Economic crisis and competition from the informal sector in manufacturing industry in eastern European and central Asian countries

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ABSTRACT

In this study, we examine how the global crisis affected the informal sector competition against manufacturing firms. Our results show that, overall, a significantly smaller proportion of manufacturing firms competed against informal firms after the global crisis. However, for some firm types, for firms with a less experienced top manager, and for firms without an internationally recognized quality certificate, the results are insignificant. Interestingly, after the global crisis, a larger proportion of firms with a female top manager stated that they competed against informal firms. We also find that, after the global crisis, a significantly smaller proportion of manufacturing firms found informal competitors a serious obstacle to their business. The findings here are uniform across all subgroups of firms. Finally, our multivariate analyses reveal that there is a relationship between formal and informal competitive intensity.

Keywords: informal firm, informal sector, competition, manufacturing, global crisis, financial crisis

Classification JEL: D40, D47, E26, E32, G01, O17

1. INTRODUCTION

In this study, we examine the impact of the 2008-2009 global economic crisis on competition faced by manufacturing firms from the informal sector in Eastern European and Central Asian countries. The effects of the 2008-2009 global economic crisis were more devastating to the economies of Eastern European and Central Asian countries due to absence of large government bailouts observed in Western Europe and United States (Smith & Swain, 2010).

Although the informal sector is an integral component of national economies (Castells & Portes, 1989) and embedded in all economies (Abbott & Wallace, 2009), it is predominantly a feature of emerging markets and developing countries (Aguilar & Campuzano, 2009; Allen, Nataraj & Schipper, 2018; Fernández & Meza, 2015; Horvath, 2018; Hudson, Williams, Orviska & Nadin, 2012; Portes & Sassen-Koob, 1987). The term informal economy was first used by Hart (1973) to denote economic activities that are illegal, yet legitimate (Hansen, 2015; Webb, Tihanyi, Ireland, & Sirmon, 2009). It is defined as "work that is in itself legal but avoids government, regulation, oversight, and/or taxation" (Yang & Pisani, 2018, p. 184). The formal economy is state regulated, while the informal economy is unofficial and outside of state regulation (Abbott & Wallace, 2009). Previous literature uses different terms for the informal economy, such as nonofficial, unofficial, hidden, nonorganized, black market, shadow, nonvisible, unobserved, underground, or irregular economy (Blackburn, Bose & Capasso, 2012; Portes & Sassen-Koob, 1987; Rodgers & Williams, 2009; Webb et al., 2013; Williams, 2009). Main causes of the informal economy are identified as rise of the tax and social security contributions, intensity of regulation, and labor market conditions (Schneider & Enste, 2000). In emerging markets, the informal sector may be seen as an accepted practice of society (Yang & Pisani, 2018). It is estimated that the average size of the informal sector in transitioning countries of Eastern Europe and Central Asia is 36.4% of the official GDP (Schneider, Buehn, & Montenegro, 2010). Especially in the former communist countries in Eastern Europe and Central Asia, bartering goods and services to alleviate market shortages and bureaucratic bottlenecks have been common (Hansen, 2015).

There are four schools of thought regarding the informal sector: the dualist, the structuralist, the legalist and the voluntarist (Brown & McGranahan, 2016; Chen, 2012; Turner, 2009). The dualists see the informal economy as an autonomous segment, distinct from and not related to the formal sector, that provides work and income for the poor (Bromley, 1978; Chen, 2012; Hart, 1973; Kumase, 2010). The structuralist school sees the informal economy as a set of subordinate economic units that serve the purpose of cost reduction for the formal sector (Chen, 2012; Moser, 1978; Kumase, 2010). The legalist school accepts the informal sector consisting of micro-entrepreneurs who operate informally to avoid costs imposed by excessive state regulation (Brown & McGranahan, 2016; Chen, 2012). The voluntarist school believes the actors in the informal sector choose to operate in the informal sector to avoid taxes after weighing-in pros and cons (Brown & McGranahan, 2016). Brown and McGranahan (2016) suggest a fifth school of thought: The inclusionist approach. The inclusionist approach posits that the informal economy exists due to national and local governments' "anti-poor" policies and regulations. This view is supported by a later study by Hansen (2015) who notes that some researchers and development organizations utilize "microenterprises" rather than the informal economy to highlight the role of informal networks in creating social capital.

The formal sector and the informal sector manufacturing firms compete in the same markets and are comparable with regard to productivity (Allen, Nataraj & Schipper, 2018). However, the informal sector firms have unfair competition against formal sector companies as they do not pay tax on their profits (Orsi, Raggi, & Turino, 2014), they do not make benefit payments on behalf of their employees and they are not restricted by government regulations (Abbott & Wallace, 2009; Brown & McGranahan, 2016; Chen, 2012; Fernández & Meza, 2015). This gives the informal firms a price advantage (Ramalho, 2009).

