{jr0}}{(\overline{X}_{j1} - \overline{X}_{j0})\hat{\gamma}_{j0}}\right]$$
(14)

where the weighted contributions of the r^{th} individual predictor is determined by the group difference in means and evaluated by using coefficient estimates from the Heckman probit model. Note that Jones (1983, p. 130) demonstrated that the unexplained portion of the gap "cannot be uniquely determined because the value for the difference in intercepts depends on measurement decisions." That is, the decomposition arbitrarily depends on the choice of the omitted group and the elements of the detailed decomposition must rely upon arbitrary normalisations (Fortin et al. 2010, pp. 40–42). Therefore, we do not attempt to estimate the separate contributions made by individual characteristics to the unexplained change in informality rates.

¹² The decomposition cannot be computed by plugging in the estimated $\hat{\gamma}$ and the mean values of *X*, as in the standard Oaxaca-Blinder technique. Counterfactual conditional expectations must instead be computed and averaged across observations. See Fairlie (2005) and Jann (2008) for the detailed discussion of the decomposition method for nonlinear response models.

DATA

The KLFS is a longitudinal (rotating) household-based survey conducted quarterly with a sample size of 21,000 households, 75% of which is held over for the next wave, with the rest dropped and replaced by new households. In 2011, however, every household in the sample was replaced by a new set of households. The present study draws its sample from the fourth quarter of the 2006, 2009 and 2011 KLFS.

The survey collects data on a national sample of households, randomly selected from a register of dwellings based on the territorial division of the housing register to ensure that each household has an equal probability of being selected. The compilation of the housing register was part of the 1999 and 2009 National Population Surveys. The first wave was conducted in 2001 by the Kazakhstan Agency on Statistics (KAS), but information on labour market tenure was first collected in the 2006 wave of the survey.

The labour market questionnaire, answered by all individuals in the household over the age of 15, provides information on the labour related characteristics (e.g. informal employment, social security coverage and trade union affiliations) and work related characteristics (e.g. industry, occupation and status in employment). In accordance with the ILO, the respondent is considered employed if he/she worked for at least one hour in the past seven days and received some form of monetary payment or payment in kind. Interviews were conducted in all 14 regions of the country, including the capital city, Astana, and the financial capital, Almaty.

The data contains no information on a person's wage rate or income, a major weakness inherent in the survey. Occupations are grouped by the degree of similarity in their constituent tasks and duties. We use the classification of occupations, reproduced from the International Classification of Occupation (ILO, 1990), to create a control variable for occupations that require a high level of job-related skills (*Professional*), as informal sector earnings are not uniformly lower.

To focus on working age adults, we have restricted our sample to working people by excluding students, children under 16 years of age, pensioners and the unemployed. We also exclude other groups of self-employed workers: unpaid family members, subsistence farmers and members of worker co-operatives. The definition of informality relies on the enterprise-based criterion that considers own-account enterprises informal if they failed to register. We also exclude own-account and paid workers engaged in agricultural activities. In the selection equation, paid workers and employers form the reference category (salaried workers).

Estimates that rely on a functional form for identification are usually unstable and stronger identification restrictions are required to achieve efficiency. Therefore, we use previous self-employment experience as an exclusion restriction to identify the model. We argue that this variable affects the self-employment choice but is not related to the probability of informality. In Appendix Tables A.1 and A.2, we describe the main variables derived from the survey and report the descriptive statistics for the variables used in our empirical analysis.

EMPIRICAL RESULTS

Selection estimates

In the first step of our analysis we measure the probability of sector choice (self-employment or salaried work) against the selected independent variables. The base outcome offers greater job security than self-employed work because of the regulating provisions and additional benefits. Table 5 reports the estimates. We find that education is negatively associated with self-employment propensity in every year for both women and men. Several explanations may account for this phenomenon. Education may correlate with tastes for leisure and subsequently favour under-employment (e.g. government work). It could also lower the search costs for formal employment, relative to those for self-employment opportunities, by satisfying job requirements. Another possible reason for the negative effect of education on self-employment is that education may correlate positively with risk aversion. Finally, this result could be explained by the employers setting strong criteria for applicants who apply for salaried work.

