Informal Competition in Kazakhstan

by

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Abstract

The size of the informal economy in Kazakhstan declined from 42.6% in 1999 to 33.8% in 2015. The informal economy can make an important contribution to solving the problem of fiscal deficit without forgoing economic growth and employment. In my thesis, I am evaluating the effect of competition stemming from informal firms on the of formal enterprises. I conduct fixed and changing structure analysis to understand the underlying factors behind the decline in the informal sector competition in Kazakhstan. In my research I use European Bank for Reconstruction and Development's Business Environment and Enterprise Performance (BEEPs) 2008-2009 and 2012-2013 surveys. This is the period that covers financial crisis and enables the study of the structure of the informal competition faced by registered firms at the micro level. The present study utilises firm-specific variables, industry specific variables and business environment. For corruption and taxes I use industry averages to address the issue of endogeneity. My findings suggest that more than 90% of the decline in the informal competition can be attributed to the socio-economic changes. Focusing on the observed heterogeneity the main contributors to the decline in the rate of the informal competition are due to an educated workforce, access to finance, losses due to theft, transportation as an obstacle to current operations and the services sector. The changes in firm size, taxes and labour regulations have kept competition from decreasing even further.

Keywords: Informal Economy, Competition Against Informal Firms, Kazakhstan.

JEL Classification: E26, O17, P29

Contents

1 Introduction

In developing countries, informality accounts for between a third and a half of all economic activity (La Porta and Shleifer, 2008). Competitors' practices from the informal sector is the number one obstacle in the business environment in Kazakhstan (EBRD BEEPS V Survey, 2013), though the proportion of firms competing against unregistered firms in the country has decreased by 2.2 percentage points in between years 2009 and 2013 to 32.9%. The firms experiencing competition with unregistered entities constitutes 28.1% and 32.2% in 2009 and 2013 of the labour force, respectively (EBRD BEEPs). Recovery of the economy and commodity prices have contributed to the decline in informal competition rate in Kazakhstan since 2009.

In the literature, there is no consensus on the definition of the informal economy. According to the International Labour Organisation the informal economy refers to "all economic activities by workers and economic units that are – in law or in practice – not covered or insufficiently covered by formal arrangements. Their activities are not included in the law, which means that they are operating outside the formal reach of the law; or they are not covered in practice, which means that – although they are operating within the formal reach of the law, the law is not applied or not enforced; or the law discourages compliance because it is inappropriate, burdensome, or imposes excessive costs".[1] The informal economy is also known as 'undeclared', 'grey', 'underground', 'hidden' or 'shadow' economy. The most important and often cited causes of the informal economy are: taxes (direct and indirect) and social security burden (De Soto, 1989; Dreher et al, 2005; Johnson et al., 2000; Lacko, 2000; Friedman et al, 2000), labour market regulations (Lacko, 2000), the quality of public goods and services, and corruption (Buehn and Schneider, 2012; Dreher and

[1] ILO: Conclusions concerning decent work and the informal economy, International Labour Conference, 90th Session (Geneva, 2002).

Schneider, 2006; Friedman et al, 2000), and high level of bureaucracy and the state of the formal economy (Schneider et al.,2010; Schneider and Enste, 2000).

According to La Porta and Shleifer (2008) there are three main views of the role of the informal firms. First, the "romantic view" states that informal firms will eventually become the engine of the economic growth unless the government stops them. Second, the "parasite view" claims that the informal firms unfairly compete with formal enterprises and undermine economic growth. Third, the "dual view", according to which the informal firms are highly inefficient, do not contribute to economic growth and do not impose any threat to formal entities. The informal firms use lower quality inputs, hire more than formal entities labour and have lesser access to finance and public goods (La Porta and Shleifer, 2008). The BEEPs data on Kazakhstan supports the dual point of view, since only 1.5% of firms have started as informal and became formal afterwards. The dualistic model of economic development prevailed in the 1960s took its lead from Lewis (1959). In his model, while the formal economy symbolizes progress, industrialisation, modernity and advancement, the informal economy was portrayed as backward, pre-industrial, under-developed and traditional. After a decade, the International Labour Organisation (ILO) report on Kenya (1972) and Hart (1973) refined the perceived status of the "informal sector" to an important source of employment and income, noting that the informal sector provides goods and services that would not be otherwise available and affordable to most people. The concept of self-employed individuals being informal workers initially emerged in the third world countries in an effort to recognise the massive number of informal street vendors, micro-entrepreneurs, and petty traders (ILO, 1972 and Hart, 1973). OECD reports that the worldwide working population is approximately 3 billion of whom 1.8 billion are in the informal economy (Jutting and Laiglesia, 2009). [2] Nowadays, it is

[2] 1.7 billion are poor, who live on less than two dollars a day and depend entirely on their labour for survival.

widely accepted that the informal economy is sizeable and an expanding feature of the modern global economy (ILO, 2002; Schneider, 2008; Williams et al., 2014).

The focus of this paper is to evaluate the determinants of the informal competition on the formal enterprises. Using BEEPs datum, I analyse the determinants of the decline in the informal competition in Kazakhstan over time due to observable heterogeneity and structural change. In doing this, I specify a flexible model accounting for the documented determinants of the informal competition in the literature and use the firm-specific variables: age, size, access to finance, percent of educated workforce, losses due to theft; industry specific variables: corruption and taxes; and business environment: transportation and labour regulations. There are only limited number of studies assessing the relative roles of these variables on the informal competition in the context of Kazakhstan.

The paper proceeds as follows. Section 2 provides a description of the business environment in Kazakhstan and provides a literature review. Sections 3 and 4 discuss the data and methodology, respectively. Section 5 presents empirical results, and Section 6 concludes with policy recommendations.

2 Business Environment in Kazakhstan and Literature Review

The size of the informal sector in any country is a good indicator of the level of competition encountered by the formal firms (Gonzalez and Lamanna, 2007). Table 1 provides the size of the shadow economy in between years 1999 and 2015 in Kazakhstan. The average size of the shadow economy in Kazakhstan was 37.8% of GDP, below the average of 6 ex-USSR countries and well above the average in Central Asian region for the time period 1999-2007 (Schneider et al., 2010).

The size of the shadow economy was only 17% in late1980s, it then reached to its highest level in 1999 and has been declining since then as shown in Figure 1 and Table 1. There was only one upward jump by half a percentage point in 2008 due to the financial market crisis of 2008. Schneider and Williams (2013) discuss that the size of the shadow economy negatively correlates with economic cycles. The period of the 1990s in Kazakhstan can be described in terms of negative real GDP growth with a minimum of -12.6% in 1994. The size of the shadow economy in the 1990s provided in Table 1 is obtained using the electricity consumption approach. The pitfall of one input method is that a single parameter cannot capture the complexity of the shadow economy. Since the shadow economy is present in the production, labour, and money markets (Schneider, 2016), it may very well be the case that the size of the shadow economy in the 1990s was even higher.