There is scarce literature on linkages between the formal and the informal sectors (Fernández & Meza, 2015). Most of the previous studies examined forward and backward integration between the formal and the informal sector firms (Meagher, 1995). The research on competition between the informal and the formal sector firms is very limited. Moreover, research on competition between the informal and the formal firms in emerging markets is even more limited (Yang & Pisani, 2018). Hudson et al. (2012) examined the competition from the informal economy in South-East European countries. Using the 2009 World Bank Enterprise survey, the researchers find that small, rural, and domestic manufacturing businesses that served their home market are the ones most adversely impacted by the informal sector. More recently, Yang and Pisani (2018) state that formal firms encounter competition from the informal firms in China. Their results indicate that the informal economy is concentrated in the construction, mining and retail industries. Regarding the relationship between the formal sector and the informal sector in China, they find two relationships: First, they find that the informal and the formal economies complement each other in China, as the Chinese formal economy is underdeveloped. Second, they find that the formal and the informal firms compete in certain market and industries, and that the competition between the informal and the formal economies strengthens the economic development in China.

The effect of economic downturns on the competition between the informal sector and the formal sector companies has not been examined. Economic crisis intensifies the level of competition faced by the formal sector firms from the informal sector firms. Economic recession fosters the expansion of the informal economy (Kirchgässner, 1983; Meagher, 1995; Snyder, 2004). During the economic crisis of the 1980s and the 1990s, it has been reported that the informal sector grew as people who lost jobs in formal economy created economic activity in the informal sector (Chen, 2012; Meagher & Yunusa, 1996). When formal sector activities are downsized or are shut down, the laid-off workers get involved in the informal economy due to lack of availability of jobs in the formal sector. This is especially true for countries without unemployment benefits. Moreover, during economic recessions, due to rising inflation or shrinking public services, workers feel the need to supplement their incomes they earn in the formal economy with jobs in the informal sector (Chen, 2012).

In this exploratory study, we examine informal sector competition on formal sector companies, and explore if there were differences in terms of firm characteristics, experience and gender of the firm manager(s) and owner(s), and possession of internationally recognized quality certification during the 2008-2009 economic crisis and after the crisis is over. We focus on Eastern European and Central Asian countries. We examine these countries because the informal sector is very large in these countries, and also as explained above, the 2008-2009 economic crisis has had a harsher impact on these economies (due to lack of large government bailouts). All countries in our sample, with the exception of Turkey, were used to be command economies. Although Turkey was not a command economy, it is included among the transition economies in the Business Environment and Enterprise Performance Surveys (BEEPS) conducted by European

Bank for Reconstruction and Development and the World Bank, as Turkey used to be a closed economy where most of the economic activities were planned and conducted by the state. Turkey went through a transition to a market economy in the early 1980s. After the collapse of the command economies many people living in these countries lost the support they used to get from the socialist governments and fall into poverty (Abbott & Wallace, 2009; Rogers & Williams, 2009). Transition to market economy caused people employed by the state to lose their previous economic status in the society. Some needed jobs in the informal economy for survival by receiving cash from casual/day labor (Abbott & Wallace, 2009). Others supplemented their incomes to have decent standard of living (Abbott & Wallace, 2009). Even doctors, teachers, engineers and etc. that worked for the state had incomes below or near the state-set minimum subsistence. They sought out employment in the informal sector to increase their incomes (Rogers & Williams, 2009). However, this is not a new phenomenon caused by transitioning from command economy to market economy. Informal sector existed in the command economies as well to meet planning targets set by the state (Abbott & Wallace, 2009; Rogers & Williams, 2009). Rogers and Williams (2009, p. 6) state "many of the informal work practices, personal and social ties that developed in the late socialist period have in fact persisted and played significant roles in shaping the emerging logic(s) of the postsocialist order(s)." Abbott and Wallace (2009) add that the steep declines in the state sector and the growth of poorly regulated economy increased the informal sector activities in the post-Soviet economies. After the transition to market economy these countries have been afflicted with low tax revenues, poor legal regulation of the market, high levels of corruption, a high tax burden on the legal sector, and an expanding informal sector (Abbott & Wallace, 2009; Hellman, Jones & Kauffman, 2000; Schneider, Buehn & Montenegro, 2010; Schneider & Ernste, 2000). There are two patterns of development observed in these transition economies: A "virtuous spiral" of development where the formal sector grows and the informal sector shrinks and a "vicious cycle" of development where there is continuing reliance on informal sector (Abbott & Wallace, 2009). Abbott and Wallace's (2009) study revealed that the countries that followed the "virtuous" development, development through increased formal economy, were countries that were the most economically developed before the transition. In other words, smaller proportion of population living in rural areas and employed by the agricultural industry.