We also find that individuals with previous self-employment experience (attempted to start a business) have a higher tendency to choose the self-employed sector. Spatial variations in self-employment propensities suggest that such propensities are negative in urban areas (for men) and locations with higher-than-average levels of income (e.g. Almaty and Astana). These findings may be explained by the housing bubble, which had over-stimulated the economy in urban locations and, in turn, led rural-urban migrants to anticipate more permanent paid employment than was actually available. It is also plausible to assume that inputs (e.g. rent) are more expensive in urban locations, as asserted by Parker (2004, pp. 99-102). The estimated effect of the exclusion restriction (*Experience*) is positive and significant.

Noticeable differences exist in the probability of entering self-employment for ethnic minorities. Compared to other women, the European and Kazakh women are much more likely to enter salaried employment than are other minorities, largely Uzbek and other central Asians. This finding may relate to customs and religious beliefs ('pull' factors). The higher propensity to be self-employed for ethnic minorities may be also attributed to institutional factors and discrimination in the paid employment sector ('push' factors).

	<u> </u>		±			<u> </u>
		Men			Women	
Variable	2006	2009	2011	2006	2009	2011
Age	-0.003 ^c	0.001	-0.0004	-0.004 ^b	0.006 ^a	-0.002
	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.002)
Children	-0.023	0.031	0.051	-0.033	0.109^{b}	0.129 ^b
	(0.046)	(0.038)	(0.036)	(0.051)	(0.041)	(0.040)
Education	-0.083 ^a	-0.077 ^a	-0.111 ^a	-0.108 ^a	-0.060 ^a	-0.110 ^a
	(0.010)	(0.008)	(0.008)	(0.010)	(0.009)	(0.009)
Married	-0.028	0.017	-0.075 ^b	0.057	0.024	-0.079 ^b
	(0.045)	(0.039)	(0.038)	(0.038)	(0.034)	(0.035)
Kazakh	-0.366 ^a	-0.302 ^a	-0.426 ^a	-0.150 ^b	-0.206 ^a	-0.385 ^a
	(0.056)	(0.053)	(0.046)	(0.063)	(0.060)	(0.057)
European	-0.589 ^a	-0.524 ^a	-0.657 ^a	-0.393 ^a	-0.403 ^a	-0.671 ^a
	(0.058)	(0.055)	(0.051)	(0.065)	(0.061)	(0.060)
Tenure	-0.095 ^a	-0.077 ^a	-0.054 ^a	-0.142 ^a	-0.150 ^a	-0.118 ^a
	(0.014)	(0.013)	(0.013)	(0.014)	(0.013)	(0.014)
Hours	-0.027 ^a	-0.009 ^b	-0.013 ^a	-0.024 ^a	-0.018 ^a	-0.016 ^a
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Professional	-0.711 ^a	- 0.560 ^a	-0.611 ^a	- 0.878 ^a	-0.979 ^a	-0.825 ^a
	(0.091)	(0.068)	(0.066)	(0.077)	(0.066)	(0.063)
Urban	-0.182 ^a	-0.121 ^a	-0.131 ^a	-0.001	-0.031	-0.102 ^b
	(0.038)	(0.033)	(0.032)	(0.039)	(0.035)	(0.035)
Almaty/Astana	-0.476 ^a	- 0.546 ^a	-0.472^a	-0.349 ^a	-0.631 ^a	-0.459 ^a
	(0.067)	(0.059)	(0.055)	(0.070)	(0.068)	(0.067)
Experience	1.544^a	1.439^a	1.491 ^a	1.590^a	1.597 ^a	1.671 ^a
	(0.047)	(0.046)	(0.048)	(0.051)	(0.052)	(0.052)
Constant	1.943 ^a	0.852^{a}	1.689 ^a	1.970 ^a	1.004 ^a	1.913 ^a
	(0.172)	(0.172)	(0.165)	(0.179)	(0.178)	(0.190)
N (total)	10527	11827	11608	10600	11437	11719

Table 5. Selection equation estimation results. Dependent variable = Self-employed

Notes: Unweighted regressions. Robust standard errors are in parentheses.

Significance levels: ^c p<0.05, ^b p<0.01, ^a p<0.001.

How do these results compare to previous empirical studies of Kazakhstan and other countries? Verme (2001), using the 1996 Kazakhstan Living Standards Measurement Survey, reports that household characteristics and differences in locality explain women's participation in self-employment. Aidis et al. (2007) analysed survey data from the Ukraine collected in the summer of 2002. The authors conclude that gendered norms and values (e.g. the resurgence of patriarchy), as well as institutional deficiencies, restrict women's self-employment opportunities. Also, non-pecuniary motivation such as flexibility (Burke et al. 2002), educational choices (Leoni and Falk, 2008), differences in human capital and labour market experience (Georgellis et al. 2005) often explain the determinants of women's self-employment decision.