Table 1: Share of the Shadow Economy

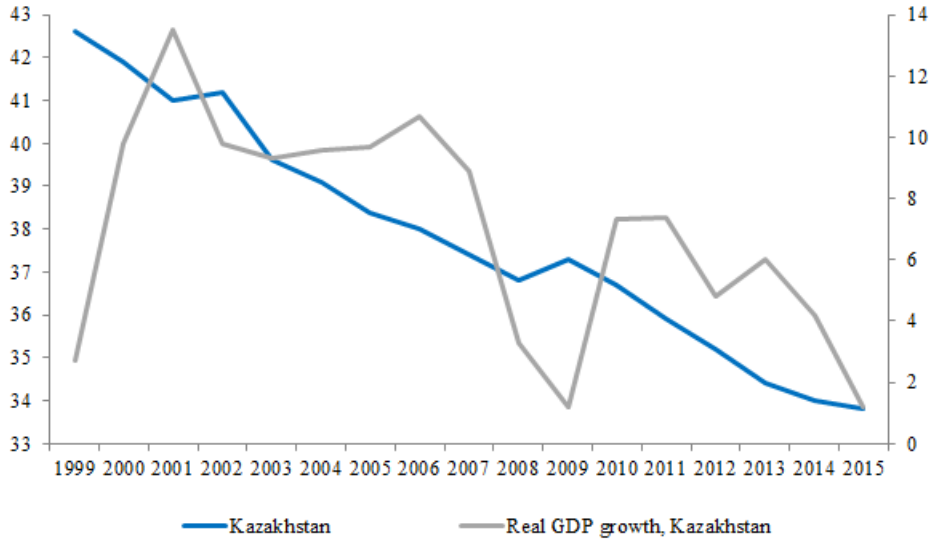
	Size of Shadow Economy						
	Average 1986-90		Average 1990-93		Average 1994-95		Average 1999-2015
	Johnson et al	Lacko	Johnson et al	Lacko	Johnson et al	Lacko	Schneider*
Kazakhstan	17%	13%	22.2%	29.8%	34.2%	38.2%	37.8%
ex-USSR**	16.7%	16.2%	25.7%	34.9%	35.3%	43.6%	40.65%***

Source: Schneider and Enste, 2000; Schneider, Buehn and Montenegro, 2010; Schneider, 2016
Schneider and Enste's calculations using values from Johnson, Kaufman, and Schleifer (1997, Table 1, p182-183), and Johnson, Kaufman, and Zoido-Lobaton (1998, p351), Lacko (1999, Table 8, p55).
Household electricity consumption method is used in Johnson et al. and Lacko, Multiple Indicators Multiple Causes (MIMIC) method is used in Schneider et al.
* Authors' calculations based on data from Schneider (2016, page 17, Table 2).
** Former USSR, average for 12 countries: Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyz Republic, Latvia, Lithania, Moldavia, Russia, Ukraine, Uzbekistan.
***weighted by population average for 6 former USSR countries, including Kyrgys Republic, Tajikistan, Russian Federation, Ukraine, Kazakhstan, Armenia.

There was a substantial decrease in informal employment in between years 2011 and 2012.

This could be due to the end of the financial crisis in the country. Rudkowski (2011) shows that almost 70% of informal workers live in rural areas and 62% work in agriculture in Kazakhstan, although informality is also common in construction, transport, and trade sectors. The agricultural and rural informality is to a larger extent "natural"; therefore, it can hardly be formalised in Kazakhstan.

Figure 1: Share of the shadow economy and real GDP growth of Kazakhstan, 1999-2015

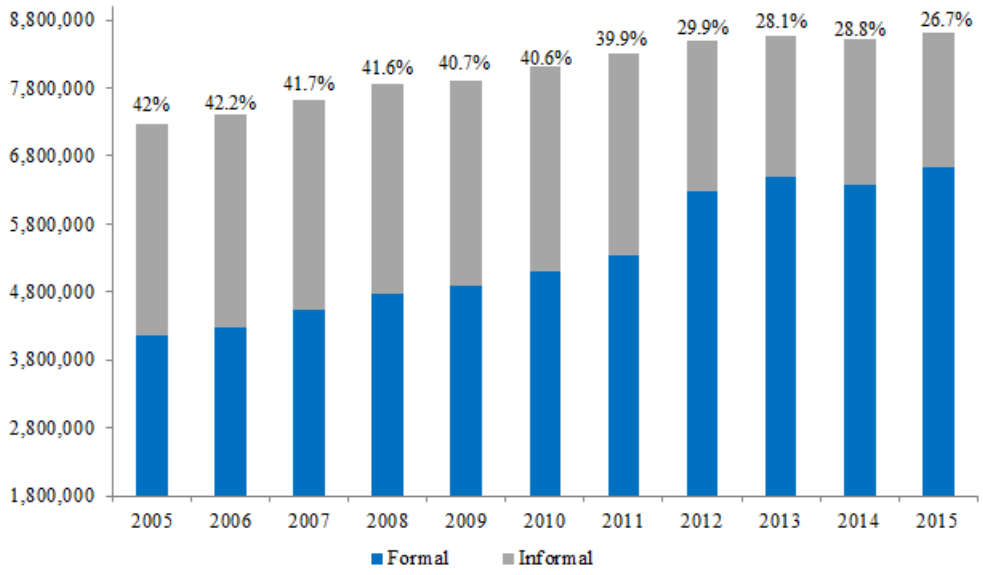


Source: Authors' calculations based on data from Schneider, 2016 (MIMIC method) and Statistical Committee, Republic of Kazakhstan.

Kazakhstan has a relatively favourable tax regime, and its ease of doing business index has improved substantially in the last ten years (World Bank, 2014). The question is then why informality is still high in Kazakhstan, a middle-income country, when informality is typically associated with low-income countries? According to Johnson et al.(1997), for the transitional countries, the main cause of informality is neither higher taxes nor extensive regulation, but the corruption, which actually drives firms to the shadow economy in the first place, and the weak rule of law. As for Kazakhstan the sizeable informal competition is due to low institutional quality and excessive reg-

ulations in financial markets (Abdih and Medina, 2013).

Figure 2: Formal and Informal Employment in Kazakhstan, 2005-2015



Source: Authors' calculations based on data from Committee of Statistics, Republic of Kazakhstan
In percent are the numbers for informal employment in Kazakhstan

Friedman et al. (2000) document that more regulation is associated with a larger informal economy using the data for 69 countries, and more importantly entrepreneurs become informal to reduce the burden of bureaucracy and corruption, rather than avoiding official taxes. Johnson et al. (1998) show that countries where the law financed by tax revenues have smaller informal economies. Possible ways to decrease competition from informal firms are having lower tax rates, fewer laws and regulations, stronger institutions, and a lower level of corruption (Williams et al., 2013). In the Tax Code of Republic of Kazakhstan, adopted in 2008, as a measure to support economic diversification, the government placed a greater tax burden on the energy sector while article 428 of the Tax Code gave the small firms an opportunity to operate under a special tax regime. According to the this article, firms with less than 25 employees having profits less than 17,000 USD

before taxes for limited liability partnerships and 9,000 USD for individual entrepreneurs, pay a corporate tax rate of 3% instead of 20%. The rest of the tax schedule can be considered as low; value-added tax (VAT) - 12%, corporate tax - 20%, including deductibles - 3% , social tax - 11%, pension contributions - 10% and income tax rate of 10%. In comparison, in Western Europe, the VAT is 20% and the average top personal income tax rate is 50%. [3] According to the Comprehensive Plan to Counteract the Shadow Economy 2014-2015, for the period 2007-2013 the loss of budget revenue in terms of VAT accounted for 193 billion tenge or 1.7 billion USD. [4] [5] Using the data from 2016 OECD report on Kazakhstan and the total number of informal employees from Statistical Committee of Kazakhstan, I have estimated the loss of tax revenue in 2014 due to informal employment approximately at 70.7 million USD. This corresponds to only 1.7% of total income tax revenue for the government.