Although the informal sector is a distinctive feature of emerging markets, limited research is conducted on how business cycles impact the informal economy (Fernández & Meza, 2015). This exploratory research examines the impact of business cycles on the perceived threat of informal sector on formal sector. As it is difficult to assess the extent of the informal competition (International Labor Organization, 2016) we use managers' perceptions to measure it. Measuring competitive intensity using perceptions of managers has been utilized in the previous literature (e.g.., Auh & Menguc, 2005; Balas, Gokus & Colakoglu, 2014; Jaworski & Kohli, 1993). Utilization of managers' perceptions of how intense the competition is appropriate as managers are responsible for making decisions on company strategy (Ceptureanu, 2016). We conducted multivariate analyses to explore possible linkages between formal sector competition to informal sector competition. Finally, in this study, we focus only on manufacturing firms as industry differences (i.e., manufacturing vs. service industry) might affect the strength of the relationships.

The paper proceeds as follows: Section 2 describes the characteristics of the sample utilized in this study. Section 3 illustrates the empirical results. Finally, in Section 4, we summarize the results, draw conclusions and suggest future research areas.

2. DATA

In this study, we study the informal competition in Eastern Europe and Central Asia. We use The BEEPSII and BEEPSIV surveys that cover businesses in twenty-nine countries in these regions. These surveys are conducted by the European Bank for Reconstruction and Development and the World Bank and were utilized in previous studies (e.g., Hudson et al., 2012). Since our objective is to examine the impact of the global crisis on the informal competition for manufacturing firms, we compare the 2008 survey results to the 2013 results. The 2008 survey results constitute the “pre-crisis period” and the 2013 results constitute the “post-crisis period.” We chose 2013 to represent the post-crisis period, as previous time periods, such as 2011 and 2012, would not have given accurate outlook on the recovery period as the effects of recession could still be affecting the companies.

The twenty-nine countries included in our study are: Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, FYR Macedonia, Georgia, Hungary, Kazakhstan, Kosovo, Kyrgyz Republic, Latvia, Lithuania, Moldova, Mongolia, Montenegro, Poland, Romania, Serbia, Slovak Republic, Slovenia, Tajikistan, Turkey, Ukraine, and Uzbekistan. We excluded Russia in our study as it was not included in the 2008 survey.

The two main questions that we focus on in these surveys are as follows:

(1) “Does this establishment compete against unregistered or informal firms?”

“Yes” is coded as “1” and “No” is coded as “2”.

(2) “Are practices of competitors in the informal sector No obstacle, A minor obstacle, A moderate obstacle, Major obstacle, or A very severe obstacle to the current operations of this establishment?”

Here, “No obstacle” is coded as “0”, “Minor obstacle” is coded as “1”, “Moderate obstacle” is coded as 2, “Major obstacle” is coded as “3”, “Very severe obstacle” is coded as “4”.

The surveys include questions on firm size, the experience level of the top manager, the gender of the top manager, whether or not the firm is part of a larger firm, firm type, whether or not at least one owner is female, and whether or not the firm has an internationally recognized quality certification.

Table 1 shows the summary statistics for the answers given to the first question for years 2008 and 2013. Panel A shows the statistics for all firms in the sample. The mean value for the answers given to the first question in 2008 is 1.579, while it is 1.605 in 2013. Since “Yes” is coded as “1” and “No” is coded as “2”, we can conclude that, overall, there are fewer manufacturing firms that competed against unregistered or the informal firms in 2013 when compared to 2008. The other panels show the statistics for our subgroups (i.e. subgroups on firm size, whether or not the firm is part of a larger firm, firm type, whether or not at least one owner is female, the experience level of the top manager, the gender of the top manager, and whether or not the firm has an internationally recognized quality certification).

Table 1. Summary Statistics for Competition Against Informal/Unreg. Firms for Manuf. Firms

	2008			2013		
	N	**Mean**	**Std**	**N**	**Mean**	**Std**
Panel A. All Firms						
all firms	3,667	1.579	0.494	3,886	1.605	0.489
Panel B. Firm Size						