Informality estimates

Table 6 displays the estimated informality (outcome) equations. The determinants of selfemployment largely overlap with causes of informality. For both men and women, informality probabilities decrease with education, partly because of the high opportunity cost of being informal. The effect of European ethnicity is negative and significant in 2009 and 2011. It is also possible that Europeans possess better skills not captured by the available variables. The recession also appears to have increased the non-European minority group's informality propensities, from which they have yet to recover. Individuals in professional occupations are more likely to register and, similar to the findings for Mexico reported in Perry et al. (2007, Figure 5.7), informality declines with time in business, suggesting that it is more efficient to reduce costs of registration and compliance for new entrants. The negative and significant effects in Astana and Almaty disappeared after the crisis struck in 2008. Thus, some individuals find it difficult to comply in such an environment and significant selectivity coefficient (*Rho*) suggests positive sorting into self-employment and indicates that it was necessary to correct for the selection bias problem.

			M	en		Women						
		Heckman			Probit			Heckman			Probit	
Variable	2006	2009	2011	2006	2009	2011	2006	2009	2011	2006	2009	2011
Age	-0.009 ^b	0.006 ^b	-0.005 ^b	-0.009 ^b	0.006 ^c	-0.007 ^b	-0.001	0.007 ^b	0.0003	-0.001	0.003	-0.002
-	(0.003)	(0.003)	(0.002)	(0.004)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Children	0.006	0.082	0.107 ^c	-0.008	0.037	0.117 ^c	-0.029	0.085	0.083	-0.014	0.012	0.071
	(0.086)	(0.061)	(0.057)	(0.090)	(0.072)	(0.065)	(0.092)	(0.059)	(0.058)	(0.097)	(0.076)	(0.074)
Education	-0.105 ^a	-0.110 ^a	-0.130 ^a	-0.096 ^a	-0.102 ^a	-0.097 ^a	-0.083 ^a	-0.059 ^a	-0.095 ^a	-0.068 ^a	-0.043 ^b	-0.057 ^b
	(0.019)	(0.014)	(0.014)	(0.020)	(0.016)	(0.016)	(0.019)	(0.013)	(0.014)	(0.020)	(0.016)	(0.018)
Married	-0.019	-0.068	-0.030	-0.029	-0.055	-0.027	-0.021	0.117 ^b	-0.062	-0.026	0.146^b	-0.059
	(0.085)	(0.064)	(0.060)	(0.087)	(0.077)	(0.070)	(0.070)	(0.051)	(0.053)	(0.073)	(0.066)	(0.066)
Kazakh	0.091	-0.126	-0.229 ^a	0.177^c	0.122	-0.023	-0.047	-0.244 ^b	-0.181 ^b	-0.022	-0.107	0.053
	(0.096)	(0.079)	(0.069)	(0.097)	(0.091)	(0.076)	(0.108)	(0.083)	(0.080)	(0.113)	(0.105)	(0.097)
European	-0.152	-0.388 ^a	-0.536 ^a	-0.099	-0.188 ^c	-0.339 ^a	-0.187	-0.494 ^a	-0.421 ^a	-0.177	-0.362 ^b	-0.248 ^b
	(0.104)	(0.087)	(0.079)	(0.106)	(0.100)	(0.089)	(0.114)	(0.088)	(0.089)	(0.119)	(0.111)	(0.108)
Tenure	-0.153 ^a	-0.122 ^a	-0.053 ^b	-0.149 ^a	-0.117 ^a	-0.033	-0.183 ^a	-0.238 ^a	-0.114 ^a	-0.169 ^a	-0.231 ^a	-0.087 ^a
	(0.026)	(0.020)	(0.019)	(0.026)	(0.024)	(0.022)	(0.026)	(0.020)	(0.020)	(0.027)	(0.025)	(0.025)
Hours	-0.026 ^a	-0.009 ^b	-0.013 ^a	-0.021 ^a	-0.007	-0.011 ^b	-0.027 ^a	-0.013 ^a	-0.018 ^a	-0.023^{a}	-0.006	-0.013 ^b
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.005)
Professional	-0.457 ^b	-0.424 ^b	-0.659 ^a	-0.225	-0.251	-0.525 ^b	-0.114	-0.805 ^a	-0.610 ^a	0.292	-0.267	-0.177
	(0.215)	(0.159)	(0.166)	(0.221)	(0.191)	(0.189)	(0.182)	(0.124)	(0.142)	(0.184)	(0.178)	(0.164)
Urban	0.175 ^b	0.046	0.115 ^b	0.238 ^a	0.169 ^b	0.212^a	0.330 ^a	0.007	0.065	0.371^a	0.079	0.218^{a}
	(0.069)	(0.055)	(0.051)	(0.070)	(0.064)	(0.058)	(0.071)	(0.052)	(0.055)	(0.073)	(0.066)	(0.066)
Almaty/Astana	-0.500^{a}	-0.061	-0.213 ^c	-0.328 ^b	0.166	-0.127	-0.563^{a}	-0.185	-0.531^{a}	-0.443 ^b	0.098	-0.241
	(0.151)	(0.110)	(0.111)	(0.156)	(0.133)	(0.129)	(0.160)	(0.131)	(0.121)	(0.167)	(0.161)	(0.159)
Constant	2.574 ^a	0.932^{a}	1.703 ^a	2.609^a	1.384 ^a	1.812^a	2.076^a	0.799 ^a	1.238 ^a	2.096^a	1.269^a	1.270^{a}
	(0.279)	(0.240)	(0.231)	(0.285)	(0.271)	(0.262)	(0.274)	(0.227)	(0.245)	(0.282)	(0.281)	(0.295)
Rho	0.376^{a}	0.961 ^a	0.862^a				0.426^{a}	1.267 ^a	1.206^a			
2	(0.065)	(0.098)	(0.093)				(0.070)	(0.175)	(0.153)			
Pseudo R ²				0.091	0.040	0.045				0.089	0.058	0.034
N	1647	1992	2300	1647	1992	2300	1566	1822	1716	1566	1822	1716