To tackle the problem of tax evasion in Kazakhstan, the government has recently launched a third wave of legalisation and second wave of privatisation, which worked well the previous time. [6] As a result of the very first amnesty, about 3,000 citizens of Kazakhstan legalized more than 480 million US dollars. Legalisation of 2006-2007 was subject not only to financial assets, but also movable and immovable property. As a result, property was legalized for 844.7 billion tenge or 6.8 billion US dollars (8.3% of GDP in 2006)[7]. The Republican budget received 59.6 billion tenge or

[3] World Bank's Doing Business Index ranked Kazakhstan 17th by ease of paying taxes. The Tax Code of 2008, was created with the intention to decrease tax rates while increasing tax compliance and broadening the tax base. However, according to the World Bank (2014) report the Tax Code "has not fully succeeded and created shortfall in the non-oil revenue in the government's budget".

[4] The average exchange rate for the period 2007-2013 according to National Bank of Kazakhstan was 108.9 KZT/USD.

[5] In the Comprehensive Plan to Counteract the Shadow Economy 2014-2015 the definition of pseudo-entrepreneur is not given.

[6] "Legalisation is defined as a procedure whereby the state recognises the rights to property ejected from the lawful economic turnover with the purpose of concealment of income and/or property where the right to the property was not duly formalised/documented or property that was formalised/documented to an inappropriate person" Source: The Legalisation Law

[7] Legalisation fee was 10%, source: The Legalisation Law

483 million US dollars as a levy for legalization[8].

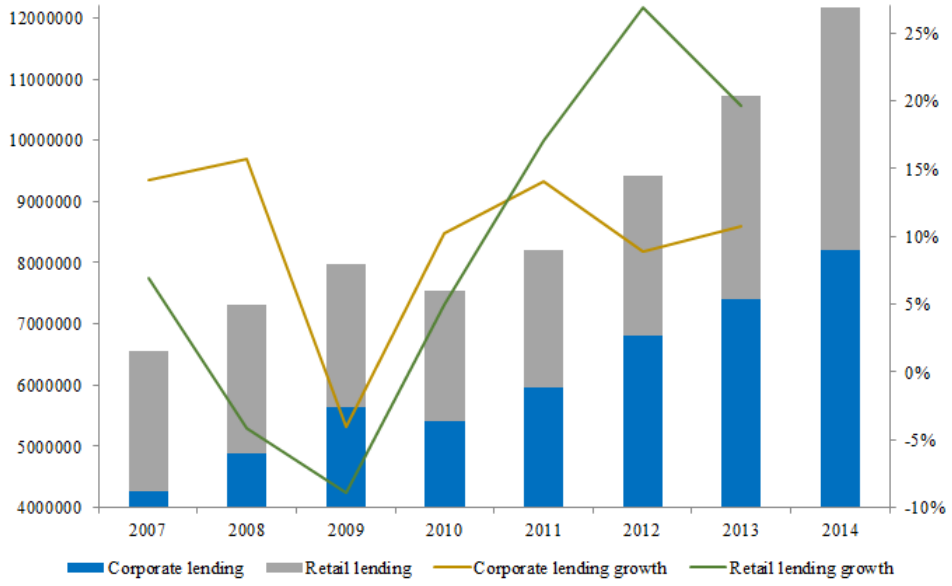
The sizeable loss of tax revenue shows how the informal economy undermines fair competition among firms and prevents the creation of regular employment with full social protection, such as insurance and pension schemes. The informal economy also causes production inefficiencies, as businesses not legally registered typically have limited access to finance, public services and advertising (Schneider & Williams, 2013). Typically, informal firms operate at the regional level and have no possibility to grow into the national, let alone international level (Schneider and Enste, 2000). Hudson et al. (2009) argues that informal competition decreases with the size of a firm in the formal economy.

The access to finance is a serious obstacle to doing business by formal firms (La Porta and Shleifer, 2008. Straub (2005) demonstrates that when the financial system, including retail banking and capital markets, becomes more developed, the magnitude of the shadow economy drops because as the opportunity cost of informality increases with being excluded from the system. The second-tier banks' lending expansion in Kazakhstan was in line with the economic growth and comparatively high interest rates on retail loans have been making lending to businesses less attractive (OECD, 2016). Corporate and retail sectors lending were hit hard during the financial crisis with negative portfolio growth by 4.1% and 6.5%, respectively (Figure 3). In 2009 the retail and corporate lending growth rate was negative; however, since 2012 the retail loan portfolio has increased by 30% though corporate lending climbed by only 6% in real terms (OECD, 2016). Hence the access to finance to formal firms is currently a substantial issue in Kazakhstan, which forces formal firms to rely on their own funding. The statement that informal firms may decide

[8]Source: The law on the amnesty of citizens of the Republic of Kazakhstan in connection with the legalization of their money, and The Legalisation Law; and their proceedings

to become formal in order to have an access to finance is weak in Kazakhstan since the banking sector is in crisis. As for the capital market in Kazakhstan, it is underdeveloped with an average market capitalisation rate of 25% over 2010-2012 and slight increase to 27% in 2015, and external sources of financing are limited (OECD, 2016) .[9]

Figure 3: Total size of loan portfolio of second-tier banks in Kazakhstan (in millions KZT)



Source: Authors' calculations based on data from National Bank of Kazakhstan.

Tedds (2010) argues the commonality of participation in the informal sector is related to firm size as smaller firms are more likely to participate in the informal economy than larger firms. According to Gonzalez and Lamanna (2007), firms find informal competition as a significant threat only in the countries with low government capacity and high regulations. They further find empirical support for the hypothesis that formal firms that experience severe informal competition actually resemble informal entities in size, age, and low entry cost to the industry.

According to Dreher and Schneider (2006) the informal economy increases corruption in low

[9]Market capitalisation is the share price times the number of shares outstanding.

income countries and Sheifer and Vishny (1993) conclude that corruption has a greater adverse effect than taxation due to the uncertainty on the amount of bribery payments . Fisman and Svensson (2007) estimate that one percentage point increase in the bribery rate decreases a firm's growth rate by more than 3 percentage points, which is a 2.5 times greater than the effect of taxation. I use the industry average of the variable, excluding the firm itself, in order to avoid the endogeneity problem between the informal sector and corruption. [10] Corruption in Kazakhstan is "perceived to be widespread" and constrains the development of the small and medium size firms (SMEs) further, which currently employs up to 30% of total employment in Kazakhstan. [11]

The Government of Kazakhstan has been supporting and encouraging the private sector, specifically SMEs, by implementing various programmes, including the Strategy of Industrial and Innovation Development of Kazakhstan for 2003-2015, the Programme of Accelerated Industrial-Innovative Development of Kazakhstan for 2010-2014, Kazakhstan - 2030, Employment roadmap 2020, Business roadmap 2020, Kazakhstan - 2050, and the latest, 100 Concrete Steps. Also programmes specifically targeting the shadow economy, such as Comprehensive Plan to Counteract the Shadow Economy 2014-2015 and current Plan for 2015 - 2017 on the implementation of the Anti-Corruption Strategy of the Republic of Kazakhstan for 2015-2025 and the counteraction to the shadow economy. According to the Comprehensive Plan to Counteract the Shadow Economy, one of the main causes of the informal economy in Kazakhstan is the migrant labour force from Commonwealth of Independent States (CIS). Labour migration in Kazakhstan is highly seasonal, most migrant workers come to work in between April and August (ILO, 2009). The amount of labour migrants in the country ranges from a quarter to one million (ILO, 2009).