employees 5-19	1,238	1.510	0.500	1,837	1.547	0.498
employees 20-99	1,335	1.584	0.493	1,268	1.640	0.480
employees >99	1,094	1.653	0.476	648	1.691	0.462
Panel C. Part of a Larger Firm						
part of a larger firm	369	1.615	0.487	316	1.646	0.479
not part of a larger firm	3,298	1.575	0.494	3,570	1.601	0.490
Panel D. Firm Type						
shareholding firm trading in the stock market	463	1.657	0.475	97	1.608	0.491
shareholding firm shares traded privately	2,142	1.559	0.497	3,231	1.615	0.487
sole proprietorship	538	1.498	0.500	416	1.507	0.501
partnership	106	1.660	0.476	41	1.659	0.480
limited partnership	283	1.678	0.468	17	1.647	0.493
other	125	1.680	0.468	81	1.691	0.465
Panel E. Female Owner						
one or more female owner	1,491	1.563	0.496	1,300	1.589	0.492
no female owner	2,107	1.585	0.493	2,521	1.610	0.488
Panel F. Experienced Top Manager						
top manager with 0-15 years of experience	1,875	1.590	0.492	1,836	1.611	0.488
top manager with >15 years of experience	1,690	1.559	0.497	1,917	1.599	0.490
Panel G. Top Manager Female						
top manager female	564	1.598	0.491	633	1.558	0.497
top manager not female	3,092	1.576	0.494	3,236	1.613	0.487
Panel H, Quality Certification						
firm without an intl recog. quality certification	2,277	1.574	0.495	2,509	1.577	0.494
firm with an intl recog. quality certification	1,260	1.587	0.493	1,263	1.656	0.475

Note: "Yes" is 1, "No" is 2.

Table 2 demonstrates the summary statistics for the answers given to the second question for years 2008 and 2013. Panel A illustrates the statistics for all firms in the sample. The mean value for the answers given to the second question in 2008 is 1.553, while it is only 1.096 in 2013. Since lower values here mean the informal competition is a less severe obstacle, we can conclude that, overall, the informal competition was a less severe obstacle for manufacturing firms in 2013 when compared to 2008. The other panels show the stats for our subgroups.

Table 2. Summary Statistics for Informal Sector as an Obstacle to Manuf. Firms

	2008			2013		
	N	Mean	Std	N	Mean	Std
Panel A. All Firms						
all firms	3,717	1.553	1.466	4,008	1.096	1.304
Panel B. Firm Size						
employees5-19	1,282	1.713	1.482	1,907	1.252	1.344
employees20-99	1,352	1.572	1.453	1,305	1.048	1.289
employees>99	1,083	1.342	1.437	659	0.778	1.165
Panel C. Part of a Larger Firm						
part of a larger firm	359	1.379	1.413	318	0.991	1.316
not part of a larger firm	3,358	1.572	1.470	3,690	1.105	1.302
Panel D. Firm Type						
shareholding firm trading in the stock market	456	1.467	1.473	95	1.095	1.329
shareholding firm shares traded privately	2,150	1.558	1.475	3,338	1.060	1.293
sole proprietorship	562	1.714	1.475	432	1.375	1.352
partnership	108	1.491	1.469	44	1.159	1.413
limited partnership	303	1.383	1.369	17	1.059	1.088
other	126	1.556	1.434	79	1.000	1.209
Panel E. Female Owner						
one or more female owner	1,503	1.579	1.487	1,332	1.152	1.326
no female owner	2,147	1.540	1.453	2,610	1.074	1.293
Panel F. Experienced Top Manager						
top manager with 0-15 years of experience	1,906	1.524	1.446	1,908	1.122	1.288
top manager with >15 years of experience	1,706	1.593	1.489	1,966	1.084	1.330
Panel G. Top Manager Female						
top manager female	568	1.636	1.516	660	1.192	1.330
top manager not female	3,140	1.536	1.456	3,334	1.077	1.297
Panel H, Quality Certification						
firm without an intl recog. quality certification	2,337	1.598	1.480	2,614	1.143	1.306
firm with an intl recog. quality certification	1,253	1.460	1.436	1,278	0.987	1.290

Note: "No" is 0, "Minor" is 1, "Moderate" is 2, "Major" is 3, "Very Severe" is 4.

In the next section, we compare the 2008 results to the 2013 results using non-parametric tests, specifically the Mann-Whitney-Wilcoxon tests. In the next section first, we compare the 2008 results to the 2013 results in for all manufacturing firms in the sample. Then, we conduct individual comparisons for each subgroup.

3. EMPIRICAL RESULTS

Table 3 compares the informal firm competition for the manufacturing firms in the 2008 sample versus 2013 sample. The mean score is 1.58 in 2008 versus 1.60 in 2013, meaning that there is an increase in the score. An increase in the score indicates that fewer firms competed against the informal firms in 2013 when compared to 2008. This difference is statistically significant (p=0.0114).

Table 3. Compete Against Unregistered/Informal Firms?
Wilcoxon Test

	2008	2013	p-value	up/down
all firms	1.58	1.60	0.0114	up

Note: "Yes" is 1, "No" is 2.

Table 4 examines whether the informal sector competition increased for all firm size groups (firms with 5-19 employees, firms with 20-99 employees, and firms with more than 99 employees), and for all firm types (whether the firm is part of a larger firm and whether the firm is a shareholding firm trading in the stock market, a shareholding firm whose shares are traded privately, a sole proprietorship, etc.).