Table 6. Informality equation estimation results. Dependent variable = Informal

Notes: Unweighted regressions. Robust standard errors are in parentheses. Significance levels: ^c p<0.05, ^b p<0.01, ^a p<0.001.

Comparing the "uncorrected" regression results with the Heckman estimates, we find that the probit regression coefficients are different in statistical significance (Kazakh and *Professional*) and lower in magnitudes. The coefficients presented in Table 6, however, are not easily interpreted in regard to the effect of recession, and thus it is useful to examine the change in informality propensities over time (pre- and post-crisis). Table 7 reports the estimated marginal effects. We find that working fewer hours increases informality probabilities. This result may be explained by the relative cost of compliance for part-time workers, but the estimated marginal effect for the post-crisis period is lower for both women and men. That is, the marginal effect was shrunk by the forces of post-crisis adjustment. For men, we find that the presence of children under 5 years of age increases the probability of informality in the postcrisis period. The marginal effects associated with tenure have larger effects on informality propensities in 2006. Our finding on the effect of ethnicity is that the crisis aggravated tendencies toward operating informally among minority ethnic minority groups. European men (women) were 6.6 (5.8) percentage points more likely to be formal during the 2009. The self-employed women living in the two largest cities tend to comply, but the magnitude is dissimilar across time. That is, the negative marginal effect was 13.5 percentage points in 2006 and 2.1 percentage points in 2009. This result probably relates to the diminished relative attractiveness of formalisation in these two cities and variation in local government authorities' enforcement of mandated business regulations during the macro-economic crisis of 2008–09. Estimates of ageinformality profiles demonstrate an upward trend as age rises, suggesting that age effects on informality are stronger for older workers in the crisis period.¹³ Qualified professionals are more likely to be formal than non-professionals, although the marginal effect falls from 12 percentage points in 2006 to 6 percentage points in 2009 for men.¹⁴

¹³ We do not find a U-shaped relationship between informality and age. Estimates can be provided by the authors on request.

¹⁴ The university enrolment trend that has been recently observed might undermine the process of formalisation. Latest figures show decreased enrolment rates from 42.6% in 2006 to 31.1% in 2009, measured as a percentage of the 18-23 age cohort, and the total number of university students fell from 768.4 to 610.3 thousand over the same period (Source: Authors' calculations based on KAS *Kazakhstan in Figures* and *The Demographic Yearbook of Kazakhstan*, various issues).