[10] Similar to Hudson et al. (2009), this represent the average perception considering the other firms in the industry, by excluding the firm itself.

[11] OECD (2016) "Multi-dimentional review of Kazakhstan", 145-146pp.

According to AT Kearney and Schneider (2013), an annual increase in electronic payments by 10% for at least four years can decrease the share of shadow economy by up to 5%. In 2013 the Government decree # 1743 came into force, which forced entrepreneurs carrying out certain types of activities, like retail shops, to accept electronic payments by debit or credit cards, causing them to install POS-terminals. The POS and online tax payments via bank cards has also been adopted. Since shadow economy is cash based, moving towards electronic payments for goods and services as well as taxes has played an important role in tackling informality in Kazakhstan.

According to the Doing Business indicator, labour regulations in Kazakhstan are not cumbersome. For example, the cost of firing employees is only 4.3 months of employee's salary and there is no limit on the maximum length of a fixed term contract. Also, formal employment has been steadily increasing since 2005 (Fig 2, Table 3), which signalled the shift from Soviet agricultural economy to the service based; and increased urbanisation that reached 55% in 2013 (Statistical Committee).

3 Data

I use the Business Environment and Enterprise Performance (BEEPS) surveys of the European Bank of Reconstruction and Development (EBRD) and the World Bank. BEEPS is a large dataset that is stratified according to the firms' sector, size, and geographical regions. The formal firms are defined as firms registered with the State Revenue Committee, Ministry of Finance of the Republic of Kazakhstan. Data are composed of 828 registered firms. The agricultural, banking, electric power, rail transport, water and waste water sectors are excluded from the BEEPs sample. The purpose of BEEPs is to study the interaction between the state and firms that are not subject to

government price regulation and prudential provisions. The BEEPs is not surveying state owned companies, which account for 30% to 40% of the GDP in Kazakhstan (OECD, 2016). Missing observations and answers "'Dont know" and "Does not apply" are deleted from the dataset.

The analysis considers two periods: 2008-2009 and 2013-2014. Earlier EBRD surveys cannot be used in my research due to inconsistency of the methodologies. I have included the stratification levels as control variables, instead of utilising the sampling weights. The business environment is important in determining the nature and the cost advantage of informal entities. Table 2 lists the variables of interest. Following Lederman (2010), I included the following firm-specific variables: the firm's age, percentage of educated labour force, access to loans and lines of credit, if there were tax inspections or losses due to theft for the last fiscal year, and firm size. In 2009, 35.1% of firms faced competition from informal counterparts. In 2013 the rate of registered enterprises competing against informal firms was 32.9%.

Table 2: Regression Variables

Variable	**Description**
Informal Competition	Binary variable equals to 1 if practices of competitors in the informal sector was an obstacle to firm's current operations, and 0 otherwise
Age	Age of the firm
Educated workforce	Number of workers with university degree
Access to finance	Binary variable indicating if the firm has a line of credit or a loan
lsize	logarithm of total number of employees
Losses due to theft	Binary variable indicating if the firm experienced losses due to theft, robbery, vandalism or arson in last fiscal year
Bribes	Binary variable indicating if firms like you pay additional payments/ informal gifts to "get things done", industry average excluding the respondent firm itself
Tax	Binary variable indicating if tax rates are an obstacle to the current operations industry average excluding the respondent firm itself
Transportation	Categorical variable from no to major if transportation of goods, supplies and inputs is an obstcle to current operations
Labour	Binary varibale equals 1 if labour regulations is an obstacle to firm's operations
Sector	Sector dummy: manfacturing, core, retail
Region	Region dummy: Northern, Southern, Central, Eastern and Western Kazakhstan

The summary statistics are provided in Table 8 with mean difference and Welch t-test. The mean difference t-test is only given to continuous variables as it is straight forward to calculate it for binary variables. The average age of firms in the survey has increased by almost one and half years whereas firms with a line of credit or loan decreased by 52% in between 2009 and 2013. Such a drastic decline in the access to finance could be due to the following reasons: 1) banks corporate lending has been weak since the financial crisis, 2) firms primarily rely on internal funding (82%) due to primarily high collateral requirement, 3) government lending to the private sector has increased through the work of JSC "Entrepreneurship Development Fund" Damu".

To evaluate industry specific effects of corruption and taxes, I estimated the weighted average perception of other firms in the industry, excluding the firm in question. [12] It is a binary instrumental variable over 14 industry averages. Another industry specific variable included in my analysis is tax, which explains whether the tax rate is an obstacle to a firm's current operations. To evaluate the effect of the business environment I use a categorical variable on transportation as an obstacle to current operations and a binary variable representing if labour regulations are obstacles to operations of the firm. [13] Labour regulations' decline as an obstacle to current operations could be due to the government's aim to join the top 30 developed countries in the world by 2050 via the Kazakhstan-2050 programme. In BEEPs surveys 2008-2009 and 2012-2013, only 28.9% of respondents replied that labour regulations are an obstacle to their operations.

Fixed effects are included to account for the possible idiosyncratic disparities between regions and sectors. However, due to data limitations, it was not possible to separate the capital city, Astana, and the biggest city, Almaty, from the other regions, as well as urban and rural areas.

[12] The correlation between corruption and bribery is 0.35 in the sample. I chose to include bribery in my analysis as it better represents the operational activities of the firm.

[13] These variables are similar to Hudson et al., 2009 and Lamanna and Gonzales, 2007.

4 Methodology

I use fixed structure and changing structure analyses to estimate where the main drivers force behind the decline in informal competition in Kazakhstan is due to a structured change or observed heterogeneity, and explain to what degree the decline in informal competition can be explained by the changes in the levels of underlying factors: corruption, taxes, crime, access to finance and the level of education of employees and socio-economic changes.

4.1 Fixed Structure Analysis

In fixed structure analysis, I assume that the structure or relationships explaining competition against informal firms stays the same over time. This amounts to estimating a logit regression by treating the repeated cross section as pooled data. In this model the registered firm either competes against informal firms (Y=1) or does not (Y=0) in the period the survey is taken, and **x** denotes set of factors such as corruption, education, access to bank loans explain possible competition. Following Greene (2012), the success probability is given by

$$Prob(Y = 1|\mathbf{x}\,) = \frac{exp(\mathbf{x}\,\beta')}{1 + exp(\mathbf{x}\,\beta')} = \Lambda(\mathbf{x}\,\beta'), \tag{1}$$

with the corresponding marginal effects:

$$\frac{\partial E[y|\mathbf{x}]}{\partial \mathbf{x}} = \frac{exp(\mathbf{x}\,\beta')}{[1 + exp(\mathbf{x}\,\beta')]^2} = \Lambda(\mathbf{x}\,\beta')[1 - \Lambda(\mathbf{x}\,\beta')]$$

I then assess the roles of changes in independent variables in explaining the changes in the probability of informal via:

$$\Lambda(\mathbf{x}\,\beta')[1-\Lambda(\mathbf{x}\,\beta')](\bar{X}_{20012-13}-\bar{X}_{2008-09}) \tag{2}$$

In words, I estimate the amount of informal competition change due to the changes in independent variables, by multiplying each change in the probability of informal competition due to change in the variable X_i by the actual mean change in that variable occurring between the two periods.