Our results demonstrate that all size groups (firms with 5-19 employees, firms with 20-99 employees, and firms with more than 99 employees) are affected similarly. For each size group, the score went up significantly, meaning that significantly fewer firms in each size group competed against the informal firms in 2013 when compared to 2008. For firms with 5-19 employees, while the mean score is 1.51 in 2008, it is 1.55 in 2013. This change (which indicates fewer firms competing against the informal firms) is statistically significant (p=0.0223). For firms with 20-99 employees, while the mean score is 1.58 in 2008, it is 1.64 in 2013. This change is also statistically significant (p=0.0017). For firms with more than 99 employees, while the mean score is 1.65 in 2008, it is 1.69 in 2013. This change is also statistically significant (p=0.0488).

Table 4. Compete Against Unreg./Informal Firms? (Effect of Firm Size and Type)
Wilcoxon Test

	2008	2013	p-value	up/down
employees5-19	1.51	1.55	0.0223	up
employees20-99	1.58	1.64	0.0017	up
employees>99	1.65	1.69	0.0488	up
part of a larger firm	1.62	1.65	0.2061	
not part of a larger firm	1.58	1.60	0.0137	up
shareholding firm trading in the stock market	1.66	1.61	0.1826	
shareholding firm shares traded privately	1.56	1.61	<0.0001	up
sole proprietorship	1.50	1.51	0.3907	
partnership	1.66	1.66	0.4927	
limited partnership	1.68	1.65	0.3949	
other	1.68	1.69	0.4327	

Note: "Yes" is 1, "No" is 2.

Table 4 also shows that it does actually matter in terms of the informal competition whether the firm is part of a larger firm. For firms that are part of a larger firm, while the mean score is 1.62 in 2008, it is 1.65 in 2013. This change is not statistically significant (p=0.2061). This result indicates that, for this group, the degree of the informal competition had not changed after the global crisis. On the other hand, for firms that are not part of a larger firm, while the mean score is 1.58 in 2008, it is 1.60 in 2013. This change is statistically significant (p=0.0137), meaning that, for this group, the degree of the informal competition had gone down (i.e. fewer firms competed against the informal firms) after the global crisis.

Table 4 illustrates that fewer manufacturing firms with shares that are traded privately competed against the informal firms in 2013 when compared to 2008. For firms whose shares are traded privately, while the mean score is 1.56 in 2008, it is 1.61 in 2013. This change is statistically significant (p<0.0001).

On the other hand, the change in the proportion of firms competing against the informal firms in the other groups (firms whose shares are trading in the stock market, sole proprietorships, partnerships, limited partnerships, and other firms) is not statistically significant. We can conclude that only certain types of firms had benefited during this period.

Table 5 examines whether female ownership or female managers made a difference. For manufacturing firms, it did not matter much whether the firm had a female owner or not. The number of firms competing against the informal firms in both groups (firms with at least one female owner and firms with no female owner) had decreased significantly. While the mean score for firms with one or more female owner is 1.56 in 2008, it is 1.59 in 2013. The difference is statistically significant (p=0.0841). While the mean score for firms with no female owner is 1.59 in 2008, it is 1.61 in 2013. This difference is also statistically significant (p=0.0427).

Table 5. Compete Against Unreg./Inf. Firms? (Effect of Female Owner/Manager)
Wilcoxon Test

	2008	2013	p-value	up/down
one or more female owner	1.56	1.59	0.0841	up
no female owner	1.59	1.61	0.0427	up
top manager female	1.60	1.56	0.0819	down
top manager not female	1.58	1.61	0.0011	up

Note: "Yes" is 1, "No" is 2.

The table also shows that, for manufacturing firms, whether the firm has a female top manager or not did actually matters. For the firms that have a female top manager, the proportion of firms that compete against the informal firms had increased significantly. While the mean score for firms with a female top manager is 1.60 in 2008, it is 1.56 in 2013. This difference is statistically significant (p=0.0819). On the other hand, for the manufacturing firms that have a male top manager, the proportion of firms that compete against the informal firms had decreased significantly. While the mean score for firms without a female top manager is 1.58 in 2008, it is 1.61 in 2013. This difference is statistically significant (p=0.0011).

Table 6 investigates whether top manager's experience made a difference. The results indicate that it does actually matter. The proportion of firms competing against the informal firms had not changed significantly for the first group (i.e. firms with a relatively less experienced top manager) while it changed significantly for the second group (i.e. firms with a more experienced top manager). While the mean score for firms with a relatively less experienced top manager is 1.59 in 2008, it is 1.61 in 2013. The difference is not statistically significant (p=0.1050). On the other hand, while the mean score for firms with a relatively more experienced top manager is 1.56 in 2008, it is 1.60 in 2013. This difference is statistically significant (p=0.0072), meaning that fewer firms in this groups competed against the informal firms after the global crisis.