Table 7. Warginar effects. Dependent variable – Informat												
			Μ	en					Wom	nen		
		Heckman			Probit			Heckman			Probit	
Variable	2006	2009	2011	2006	2009	2011	2006	2009	2011	2006	2009	2011
Age	-0.003 ^b	0.001 ^b	-0.001 ^b	-0.004 ^b	0.002^c	-0.003 ^b	-4×10^{-4}	0.001 ^b	4×10^{-5}	-3×10^{-4}	0.001	-0.001
	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.0003)	(0.0002)	(0.001)	(0.001)	(0.001)
Children	0.002	0.015	0.023 ^c	-0.003	0.015	0.046^c	-0.008	0.011	0.010	-0.006	0.005	0.028
	(0.027)	(0.012)	(0.013)	(0.036)	(0.029)	(0.026)	(0.026)	(0.008)	(0.008)	(0.038)	(0.030)	(0.029)
Education	-0.032 ^a	-0.020 ^a	-0.027 ^a	-0.038 ^a	-0.040 ^a	-0.038 ^a	-0.024 ^a	-0.007^{a}	-0.011 ^a	-0.027 ^a	-0.017 ^b	-0.022 ^b
	(0.006)	(0.003)	(0.003)	(0.008)	(0.006)	(0.006)	(0.006)	(0.002)	(0.002)	(0.008)	(0.006)	(0.007)
Married	-0.006	-0.013	-0.006	-0.012	-0.022	-0.011	-0.006	0.014^b	-0.007	-0.010	0.057^b	-0.023
	(0.026)	(0.012)	(0.013)	(0.035)	(0.030)	(0.028)	(0.020)	(0.006)	(0.006)	(0.029)	(0.026)	(0.026)
Kazakh	0.028	-0.023	-0.048 ^a	0.070^c	0.048	-0.009	-0.014	-0.031 ^b	-0.022 ^b	-0.009	-0.042	0.020
	(0.030)	(0.014)	(0.015)	(0.039)	(0.035)	(0.030)	(0.031)	(0.011)	(0.010)	(0.045)	(0.041)	(0.038)
European	-0.047	-0.066 ^a	-0.098 ^a	-0.040	-0.073 ^c	-0.132 ^a	-0.053 ^c	- 0.058 ^a	-0.045 ^a	-0.071	-0.140 ^a	-0.095 ^b
	(0.031)	(0.014)	(0.014)	(0.042)	(0.038)	(0.034)	(0.032)	(0.011)	(0.009)	(0.047)	(0.042)	(0.041)
Tenure	-0.047 ^a	-0.022 ^a	-0.011 ^b	-0.059 ^a	-0.046 ^a	-0.013	-0.052 ^a	-0.030 ^a	-0.014 ^a	-0.067 ^a	-0.090 ^a	-0.034 ^a
	(0.008)	(0.004)	(0.004)	(0.010)	(0.009)	(0.009)	(0.008)	(0.005)	(0.003)	(0.011)	(0.009)	(0.010)
Hours	-0.008 ^a	-0.002 ^b	-0.003 ^b	-0.008 ^a	-0.003	-0.004 ^b	-0.008 ^a	-0.002 ^a	-0.002 ^a	-0.009 ^a	-0.002	-0.005 ^b
	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.001)	(0.0007)	(0.001)	(0.001)	(0.002)	(0.002)
Professional	-0.123 ^b	-0.063 ^a	-0.100 ^a	-0.089	-0.096	-0.194 ^b	-0.032	-0.074 ^a	-0.059 ^a	0.115	-0.102	-0.068
	(0.047)	(0.018)	(0.018)	(0.086)	(0.070)	(0.062)	(0.048)	(0.009)	(0.009)	(0.071)	(0.065)	(0.061)
Urban	0.054 ^b	0.008	0.024^b	0.095 ^a	0.066 ^b	0.084 ^a	$0.092^{\rm a}$	0.001	0.008	0.147 ^a	0.031	0.085 ^a
	(0.022)	(0.010)	(0.011)	(0.028)	(0.025)	(0.023)	(0.022)	(0.006)	(0.007)	(0.029)	(0.026)	(0.026)
Almaty/Astana	-0.135 ^a	-0.011	-0.040 ^b	-0.129 ^b	0.066	-0.050	-0.135 ^a	-0.021 ^c	-0.047 ^a	-0.171 ^b	0.039	-0.091
	(0.033)	(0.019)	(0.019)	(0.060)	(0.053)	(0.050)	(0.031)	(0.012)	(0.010)	(0.061)	(0.064)	(0.058)
Ν	1647	1992	2300	1647	1992	2300	1566	1822	1716	1566	1822	1716

Table 7. Marginal effects. Dependent variable = Informal

Notes: Marginal effects (at mean) were computed in Stata using the "margeff" command (Bartus, 2005). Robust standard errors are in parentheses. Significance levels: $^{\circ}$ p<0.05, b p<0.01.