4.2 Changing Structure Analysis

Fixed structure analysis does not account for the changes in the economic factors that might have affected the informal competition. It is possible that due to financial crisis of 2008-2010 and implementation of various government programmes, the underlying structure of the informal competition have changed. To evaluate the role of the structural change, I first estimate a logit model for each period separately. Next I test whether the coefficients in two regressions differ for each variable. In order to evaluate the effect of various factors on the competition against informal firms, I take the logit coefficients of 2008-2009 and multiple them by the average of explanatory variables in 2012-2013. To see how well the earlier structure would have predicted informal competition rate, I then repeat the process backwards to understand how well later structure forcasts the earlier informal competition rate. Thereafter, I estimate the portion attributable to overall structural change by taking the difference between the actual informal competition and predicted by that

period's structure.

$$Prob(Y = 1, year = 2008 - 09|\mathbf{x}_{\ 2012-13}) = \frac{\exp(\mathbf{x}_{2012-13}\beta'_{2008-09})}{[1 + \exp(\mathbf{x}_{\ 2012-13}\beta'_{2008-09})]}$$
$$Prob(Y = 1, year = 2012 - 13|\mathbf{x}_{\ 2008-09}) = \frac{\exp(\mathbf{x}_{2008-09}\beta'_{2012-13})}{[1 + \exp(\mathbf{x}_{\ 2008-09}\beta'_{2012-13})]} \quad (3)$$

5 Empirical Results

Standard Principle Component Analysis (PCA) is based on a matrix of Pearson's correlations and assumes that the variables are continuous and follow a multivariate normal distribution. I use PCA to understand which variables contain the most variance since my model includes variables that are dichotomous, ordinal and continuous, PCA is performed using a polychoric/polyserial correlation matrix.

According to Kolenikov and Angeles (2009), in the polyserial correlation computation, the likelihood for the latent variable x_1 with underlying standard normal x_1^* discretized according to the thresholds $\alpha_{1,0} = \infty < \alpha_{1,1} < ... < \alpha_{1,K_1} < \alpha_{1,K} = \infty$, and the continuous variable x_2 (assumed to have the standard normal distribution) the following way:

$$\begin{aligned} L(\rho, \alpha; x_1 = k, x_2) &= f(x_1 = k, x_2; \rho, \alpha) \\ &= Prob[\alpha_{1,k-1} < x_1^* \leqslant \alpha_{1,k}|x_2]\phi(x_2) \\ &= (\Phi(\alpha_{1,k} - \rho x_2) - \Phi(\alpha_{1,k-1} - \rho x_2))\phi(x_2) \\ E[x_1^*|x_2] &= \rho x_2 \end{aligned} \quad (4)$$

To obtain polyserial correlation, the expression has to be maximised with respect to α and ρ,

assuming independence of observations to sum up the log-likelihood. After the correlations are estimated, the next step is to proceed to the PCA through solving the eigenproblem for the estimated correlation matrix. In Stata, polychoric correlation matrix takes into account types of variables, hence when variables are binary, a polychoric correlation is calculated; when variables are continuous and categorical, a polyserial correlation is calculated, and if all variables are continuous, then Pearson's correlation is taken into account.

The polychoric PCA results are shown in Tables 4-7. In Table 4 Kaiser-Meyer-Olkin (KMO) test, which measures sampling adequacy both overall and for each variable, is equal to 0.55. The KMO estimate can be interpreted as miserable implying that variables share low level of common factors. However, as my data fail to reject the Bartlett's test of sphericity with null-hypothesis that the variables are intercorrelated at 1% level of significance, there is evidenec in favour of conducting polychoric PCA.

Table 5 provides the correlation matrix where the highest observed correlation is between bribe and tax of 0.404, followed by labour regulation and losses due to theft -0.369, and transportation and labour regulation 0.379.

As for polychoric principle components analysis (Table 6), where first 5 eigenvalues are greater than 1. These components explain only 63.6% of the total variation. However, all the factors contribute to the total variance, and according to the scree rule, I include all the variables in my regressions. As the variables of interest are not highly intercorrelated, given low KMO, along with the results from correlation matrix, I proceed further with all 11 variables for my fixed and changing structure analysis. Table 7 also shows scoring coefficient or loadings. The first components is related to access to finance, labour regulations, losses due to theft and transportation as an obstacle to firms' operations. The second component is related to age, firm size, bribes, taxes, regions and

sectors.

5.1 Fixed Structure Analysis

Tables 9 and 10 show logit regression that explains the competition against informal firms and the decomposition of the decrease in the informal competition between 2008-2009 and 2012-2013 respectivey, assuming the same structure of relationships remain the same in both periods. The firm's size is important as evidence by Lamanna and Gonzales (2010), since smaller firms experience competition from unregistered firms more strongly. One percentage increase in size of the firm holding other variables at mean decreases probability of competition against informal firms by 3.4%. Firms which experience losses due to theft or vandalism and firms with a higher percentage of an educated workforce are less likely to compete against unregistered entities. More importantly, industry specific bribes are significant and positive, meaning that if the firms in the industry give bribes to get things done, they are on average 71.4% more likely to compete against informal entities. Firms operating in the southern region and in the services sector are more likely to compete against informal firms by 17.4% and 10.8%, respectively. Bribes and losses due to theft may be endogenous due to unobserved heterogeneity.

To evaluate the decline in informal competition due to changes in each explanatory variable, the mean difference of two periods is multiplied by regression coefficients. The sum of all the entries explain only 0.18% of the decline in informal competition.

Firm size and entrepreneurship in the Southern part of Kazakhstan have largely contributed to the increase in the rate of informal competition. Modest contributions were made by all the other regions, core sector and age of the firm. The result indicates that the level of the university educated

labour force, access to finance, theft, transportation as a major obstacle and the services sector are the main contributors to the part of the decline in the informal competition between periods that we are able to explain. The estimations show holding everything at their overall sample means that labour regulations, as well as the firm size and southern region contributed to an increase in the rate of informal competition by 5.2%. Holding firm size, labour regulations and regions variables constant, the level of the university educated labour force, access to finance, theft, transportation as a major obstacle and the services sector contribute to 5.4% decline in the informal competition.

Although some factors have accounted for the decline in the rate of informal competition and others have increased it even further, I am unable to explain the majority of the actual decline with these variable changes. Further, I estimate whether some of the relationships between informal competition and its determinants have changed over time and if these might help to explain the decline in informal competition.

5.2 Structural Change Analysis

To analyse if the coefficients have changed over time, I run separate logit regression for each period (Table 11). The Welch t-test indicates if coefficients of each variable differs significantly between periods, where educated workforce, transportation as no to minor obstacle to operations, labour regulations and northern region are significant. Change in firm size, losses due to theft and the southern region are significant in both periods. One percent decrease in the size of the firm, decreases the probability of competition from informal firms holding all variables at mean by 3.9% in 2008-2009 and by 4.6% in 2012-2013. The importance of transportation as a minor obstacle and the services sector are significant in the period 2008-2009; and in the 2012-2013

period an educated labour force, labour regulations, and central and northern regions are more important. Transportation became less of an obstacle to a firm's operations, and firms that consider transportation as no or a minor obstacle are less likely to compete against informal entities with respect to ones considering it as a moderate obstacle by 10.4% and 8.7% in 2012-13, respectively. The probability of competition from informal firms due to transportation from no to a minor and labour regulations obstacle has changed sign from more likely to less likely, the opposite happened in the northern region. Transportation has become less of an obstacle for a firm's operations from 2008 to 2013. As for the northern region, which includes Astana, the probability of competing against informal firms became 24.2% more likely in 2013 from -0.33% in 2008. This could be primarily due to construction and trade in Astana. The firm size, educated workforce, losses due to theft, service sector and southern region are persistently significant for separate periods as well as merged into one pooled period. The firm size, theft and educated workforce have contributed to the decline of informal competition; and the southern region and the service sector assisted in its increase.

