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Measuring its Determinants: Evidence from Russia**

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## ABSTRACT

### **Re-defining Informal Employment and Measuring its Determinants: Evidence from Russia<sup>\*</sup>**

Informal activities impact countries' economic development and overall growth. However, studying informal employment is not easy and it is crucial to provide a valid definition of it. This paper contributes to the recent discussion of the measures of informality by taking advantage of a rich dataset on Russia over the period 2003 - 2011, that is before and after the economic downturn, together with a special supplement on informality that allows to construct different measures of informal employment and to analyze its determinants. We demonstrate that the incidence of informal employment varies across the different definitions. However, the determinants of informal employment are roughly stable across the different measures as long as we exclude firm size as a criterion. We also show that risk-averse individuals, as expected, are less likely to select themselves into informal employment.

JEL Classification: J31, J40, P23

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## **I. Introduction**

Informality, that is, economic activity that is not registered or only partially registered, and informal employment, which provides only partial or no protection against unemployment, illness and old age, pose a major challenge to policy makers in all parts of the world. There exist equity and efficiency considerations that point to a strong need to pursue policies that increase the shares of formal economic activity and employment. It is certainly inequitable if part of the workforce and some firms do not pay their taxes since this implies that those who are formal, whether workers or entrepreneurs, have to bear a disproportionate burden in the financing of public goods that are also of benefit to those being economically active without registration. If the informal part of the economy becomes more substantial this can also mean that governments have to raise taxes and contributions on the formal part and thus have to increase the costs of being formal, which in the final analysis can result in even more informality and a reduced tax base. Furthermore, often workers in informal jobs are severely exploited and are working under conditions that can be hazardous to their health (Lehmann and Tatsiramos 2012).

Turning to efficiency, most economists maintain that employment in the formal sector is associated with a greater use of physical capital that requires human capital acquisition on the part of the employed workers, while the informally employed often work with little or no physical capital and possess little human capital. Since physical and human capital are very important ingredients of growth (see, e.g., Lucas 1988), an economy with a relatively large formal sector will, *ceteris paribus*, grow at a more rapid pace than an economy with a smaller formal sector. In the medium run, policies combating informality and informal employment are thus vital for raising income and welfare of low and middle income countries.

Before one can devise policies to combat informal employment one needs to establish the incidence and the determinants of informal employment. As we shall demonstrate, the incidence and to a lesser degree the determinants of informal employment depend on how it is measured.

Taking advantage of a rich dataset on Russia over 2003-2011 together with a special supplement on informality allows us to construct different measures of informal employment and to analyze its determinants. We are able to construct those competing measures of informal employment that are most commonly used in the literature, plus additional measures that can be derived because of the richness of our data set. We thus contribute to a growing literature that paints a detailed and subtle picture of informal employment and its determinants in emerging economies using a gamut of different definitions and emphasizing the importance of measuring this phenomenon (see, e.g., Henley, Arabsheibani and Carneiro 2009 on Brazil). Having different measures of informality, that include both formal and informal dependent employees and entrepreneurs, as well as voluntary and involuntary informal workers allows us to overcome measurement difficulties that usually arise in such studies. Our dataset spans a period before and after the economic downturn of 2008, thus allowing us also making a descriptive inference on whether informality has increased after the 2008, and for which groups. Finally, we also estimate determinants of informal employment, both voluntary and involuntary, including those that are usually unobserved to the researchers, such as risk proclivity. This direct evidence is possible because we have data on self-assessed risk attitudes of workers and the data allow us to distinguish between voluntary and involuntary informal employment. The exploration of the link between risk attitudes and labor market behavior has been undertaken with respect to, e.g., the migration decision (Jaeger et al. 2010); exploring the link between risk attitudes and self-selection into one of the types of informal employment or into formal employment, to our knowledge, has not been done in the literature thus far.

< Table 1 >

While it is difficult to precisely estimate the size of informality and informal employment, there can be no doubt that in Russia a substantial part of economic activity is not registered or only partially registered and that many workers enter employment relationships that provide only partial or no protection (see Slonimczyk 2012, Gimpelson and Zudina 2011, Kapeliushnikov, 2012). Table

1, based on official Rosstat<sup>1</sup> data, shows the distribution of informal employment relationships across main and secondary jobs and across regions for the years 2003 and 2010. The figures point to a wide variation in the incidence across Russia's macro-regions. While according to these official data the average share of informal jobs is about 16 percent, this share can be in the low single digits in the high growth and diversified regions of Moscow and Sankt-Petersburg, while it reached 23 percent in 2010 in the relatively poor Southern Region and roughly 38 percent in the North-Caucasus region. Table 1 certainly demonstrates that informal employment is a wide-spread phenomenon in the Russian labor market. In this paper we shall go beyond these official estimates, however, and shall provide a much more detailed and refined picture of informal employment in Russia.

The rest of the paper has the following structure. The next section describes the data and the various measures of informal employment. We then discuss the incidence and the determinants of informal employment by estimating probit and multinomial logit models. A final section offers some conclusions.

## **II. Pertinent Literature on Russia**

A number of recent studies have analyzed informality in Russia. The study by Gimpelson and Zudina (2011a) discusses the general trends of informal employment in Russia, emphasizing the difference between employment in the informal sector and informal employment, covering the years 1999 to 2009. Their analysis uses Russian Labor Force Survey (RLFS) data collected by Rosstat and employs a productivity-based definition of informality. They find a clear upward trend in informal employment in the reported period from roughly 8 million in 1999 to about 12 million in 2008, i.e. from roughly 13 to approximately 18 percent of total employment (while when using a definition based on the difference between the overall employment and employment according to enterprise accounting they arrive at a figure of more than 30 percent, Gimpelson and Zudina,

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<sup>1</sup> Rosstat is the Federal Statistical Office of the Russian Federation.