Decomposition estimates

Table 8 reports decomposition results of the change in the probability of informality before and after the crisis for each gender group. The estimates reveal a sharp decrease in the probability of informality, especially for women. We find that the gap in mean informality probabilities in the pre- and post-crisis periods decreases from 36 (33) percentage points to 20 (13) percentage points for men (women) between the two periods. Differences in characteristics explain roughly 25% (24%) of the change for men (women), whilst the unexplained decline accounts for a significant portion of the observed change between the two periods.

Table 8. De	ecomposition of	informality diffe	erences across gene	der: 2006 and 2011			
	M	en		Women			
	2006	2011	2006	2011			
Predicted	0.355	0.199	0.332	0.132			
probability	(0.040)	(0.024)	(0.039)	(0.019)			
[Pr(I =1)]							
Difference	-0.1	156		-0.200			
$[\Delta IGAP]$	(100)%)		(100%)			
Due to	-0.()39		-0.048			
characteristics	(-25	5%)	(-24%)				
$[EXP_{j\Delta t}]$							
]	Explained by				
			$[EXP_{jr\Delta t}]$	_			
Age	-0.0	010		5×10^{-5}			
Children	0.00	001		-0.0010			
Education	-0.0	066		-0.0109			
Married	0.00	001		0.0002			
Kazakh	0.00)15		-0.0009			
European	0.00)36		0.0054			
Tenure	-0.0	184		-0.0168			
Hours	-0.0	133		-0.0156			
Professional	-0.0	010		-0.0005			
Urban	-0.0	027		-0.0089			
Almaty/Astana	-0.0	013		0.0009			

Notes: Probabilities evaluated at the mean value of variables. The estimated standard errors of the predictions, based on Stata's delta method command, are in parentheses (row 1). The explained part of the predicted change in informality rates between 2006 (period 0, pre-crisis) and 2011 (period 1, post-crisis) is attributed to the change in informality that occurs only if the composition value (ΔX) changes from period 0 to period 1.

Generally, our analysis of individual contributions indicates that a relatively high share of the explained change results largely from an increase in working hours and duration in selfemployment (survival) after the crisis. The contribution made by education in the explained component of the decline is more pronounced for women.

Next, we discuss the decomposition analysis of the change in informality rates amongst ethnic groups. The decomposition analysis reported in Table 9 shows that while the predicted probabilities of being informal declined for Kazakhs and Europeans over the period, they have risen for members of other self-employed ethnic groups. For females from the Kazakh and European groups, the most important contributions to the explained decline can be attributed to changes in work hours, duration in self-employment, urban location and educational qualifications. The contribution made by education to the explained part was less important for men (except Europeans). The increasing number of small children in households contributed to a reduction in informality for women from minority ethnic groups. An increase in the share of self-employed minority ethnic women working in urban locations contributes to informality growth, suggesting that secondary cities have not been conducive to formalisation. However, it should be noted that the probability difference increased from 0.149 in 2006 to 0.168 – that is, by only 13 percentage points. Further, given their relatively small numbers, decomposition analyses for self-employed minority workers should be treated with caution.

Table 9. Decomposition of informativy differences across gender and ethnic groups. 2000 and 2011												
		Kaz	<u>akh</u>			Euro	pean		<u>Minority</u>			
	Μ	len	Wo	men	Μ	en	Women		Μ	len	Wo	men
	2006	2011	2006	2011	2006	2011	2006	2011	2006	2011	2006	2011
Predicted probability	0.385	0.224	0.404	0.133	0.357	0.100	0.299	0.094	0.195	0.311	0.149	0.168
[Pr(I =1)]	(0.055)	(0.033)	(0.059)	(0.024)	(0.064)	(0.033)	(0.055)	(0.031)	(0.062)	(0.068)	(0.052)	(0.040)
Difference	-0.	161	-0.	271	-0.2	257	-0.205		0.116		0.019	
$[\Delta IGAP]$	(10	0%)	(10	0%)	(10	0%)	(10	0%)	(10	0%)	(10	0%)
Due to	-0.	039	-0.	048	-0.	075	-0.	064	-0.	015	-0.044	
characteristics	(-24.2%)		(-17.7%)		(-29.2%)		(-31.2%)		(-12.9%)		(-232%)	
$[EXP_{j\Delta t}]$												
		Explained by										
						[EX]	$P_{jr\Delta t}$]					
Age	-0.0	046	0.0	003	-0.0	002	-0.0	003	-0.0001		-0.0077	
Children	0.0	004	0.0	027	0.0	036	-0.0	026	-0.0	0048	-0.0	249
Education	-0.0)055	-0.()147	-0.0	175	-0.0	145	0.0	059	0.0	030
Married	-0.0	0007	-0.0	0002	0.0	009	0.0	024	$3 \times$	10^{-5}	-0.0	034
Tenure	-0.0)091	-0.0)104	-0.0	333	-0.0	176	-0.()162	-0.0	275
Hours	-0.0)157	-0.()180	-0.0	211	-0.0	123	-0.0)019	-0.0	245
Professional	-0.0)006	-0.0)003	-0.0	011	0.0	002				
Urban	-0.0	0031	-0.0)056	-0.0	-0.0009		-0.0202		0.0029		397
Almaty/Astana	$1 \times$	10 ⁻⁵	-0.0	0018	-0.0053		0.0010		-0.0007		0.0	014