Table 6. Compete Against Unreg./Inf. Firms? (Effect of Experience and Quality)
Wilcoxon Test

	2008	2013	p-value	up/down
top manager with 0-15 years of experience	1.59	1.61	0.1050	
top manager with >15 years of experience	1.56	1.60	0.0072	up
firm without an intl recog. quality certification	1.57	1.58	0.4366	
firm with an intl recog. quality certification	1.59	1.66	0.0001	up

Note: "Yes" is 1, "No" is 2.

The table also illustrates that, for manufacturing firms, whether the firm has an internationally recognized quality certification or not did actually matter. The proportion of firms competing against the informal firms in the first group (i.e. firms without an internationally recognized quality certificate) had not changed significantly. While the mean score for firms without a quality certification is 1.57 in 2008, it is 1.58 in 2013. This difference is not statistically significant (p=0.4366). On the other hand, the results indicate that the proportion of firms competing against informal firms in the second group (i.e. firms with an internationally recognized quality certificate) had decreased significantly. While the mean score for firms with a quality certification is 1.59 in 2008, it is 1.66 in 2013. This difference is statistically significant (p=0.0001).

Table 7 compares the survey results to the question "Are practices of informal competitors an obstacle?" in 2008 versus in 2013. Here, the lower scores denote a less severe obstacle to the firm. The mean score is 1.55 in 2008 versus 1.10 in 2013, meaning that there is a decrease in the score. A decrease in the score indicates that firms find informal competitors less of an obstacle in 2013 when compared to 2008. This difference is statistically significant (p<0.0001).

Table 7. Are Practices of Informal Competitors an Obstacle?
Wilcoxon Test

	2008	2013	p-value	up/down
all firms	1.55	1.10	<0.0001	down

Note: "No" is 0, "Minor" is 1, "Moderate" is 2, "Major" is 3, "Very Severe" is 4.

Table 8 examines the results to the same question for all firm size groups (firms with 5-19 employees, firms with 20-99 employees, and firms with more than 99 employees), and for all firm types (whether the firm is part of a larger firm and whether the firm is a shareholding firm trading in the stock market, a shareholding firm whose shares are traded privately, a sole proprietorship, etc.).

Table 8. Are Practices of Informal Comp. an Obstacle? (Effect of Firm Size and Type)
Wilcoxon Test

	2008	2013	p-value	up/down
employees5-19	1.71	1.25	<0.0001	down
employees20-99	1.57	1.05	<0.0001	down
employees>99	1.34	0.78	<0.0001	down
part of a larger firm	1.38	0.99	<0.0001	down
not part of a larger firm	1.57	1.11	<0.0001	down
shareholding firm trading in the stock market	1.47	1.09	0.0150	down
shareholding firm shares traded privately	1.56	1.06	<0.0001	down
sole proprietorship	1.71	1.38	0.0002	down
partnership	1.49	1.16	0.0899	down
limited partnership	1.38	1.06	0.2175	
other	1.56	1.00	0.0034	down

Note: "No" is 0, "Minor" is 1, "Moderate" is 2, "Major" is 3, "Very Severe" is 4.

The results demonstrate that all firm size groups and all types of firms (except for limited partnerships) find the informal competitors less of an obstacle in 2013 compared to 2008. The scores are significantly lower in 2013 when compared to 2008 for all firm size and firm type groups, meaning that each of these size/type groups (except for limited partnerships) are bothered significantly less by the informal sector competition.

Table 9 examines whether female ownership or female managers made a difference. The results indicate that, the scores for all groups (i.e. firms with one or more female owner, firms with no female owner, firms with a female top manager, and firms with a male top manager) went down significantly after the global crisis, meaning that each of these groups were bothered significantly less by the informal sector competition. In other words, female ownership or female managers did not matter in terms of the change in the degree of the informal competition.

Table 9. Are Practices of Informal Comp. an Obstacle? (Effect of Female Owner/Manager)
Wilcoxon Test

	2008	2013	p-value	up/down
one or more female owner	1.58	1.15	<0.0001	down
no female owner	1.54	1.07	<0.0001	down
top manager female	1.64	1.19	<0.0001	down
top manager not female	1.54	1.08	<0.0001	down

Note: "No" is 0, "Minor" is 1, "Moderate" is 2, "Major" is 3, "Very Severe" is 4.