Since several coefficients differ in their effect on the rate of informal competition, I further estimate the relative importance of these structural changes versus changes in variables in explaining the informal competition decline between periods by seeing how well 2008-2009 coefficient and the 2012-2013 values of explanatory variables predict the 2012-2013 informal competition rate. The difference between the predicted 2008-2009 informal rate and the actual 2012-2013 rate is the portion of informal competition decline attributable to changes in variables. This difference between the predicted 2012-2013 informal competition rate and the actual 2012-2013 rate is the portion of informality decline due to structural change (i.e. coefficients). In doing so I am interested in how well I would have predicted the informal competition rate while only knowing

2008-2009 coefficients. Table 11 shows the prediction of the informal competition rate. In 2008-2009 the actual rate of the informal competition was 35.1% and the predicted value was estimated at the level of 38.9%, while the actual rate of informal competition has declined to 32.9%. I came to a similar conclusion while repeating the same exercise backwards.

I conclude that a substantial part of the decline in the informal competition rate between 2008-2009 and 2012-2013 is due to changes in the structure of the informal competition. Hence, structural changes between 2008 and 2012 as well as the determinants of informal competition in 2012 have contributed to a decline in informality. This research is beneficial from the public policy perspective since it shows how effective government policies were in tackling informality, which is of great interest to the Kazakhstani government.

6 Conclusion

Kazakhstan is a developing country, with a higher GDP per capita compared to other Central Asian countries, and a large shadow economy, which is attributable to countries with low institutional quality. The loss of revenue to the government in the form of income and social tax due to the informal employment in 2014 was 70 million USD. The Comprehensive Plan to Counteract the Shadow Economy and other government policies are aiming to decrease the underground economy because the informal economy can make entrepreneurship less profitable, obstruct investment, undermine the development of the private-sector, and diminish social protection, thereby reducing economic growth and wealth. On the other hand, the shadow economy can also provide a much needed source of income for a larger number of people. According to the Ernst & Young (2012) survey, 50% of respondents feel that the level of legal and regulatory transparency and predictabil-

ity is insufficient in Kazakhstan. The significance of bribes highlights the need for reform. The government is currently implementing an e-government initiative and other substantial reforms to tackle the problem of the shadow economy. The rate of informal competition persists in retail (bazaars), agricultural and construction sectors due to the seasonality of work and high migrant work force in these seasonal jobs (World Bank, 2014). As a result, firms in retail, real-estate and construction companies who work legally and pay taxes compete against unregistered firms with a high burden.

The average size of shadow economy in between 1999 and 2015 was 39.7% in Russia, where the same statistics for Turkey was 30.1% of GDP (Schneider, 2016). The main determinants of informal economy in Russia are corruption, taxes and unemployment (Schneider, 2016).

This study has identified several factors contributing to the decline in the informal competition between 2008-2009 and 2012-2013 in Kazakhstan. The research has also estimated factors that have prevented the informal competition rate from decreasing even further. Out of 2.2 percentage points decline in informal competition, 0.18 percentage point is explained by the observable heterogeneity whereas the rest is due to structural changes. The decrease in the average firm size and increased entrepreneurship in the southern part of Kazakhstan have prevented the decrease in the informal competition from being even higher. An educated workforce, access to finance, losses due to theft, transportation as a major obstacle and the services sector were the main contributors behind the decline in the informal competition. In order to combat the shadow economy, the government of Kazakhstan should continue with the reforms and supporting the private sector through ongoing Business Roadmap 2020, Employment Roadmap 2020 and other similar programmes. The educated workforce and size of the firms, the two determinants of the informal competition, that could be further enhanced to tackle the problem. Another factor (Table 10) that decreases

informality is labour regulations, which has already been substantially eased.

Taxes and labour regulations do not seem to be as powerful factors as expected. Since not all industries and sectors were covered under the BEEPs survey, it is possible for other factors beyond those reviewed here to influence rate of informal competition. To curb the informal economy and rate of informal competition, it is worth working on the improvement of the institutional and the regulatory framework in Kazakhstan. The results would be more robust if the sales, total tax expense and bribes as percent of sales data were fully available. It would be interesting to evaluate how the informal economy affects the government revenue, job creation rates and worker compensation in the future.

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8 Appendices

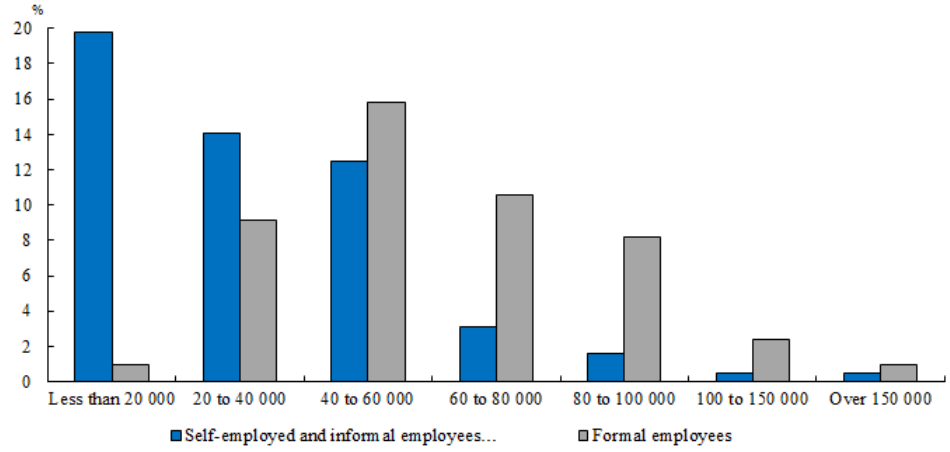
Table 3: Formal and Informal Employment in Kazakhstan, 2006-2015