 Table 9. Decomposition of informality differences across gender and ethnic groups: 2006 and 2011

Notes: Probabilities evaluated at the mean value of variables. The estimated standard errors of the predictions, based on Stata's delta method command, are in parentheses (row 1). The explained part of the predicted change in informality rates between 2006 (period 0, pre-crisis) and 2011 (period 1, post-crisis) is attributed to the change in informality that occurs only if the composition value (ΔX) changes from period 0 to period. To obtain the coefficients for each ethnic group, we estimated Eq. (1) using the Heckman model. 'Professional' variable was excluded because it predicts failure perfectly. Full regression results across ethnic groups are available on request.

CONCLUSION

This paper analysed the determinants of entry into informal self-employment in the Kazakh labour market. The results offer an additional piece of evidence of gender differences in informality propensities in a transitional setting. Overall, our empirical findings indicate that work hours and years in current business affect the propensity to informal self-employment. Moreover, the probability of informality also diminishes with education. Those independent workers representing minority ethnicity groups have a greater tendency to operate informally.

The decomposition reveals that the unexplained component explains much of the decline in informality. We assert that the large unexplained decline can result from changes in the shape of structural effects such as changes in taxation that make one sector relatively more attractive than the other, employers' hiring and firing behaviour, changes in labour regulation and a change in preferences (taste) for the informal sector. Another possible explanation for this finding is that the government introduced post-crisis reforms designed to ease the administrative burden on business. For example, the government reduced the number of licensed activities and eased registration procedures in the late 2000s (OECD, 2012).

In general, the analysis suggests that reducing informality may require coordinating policies rather than pursuing a few narrow, ostensibly distinct, policies. For example, we believe that the government's policy of increasing the size of the SME sector should comprise policy instruments that tackle informality among the self-employed. The finding that human capital makes a key contribution to explaining of the change in informality suggests that the government should target informality through skills training and education. These policy instruments are especially important if, in an economic slowdown, the ratio of educational cost to income increases so much for some groups that it may discourage low-income women in particular from attending college or university, or low-skilled workers from acquiring training that may later increase their probability of self-employment and informality.

	Specification							
Panel A. Depend	ent							
Self-employed	0 = paid employment; 1 = own-account (independent) self-employment.							
Informal	1 = unregistered entrepreneurship/unlicensed economic activity,							
	formalising the registration, or the respondent does not know.							
	0 = registered entrepreneurship or licensed economic activity (formal).							
Panel B. Expland	itory							
Age	Age (years).							
Children	Number of children in the household below the age of 5.							
Education	4 = less than secondary, $8 = $ incomplete secondary, $10 = $ complete							
	secondary or vocational, $12 =$ technical or incomplete higher, $15 =$ higher							
	or postgraduate.							
Married	1 = Married.							
Kazakh	1 = Kazakh.							
European	1 = Russian, German, Ukrainian or Belarusian.							
Tenure	Years in current business/Tenure in current employment. $1 = less$ than 6							
	months, $2 = 6-12$ months, $3 = 1-3$ years, $4 = 3-5$ years, $5 =$ more than 5							
	years.							
Hours	Usual work hours (per week) in the main job.							
Professional	1 =Architects, Chemists, Computer Specialists, Dentists, Doctors,							
	Engineers, Lawyers, Managers, Mathematicians, Physicists, Public							
	Officials, Pharmacists, School Teachers, Scientists, Statisticians, College or							
	University Lecturers.							
Urban	1 = Urban location except Almaty and Astana.							
Almaty/Astana	1 = Almaty or Astana.							
Panel C. Identif	ying							
Experience	1 = previous experience of attempting to start own business.							