Table 10 examines whether having a more experienced top manager or having an internationally recognized quality certification made a difference. The results reveal that, the scores for all groups (i.e. firms with a less experienced top manager, firms with a more experienced top manager, firms without an internationally recognized quality certification, and firms with an internationally recognized quality certification) went down significantly after the global crisis, meaning that each of these groups were bothered significantly less by the informal sector competition. In other words, having a more experienced top manager or having an internationally recognized quality certification did not matter in terms of the change in the degree of the informal competition.

Table 10. Are Practices of Informal Comp. an Obstacle? (Effect of Exper. and Quality)

Wilcoxon Test	2008	2013	p-value	up/down
top manager with 0-15 years of experience	1.52	1.12	<0.0001	down
top manager with >15 years of experience	1.59	1.08	<0.0001	down
firm without an intl recog. quality certification	1.60	1.14	<0.0001	down
firm with an intl recog. quality certification	1.46	0.99	<0.0001	down

Table 11 shows the results of the logistic regression that predicts whether there was informal sector competition among the manufacturing firms. The two main independent variables that we focus on here are "the degree of formal sector competition" and "subsidies". We examine whether the degree of formal sector competition or subsidies explain the existence of informal sector competition. Our control variables are firm size, whether firm was part of a larger firm, firm type, whether firm had a female owner, whether the top manager was female, and whether the firm had an internationally recognized quality certification.

$$\text{Informalsectorcompetition} = c_0 + c_1(\text{size}) + c_2(\text{partofalarger}) + c_3(\text{type}) + c_4(\text{femaleowner}) + c_5(\text{topmanagerfemale}) + c_6(\text{intlcertification}) + c_7(\text{degreeofformalsectorcompetition}) + c_8(\text{subsidies}) + \varepsilon_t \quad (1)$$

The dependent variable "Informalsectorcompetition" takes the value "1" if the firm competes against unregistered or informal firms, and takes the value "2" if the firm does not compete against unregistered or informal firms. Our first main dependent variable "degreeofformalsectorcompetition" is coded as "0" if the formal sector competition was described as "No obstacle" for the firm. "Minor obstacle" is coded as "1", Moderate obstacle" is coded as "2", Major obstacle" is coded as "3", Very severe obstacle" is coded as "4". Our second main dependent variable "subsidies" is coded as "1" if the firm had received subsidies from the national, regional or local governments or European Union sources over the previous three years. Otherwise, it is coded as "2".

Table 11. Regression Predicting Whether There was Informal Sector Competition

Independent variables	Coefficient	p-value
size	0.0566	<0.0001
part of a larger	0.0024	0.9331
type	0.0105	0.0912
female owner	-0.0090	0.1047
top manager female	-0.0079	0.5311
intl certification	-0.0005	0.9262
degree of formal sector competition	-0.0632	<0.0001
subsidies	0.0165	0.5341
N	3,542	

The results show that, after controlling for several variables, our first main independent variable, "degreeofformalsectorcompetition", had a negative and significant impact on the existence of informal sector competition. The regression coefficient for "degreeofformalsectorcompetition" is -0.0632 (p<0.0001). A negative impact here means that, when the degree of formal sector competition goes up, the probability of a firm competing against unregistered or informal firms goes up (since "1" denotes the firm competes against unregistered firms while "2" denotes the firm does not compete against unregistered firms). In other words, when competition by the formal sector intensifies, competition by the informal sector also intensifies (i.e. more firms feel pressure from unregistered firms).

Our results show that, our second main independent variable, "subsidies", did not have a significant impact on the existence of informal sector competition. The regression coefficient for "subsidies" is 0.0165 (p=0.5341). In other words, "subsidies" do not explain informal sector competition.

Table 12. Regression Predicting the Degree of Informal Sector Competition

Independent variables	Coefficient	p-value
size	-0.1032	0.0003
part of a larger	0.0970	0.2006
type	0.0036	0.8259
female owner	0.0010	0.9456
top manager female	-0.0393	0.2506
intl certification	-0.0044	0.7470
degree of formal sector competition	0.4918	<0.0001
subsidies	0.0857	0.2334
N	3,655	

Table 12 shows the results of the logistic regression that predicts the degree of informal sector competition among the manufacturing firms. Again, the two main independent variables that we focus on here are "the degree of formal sector competition" and "subsidies". We examine whether the degree of formal sector competition or subsidies explain the degree of informal sector competition. Our control variables are firm size, whether firm was part of a larger firm, firm type, whether firm had a female owner, whether the top manager was female, and whether the firm had an internationally recognized quality certification.

$$\text{Degreeofinformalsectorcompetition} = c_0 + c_1(\text{size}) + c_2(\text{partofalarger}) + c_3(\text{type}) + c_4(\text{femaleowner}) + c_5(\text{topmanagerfemale}) + c_6(\text{intlcertification}) + c_7(\text{degreeofformalsectorcompetition}) + c_8(\text{subsidies}) + \varepsilon_t \quad (2)$$

The dependent variable "degreeofinformalsectorcompetition" is coded as "0" if the informal sector competition was described as "No obstacle" for the firm. "Minor obstacle" is coded as "1", Moderate obstacle" is coded as "2", Major obstacle" is coded as "3", Very severe obstacle" is coded as "4".