Year	Employment			in registered firms		in informal firms		in subsistent farming	
	total	formal	informal	formal	informal	formal	informal	producing agricultural products for own consumption	paid workers who provide domestic services
2005	726100	4148200	3112700	3428400	1162000	719800	603500		1347200
2006	7 403 494	4 281 909	3 121 585	3 580 594	1 143 780	701 315	702 257	1 223 279	52 269
2007	7 631 109	4 545 531	3 085 578	3 767 657	1 158 936	777 874	685 074	1 194 692	46 876
2008	7 857 200	4 780 703	3 076 497	4 044 518	1 107 271	736 185	755 436	1 166 141	47 649
2009	7 903 368	4 886 920	3 016 448	3 742 219	544 401	1 144 701	1 291 131	1 125 529	55 387
2010	8 114 165	5 111 762	3 002 403	3 933 123	516 219	1 178 639	1 366 923	1 068 978	50 283
2011	8 301 635	5 348 136	2 953 499	4 057 865	550 382	1 290 271	1 317 497	1 042 231	43 389
2012	8 507 152	6 291 604	2 215 548	4 534 469	307 305	1 757 135	970 540	936 386	1 317
2013	8 570 648	6 490 102	2 080 546	4 744 030	265 478	1 746 072	1 359 394	452 681	2 993
2014	8 510 074	6 380 995	2 129 079	6 380 995	1 034 547	-	798 961	277 977	17 594
2015	8 623 754	6 643 750	1 980 004	6 643 750	994 068	-	787 712	190 441	7 783
in percent									
2005	100%	56.0%	42.0%	82.6%	37.3%	17.4%	19.4%		43.3%
2006	100%	57.8%	42.2%	83.6%	36.6%	16.4%	22.5%	39.2%	1.7%
2007	100%	61.4%	41.7%	82.9%	37.6%	17.1%	22.2%	38.7%	1.5%
2008	100%	64.6%	41.6%	84.6%	36.0%	15.4%	24.6%	37.9%	1.5%
2009	100%	66.0%	40.7%	76.6%	18.0%	23.4%	42.8%	37.3%	1.8%
2010	100%	69.0%	40.6%	76.9%	17.2%	23.1%	45.5%	35.6%	1.7%
2011	100%	72.2%	39.9%	75.9%	18.6%	24.1%	44.6%	35.3%	1.5%
2012	100%	85.0%	29.9%	72.1%	13.9%	27.9%	43.8%	42.3%	0.1%
2013	100%	87.7%	28.1%	73.1%	12.8%	26.9%	65.3%	21.8%	0.1%
2014	100%	86.2%	28.8%	100.0%	48.6%	-	37.5%	13.1%	0.8%
2015	100%	89.7%	26.7%	100.0%	50.2%		39.8%	9.6%	0.4%

*Source: Committee of Statistics, Republic of Kazakhstan

Data for subsistent farming in 2005 is the sum of own consumption and paid work

Figure 4: The self-employed/informal and formal employees wage distribution , 2014



Source: OECD Development Pathway "Multidimentional review of Kazakhstan" Vol1. Initial Assessment (2016) page 59, Table 2.18: Mun D. et al (2015), "Social spending, taxes and income redistribution in Kazakhstan", Background Paper for the MDCR of Kazakhstan.

Table 4: Factor test

Determinant of the correlation matrix	0.506
Bartlett test of sphericity	
Chi-square	558.885
Degrees of freedom	55
p-value	0.000
H0: variables are not intercorrelated	
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.55

Table 5: Polychoric correlation matrix

	Age	Educated	Access to finance	lsize	Losses due to theft	Bribe	Tax	Transportation	Labour regulation	Region	Sector
Age	1										
Educated	0.042	1									
Access to finance	-0.008	-0.096	1								
lsize	0.153	-0.117	0.379	1							
Losses due to theft	0.023	0.059	-0.318	-0.191	1						
Bribe	-0.024	-0.037	0.019	-0.05	0.057	1					
Tax	-0.035	-0.096	-0.038	-0.037	-0.046	0.404	1				
Transportation	-0.086	-0.018	0.134	0.113	-0.217	0.0142	0.034	1			
Labour regulation	-0.002	-0.041	0.131	0.141	-0.369	0.097	0.113	0.379	1		
Region	-0.054	0.094	-0.103	-0.062	0.041	0.055	0.034	0.181	0.041	1	
Sector	-0.118	0.063	-0.005	-0.092	-0.047	0.265	0.037	-0.052	0.033	0.071	1

Table 6: Polychoric Principal Component Analysis

	Eigenvalues	Proportion explained	Cum. explained
1	1.990009	0.180910	0.180910
2	1.616183	0.146926	0.327836
3	1.281701	0.116518	0.444354
4	1.073430	0.097585	0.541938
5	1.037990	0.094363	0.636301
6	0.910281	0.082753	0.719054
7	0.797013	0.072456	0.791510
8	0.704166	0.064015	0.855525
9	0.596699	0.054245	0.909770
10	0.533720	0.048520	0.958290
11	0.458807	0.041710	1.00000

Table 7: Scoring coefficients

Variable	Coeff. 1	Coeff. 2	Coeff. 3
Age	-0.000123	-0.232051	-0.211018
Educated labour force	-0.158522	0.020407	0.386837
Access to finance			
No	-0.219095	0.090114	0.110382
Yes	0.502332	-0.206610	-0.253079
lsize	0.389211	-0.278720	-0.237219
Losses due to theft			
Yes	0.708314	-0.038064	0.102098
No	-0.158543	0.008520	-0.022853
Bribe	0.053667	0.572254	-0.345334
Tax	0.096069	0.489647	-0.336152
Transportation			
No obstacle	-0.386540	-0.120434	-0.418386
Minor obstacle	-0.003046	-0.000949	-0.003297
Moderate obstacle	0.185755	0.057875	0.201059
Major obstacle	0.514314	0.160244	0.556687
Labour regulation			
No	-0.233912	-0.087747	-0.103208
Yes	0.545607	0.204672	0.240736
Region			
Central	0.013918	-0.431386	-0.809362
Eastern	0.007578	-0.234870	-0.440661
Northern	0.003054	-0.094650	-0.177582
Southern	-0.003142	0.097401	0.182743
Western	-0.012003	0.372034	0.698007
Sector			
Manufacturing	0.014822	-0.433008	0.037144
Services	-0.000190	0.005550	-0.000476
Core	-0.015118	0.441641	-0.037884

Table 8: Summary Statistics

	Total		2008-2009		2012-2013		Mean difference	
	mean	sd	mean	sd	mean	sd	diff	t-test
Informal	0.341	0.474	0.351	0.478	0.329	0.471	-0.022	
Age	11.106	8.036	10.431	6.702	11.825	9.202	1.395*	(2.479)
Educated workforce	39.118	29.087	33.389	27.363	45.219	29.655	11.831***	(5.955)
Access to finance	0.301	0.459	0.400	0.491	0.195	0.396	-0.206	
Firm size, log	3.397	1.256	3.745	1.284	3.029	1.115	-0.715***	(-8.554)
Losses due to theft	1.816	0.387	1.792	0.407	1.843	0.364	0.051	
Bribes	0.603	0.052	0.604	0.053	0.601	0.051	-0.003	(-0.914)
Taxes	0.732	0.086	0.752	0.091	0.710	0.074	-0.042***	(-7.388)
Transportation: no obstacle	0.397	0.490	0.323	0.468	0.476	0.500	0.153-	
Transportation: minor obstacle	0.200	0.401	0.150	0.357	0.254	0.436	0.104	
Transportation:moderate obstacle	0.162	0.369	0.148	0.355	0.177	0.382	0.030	
Transportation: major obstacle	0.240	0.428	0.379	0.486	0.092	0.290	-0.287	
Labour regulations	0.298	0.458	0.365	0.482	0.227	0.419	-0.138	
Region: Central	0.118	0.323	0.115	0.319	0.122	0.328	0.007	
Region: Eastern	0.133	0.340	0.178	0.383	0.085	0.279	-0.093	
Region: Northern	0.221	0.415	0.213	0.410	0.229	0.421	0.016	
Region: Southern	0.348	0.477	0.290	0.454	0.409	0.492	0.119	
Region: Western	0.180	0.384	0.204	0.403	0.155	0.362	-0.049	
Sector: manufacturing	0.329	0.470	0.326	0.469	0.332	0.471	0.006	
Sector: services	0.356	0.479	0.386	0.487	0.324	0.469	-0.062	
Sector: core	0.315	0.465	0.288	0.453	0.344	0.476	0.056	
Observations	828		427		401		828	