Appendix Table A.1. Definitions of variables

Appendix Table A.2. Summary statistics												
			M	en					Wo	men		
		Formal			Informal		Formal			Informal		
	2006	2009	2011	2006	2009	2011	2006	2009	2011	2006	2009	2011
Age	40.12	39.21	39.41	36.44	39.17	37.57	39.30	40.11	38.84	37.30	39.14	37.49
	(11.16)	(11.05)	(11.48)	(10.94)	(11.43)	(11.57)	(10.48)	(10.39)	(11.14)	(11.03)	(10.84)	(11.56)
Children	0.184	0.226	0.226	0.183	0.240	0.271	0.143	0.202	0.227	0.158	0.230	0.268
	(0.388)	(0.418)	(0.419)	(0.387)	(0.427)	(0.445)	(0.351)	(0.401)	(0.419)	(0.365)	(0.421)	(0.443)
Education	11.58	11.60	11.69	10.87	10.97	11.06	11.54	11.82	11.85	11.10	11.46	11.46
	(1.926)	(1.977)	(1.955)	(1.655)	(1.802)	(1.683)	(1.87)	(1.99)	(1.91)	(1.78)	(1.91)	(1.84)
Married	0.760	0.718	0.701	0.638	0.693	0.662	0.657	0.622	0.617	0.616	0.675	0.594
	(0.428)	(0.450)	(0.458)	(0.481)	(0.462)	(0.473)	(0.475)	(0.485)	(0.486)	(0.487)	(0.469)	(0.491)
Kazakh	0.510	0.554	0.579	0.618	0.650	0.650	0.527	0.533	0.577	0.591	0.616	0.661
	(0.500)	(0.497)	(0.494)	(0.486)	(0.477)	(0.477)	(0.500)	(0.500)	(0.494)	(0.492)	(0.486)	(0.474)
European	0.332	0.323	0.273	0.256	0.229	0.170	0.368	0.386	0.299	0.313	0.272	0.207
	(0.471)	(0.468)	(0.446)	(0.437)	(0.421)	(0.376)	(0.482)	(0.487)	(0.458)	(0.464)	(0.445)	(0.405)
Tenure	3.63	3.67	3.74	3.05	3.35	3.62	3.54	3.69	3.60	2.92	3.06	3.34
	(1.21)	(1.20)	(1.28)	(1.34)	(1.36)	(1.32)	(1.22)	(1.23)	(1.32)	(1.37)	(1.34)	(1.35)
Hours	40.81	40.86	40.84	37.12	40.10	39.87	40.06	39.70	39.89	35.71	38.88	38.37
	(7.44)	(6.75)	(6.69)	(10.59)	(8.03)	(7.961)	(7.74)	(7.37)	(6.61)	(11.61)	(7.51)	(8.134
Professional	0.034	0.043	0.047	0.014	0.017	0.011	0.030	0.045	0.054	0.034	0.024	0.029
	(0.182)	(0.203)	(0.211)	(0.119)	(0.130)	(0.106)	(0.171)	(0.207)	(0.227)	(0.181)	(0.152)	(0.168)
Urban	0.515	0.472	0.476	0.571	0.472	0.524	0.536	0.547	0.509	0.684	0.535	0.569
	(0.500)	(0.499)	(0.500)	(0.495)	(0.500)	(0.500)	(0.499)	(0.498)	(0.500)	(0.465)	(0.499)	(0.496)
Almaty/Astana	0.092	0.070	0.091	0.028	0.054	0.039	0.091	0.047	0.069	0.023	0.043	0.031
	(0.289)	(0.255)	(0.287)	(0.164)	(0.226)	(0.194)	(0.287)	(0.212)	(0.254)	(0.151)	(0.202)	(0.172)
Experience	0.451	0.425	0.3905	0.257	0.131	0.131	0.444	0.431	0.460	0.234	0.100	0.098
	(0.498)	(0.495)	(0.391)	(0.437)	(0.337)	(0.337)	(0.497)	(0.495)	(0.498	(0.424)	(0.300)	(0.298)
Ν	815	1120	1247	832	872	1053	795	1022	995	771	800	721

Notes: Standard deviations are in parentheses. Data are unweighted.

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