The results show that, after controlling for several variables, our first main independent variable, "degreeofformalsectorcompetition", had a positive and significant impact on the degree of informal sector competition. The regression coefficient for "degreeofformalsectorcompetition" is 0.4918 (p<0.0001). A positive impact here means that, when the degree of formal sector competition goes up, the degree of informal sector competition also goes up. In other words, when competition by the formal sector intensifies, competition by the informal sector also intensifies (i.e. firms feel more pressure from unregistered firms).

Our results show that, our second main independent variable, “subsidies”, did not have a significant impact on the existence of informal sector competition. The regression coefficient for “subsidies” is 0.0857 (p=0.2334). In other words, “subsidies” do not explain the degree of informal sector competition.

5. DISCUSSION AND CONCLUSION

Using national data on twenty-nine countries located in Eastern Europe and Central Asia, we empirically examined how the global crisis affected the informal sector competition against formal manufacturing firms.

The overall results indicate that, five years after the global crisis started, manufacturing firms in Eastern Europe and Central Asia perceived less competition from the informal sector firms. According to an ERBD and World Bank report that utilized the 2013-2014 BEEPS data, the number one complaint among the companies in the twenty-nine Eastern European and Central Asian countries was unfair competition from the informal economy (Williams, 2015). Our study adds on to this finding by establishing that the threat from the informal economy is perceived as a less threat by managers in 2013, after the global crisis, compared to 2008. This result might due to improvements made in the five years after the crisis. The improvements were related to court procedures and bureaucracy related to business licensing and permits, and corruption, especially on informal payments expected or requested by tax and public officials and attainment of import and operating licenses (Williams, 2015). ILO states that it has been working with governments in Central and Eastern Europe to assist in adoption of legal legislation that aids in reducing informal employment, enhancing law enforcement, and increasing awareness of the negative impact of informal employment (ILO, 2016).

Our detailed analysis reveals this result was true for all manufacturing firms regardless of size, and gender of the owner. However, for some firm types (i.e. for firms with a less experienced top manager and for firms without an internationally recognized quality certificate), the results are insignificant. Future research needs to be conducted to undercover the reasons for this finding.

Additionally, our study found that, five years after the global crisis started, more firms with a female top manager felt competition against the informal firms. For manufacturing firms with a male top manager, the perceived threat of competition from the informal sector went down after the crisis. However, for manufacturing firms with a female top manager, the perceived threat of competition from the informal sector went up five years after the 2008-2009 economic crisis started. These results are interesting in pointing out the importance of gender of top manager. However, we need to emphasize that rather than measuring direct competition from the informal sector, perceived competition measure is used in this study. Future studies might use measures that directly assess the actual competition from the informal firms rather than how the top managers perceive it.

After examining whether these firms felt more or less competition from the informal sector over time, we focused on whether they saw the informal sector competition as a larger or a smaller obstacle over time. We found that, five years after the global crisis started, manufacturing firms in Eastern European and Central Asian countries found the informal sector competition as less of an obstacle. The results held true for all types of firms.

Our result for larger firms contradicts the results of Yang and Pisani's (2018) study which finds that larger firms are more likely to face competition from the informal firms. The contradiction might be due to the different characteristics of the countries included in the two studies. While our study focuses on emerging markets of Eastern Europe and Central Asia, Yang and Pisani's (2018) study focuses on China. What is true in the emerging market of China might be very different than other emerging markets (Yang & Pisani, 2018). Furthermore, our study only focuses on the manufacturing industry, while Yang & Pisani's (2018) study covers all industries. More future research is needed to study the reasons for this contradiction. One future research avenue might be to conduct a study that covers a large number of emerging markets from different regions of the world. Additionally, future studies could divide the countries into different groups based on their economic development and then test to see if the results differ based on the economic development level of the countries. Smith and Swain (2010) reports that, among the Eastern and Central European and former Soviet Union countries, the impacts of the 2008-2009 global crisis are different. Moreover, a study conducted by Abbott and Wallace (2009) find that, among Commonwealth of Independent States, countries that are more economically developed had fewer households that depend on the informal economy compared to countries that are less developed.

Finally, our multivariate analysis results indicate that there is a relationship between formal competitive intensity and informal competitive intensity after controlling for size, whether the firm is a part of a larger firm, whether the owner is female, whether the top manager is female, whether the firm has internationally recognized quality certification, and whether the firm received government subsidies.

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