Standard errors in parentheses

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 9: Logit Regression explaining informal competition and decomposition of the decrease in the informal competition rate between 2008-2009 and 2012-2013, assuming the same structure of relationships in both periods

	Logit regression		Mean	Change
	logit	dydx	difference	due to variable
Age	0.001	0.000	1.395**	0.000
	(0.009)	(0.002)	(0.557)	
Educated workforce	-0.011***	-0.002***	11.831***	-0.027
	(0.003)	(0.001)	(1.982)	
Access to finance	0.244	0.051	-0.206***	-0.010
	(0.185)	(0.039)	(0.031)	
Firm size, log	-0.162**	-0.034**	-0.715***	0.024
	(0.070)	(0.014)	(0.084)	
Losses due to theft	-0.493**	-0.104**	0.051*	-0.005
	(0.203)	(0.042)	(0.027)	
Bribes	3.395*	0.714*	-0.003	-0.002
	(1.813)	(0.378)	(0.004)	
Taxes	0.483	0.102	-0.042***	-0.004
	(1.010)	(0.212)	(0.006)	
Transportation: no obstacle	-0.049	-0.010	0.153***	-0.001
	(0.228)	(0.047)	(0.034)	
Transportation: minor obstacle	0.122	0.026	0.104***	0.002
	(0.251)	(0.053)	(0.028)	
Transportation: major obstacle	0.089	0.019	-0.287***	-0.005
	(0.253)	(0.053)	(0.028)	
Labour regulations	-0.230	-0.048	-0.138***	0.007
	(0.182)	(0.038)	(0.031)	
Central	0.370	0.073	0.007	0.000
	(0.291)	(0.058)	(0.022)	
Eastern	-0.097	-0.017	-0.093***	0.001
	(0.300)	(0.053)	(0.023)	
Northern	0.407	0.081	0.016	0.001
	(0.252)	(0.049)	(0.029)	
Southern	0.825***	0.174***	0.119***	0.021
	(0.237)	(0.047)	(0.033)	
Sector: services	-0.517***	-0.108***	0.062*	-0.007
	(0.196)	(0.041)	(0.033)	
Sector: core	0.301	0.061	0.056*	0.003
	(0.202)	(0.041)	(0.032)	
Constant	-1.961*			
	(1.172)			

Standard errors in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$; χ^2 [17] = 52.01, p=0.000

Transportation reference category: moderate; Region reference category: Western;

Sector reference category: manufacturing.

Table 10: Decomposition of the decrease in the informal competition rate between 2008-2009 and 2012-2013, assuming the same structure of relationships in both periods

	Mean difference	Change due to variable
Informal competition	-2.2%	
Age	1.395**	0.000
Educated workforce	11.831***	-0.027
Access to finance	-0.206	-0.010
Firm size, log	-0.715***	0.024
Losses due to theft	0.051	-0.005
Bribes	-0.003	-0.002
Taxes	-0.042***	-0.004
Transportation: no obstacle	0.153	-0.001
Transportation: minor obstacle	0.104	0.002
Transportation: major obstacle	-0.287	-0.005
Labour regulations	-0.138	0.007
Central	0.007	0.000
Eastern	-0.093	0.001
Northern	0.016	0.001
Southern	0.119	0.021
Sector: services	0.062	-0.007
Sector: core	0.056	0.003
Σ of informal competition due to variables		-0.18%

Transportation reference category: moderate; Region reference category: Western; Sector reference category: manufacturing.

Table 12: Competition against informal firms: predictions based on Table 11

Item	2008-09	2012-13	
Observed informality	35.1%	32.9%	
	Predicted informality		
	2009	2013	change due to explanatory variables
Predicted informality using 2009 coefficients	35.1%	38.87%	3.77%
Predicted informality using 2013 coefficients	34.3%	32.9%	-1.4%
Change due to change in structure	-0.8%	-5.97%	

Table 11: Logit regression explaining informal competition for the 2008-2009 and 2012-2013 periods, allowing the structure of relationships to differ between the periods

	Period 2008-09		Period 2012-13		
	logit	dydx	logit	dydx	t-test*
Age	0.002	0.000	0.001	0.000	0.00
	(0.017)	(0.003)	(0.013)	(0.002)	(0.952)
Educated workforce	-0.004	-0.001	-0.018***	-0.003***	5.72**
	(0.004)	(0.001)	(0.004)	(0.001)	(0.016)
Access to finance	0.187	0.039	0.253	0.049	0.03
	(0.245)	(0.051)	(0.318)	(0.061)	(0.87)
Firm size, log	-0.189*	-0.039**	-0.237*	-0.046**	0.09
	(0.098)	(0.020)	(0.122)	(0.023)	(0.761)
Losses due to theft	-0.447*	-0.093*	-0.694**	-0.134**	0.34
	(0.271)	(0.056)	(0.330)	(0.062)	(0.562)
Bribes	3.773	0.782	2.061	0.398	0.19
	(2.534)	(0.522)	(2.945)	(0.567)	(0.659)
Taxes	0.095	0.020	1.362	0.263	0.30
	(1.471)	(0.305)	(1.795)	(0.346)	(0.584)
Transportation: no obstacle	0.308	0.062	-0.527	-0.104	2.94*
	(0.355)	(0.070)	(0.334)	(0.067)	(0.086)
Transportation: minor obstacle	0.834**	0.179**	-0.438	-0.087	5.83**
	(0.388)	(0.080)	(0.357)	(0.072)	(0.015)
Transportation: major obstacle	0.063	0.012	0.502	0.108	0.56
	(0.347)	(0.067)	(0.472)	(0.102)	(0.453)
Labour regulations	0.064	0.013	-0.758**	-0.146**	4.02**
	(0.240)	(0.050)	(0.332)	(0.063)	(0.045)
Central	0.042	0.009	0.760*	0.124*	1.43
	(0.390)	(0.079)	(0.457)	(0.076)	(0.231)
Eastern	-0.266	-0.051	-0.085	-0.011	0.08
	(0.372)	(0.071)	(0.543)	(0.071)	(0.782)
Northern	-0.169	-0.033	1.340***	0.242***	8.05***
	(0.353)	(0.069)	(0.398)	(0.066)	(0.004)
Southern	0.867***	0.194***	1.177***	0.207***	0.39
	(0.323)	(0.069)	(0.380)	(0.059)	(0.533)
Sector: services	0.734***	0.150***	0.148	0.028	1.75
	(0.282)	(0.057)	(0.342)	(0.065)	(0.186)
Sector: core	0.483	0.096	0.258	0.050	0.26
	(0.311)	(0.062)	(0.308)	(0.060)	(0.607)
Constant	-2.358		-0.820		0.37
	(1.693)		(1.879)		(0.542)
N	424	424	401	401	

Standard errors in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

For period 2008-09: χ^2 [17] = 38.77, p=0.002; for period 2012-13: χ^2 [17] = 46.14, p=0.000.

Transportation reference category: moderate; Region reference category: Western;

Sector reference category: manufacturing.

* Welch t-test, in parentheses the p-value.