2011b). The authors perform an analysis at the individual and at the regional level. Using multinomial regressions they describe the main determinants of the probability to be informally employed: males, workers with low educational attainment and workers who are employed in construction, retail trade and the hotel and restaurant business are particularly affected. Estimated distributions of the share of informal employment by region point to a rightward shift and a widening of the distributions between 2000 and 2008. Results of fixed effects models that use regional panel data show that in regions with higher GDP per capita but also with a higher unemployment rate the share of dependent informal workers is larger. The first result points to the fact that much of the growth of economic activity that we observe in this period is linked to the growth of informal jobs. The co-movement of the unemployment rate and the share of informal employment can be interpreted that regions with relatively loose labor markets are also characterized by a disproportionately high share of bad jobs. The authors also find that regions with disproportionately high shares of tertiary education, of young and older workers have lower shares of informal employment. While the first finding is very intuitive, the impact of the age structure of the workforce according to the authors can only be explained by the fact that dependent informal employment is heavily concentrated among workers of middle age. As far as the share of informal self-employment is concerned, the regional fixed effects regressions only find a positive relationship between this share and the unemployment rate and the share of young workers. The first result points to a complementary relationship between unemployment and informal self-employment. The second finding seems to imply that informal self-employment is especially widespread among young workers.

Karabchuk and Nikitina (2011) employ the RLMS data to describe informal and occasional employment and define as informally employed those who work in firms with less than 5 employees, those who report not working in an enterprise/organization as well as those who work in an enterprise but do not have an official contract. They report that informal employment has

increased somewhat over 2003-2009, reaching its peak in 2004 with 17.6% and slightly tapering off to 17.2% in 2009, when the overall number can be broken down as follows: 3.3% working in small firms, 8% not working in an enterprise/organization and 5.5% working without an official contract. Among the informally employed they find roughly equal shares of female and male workers (although females are more likely to dominate in firms with less than 5 employees while men – to work without a contract or to be self-employed), a higher proportion of workers 26-35 years old, among dependent employees a higher proportion of those 15-25 years old, and a higher share of married persons and service workers (see also Karabchuk, 2012).

The paper by Kapeliushnikov (2012) uses the 2009 supplement on informality to the Russian Longitudinal Monitoring Survey (RLMS). This supplement contains information that allows the assessment of informality employing various definitions. Kapeliushnikov finds that depending on its definition the incidence of informal employment can vary between slightly more than 10 and almost 25 percent in the Russian labor market and that the social and demographic profile of informal workers dramatically changes when using different definitions. In addition, his econometric exercises demonstrate that the determinants of informality also crucially depend on the definition on which the dependent variable, informal employment, is based. He thus moots that estimates of informal employment and its determinants are hardly robust in the Russian case. Our paper goes beyond Kapeliushnikov's study in that we do not only use the 2009 supplement on informality but also panel data from the main RLMS survey and retrospective panel data from the 2008 supplement on worker displacement that contains questions on the nature of the employment relationship that workers enter between 2003 and 2008, hence we cover more than a cross section. In addition, we also distinguish between the voluntary or involuntary nature of the informal employment relations, which can be done using the main RLMS questionnaire, and analyze determinants of both.



The literature that we have discussed thus far is “static”, essentially looking at stocks of employed workers. The papers by Lehmann, Razzolini and Zaiceva (2012) and by Lehmann, Muravyev, Razzolini and Zaiceva (2013) in contrast have a dynamic dimension as they also look at the impact of worker flows on informal employment. Both studies find that those who separate from jobs, whether voluntarily or involuntarily, have a higher probability of finding a subsequent job that is informal or where part of the wage consists of “envelope payments”, that is, of undeclared wages. This probability is particularly high for workers who were displaced and who have low human capital. The study by Lehmann, Razzolini and Zaiceva (2012) in addition establishes that “informality breeds informality”, that is, that workers who separated from an informal job have a far higher likelihood to find a subsequent job that is informal than workers who separated from a formal job.

Slonimczyk (2013) analyzes mobility across different forms of formal and informal employment using transition matrices and a dynamic multinomial logit model employing the RLMS data over the period 2002-2011. He considers as informal entrepreneurs and employees those workers who do not work in firms or organizations, those working at firms without a contract as well as those who report undertaking irregular activities. Consistent with the above studies, the author finds little evidence of entry barriers to the formal sector (with the exception of irregular activities) and concludes that while informal entrepreneurship acts as a stepping-stone toward formal entrepreneurship, informal employees are not more likely than the unemployed to get a formal position. Finally, earnings regressions show a significant gap between formal entrepreneurship which is the best paid option, and other forms of employment.

Our paper contributes to the above literature on informal employment in Russia in two ways. First, we paint a more complete picture of informal employment in the Russian labor market than previously done and estimate its determinants using different definitions over the years 2003 - 2011. We thus contribute to the literature that discusses how to define and measure the informal

sector in emerging economies, as done for Brazil by Henley et al. (2009). In addition, we have direct evidence on the link of risk attitudes and labor market status divided into informal involuntary employment, voluntary informal employment and formal employment.

### **III. Data, Various Measures of Informal Employment and Descriptive Analysis**

#### **III.1 Data**

The analysis uses a database that consists of the panel data of the Russian Longitudinal Monitoring Survey (RLMS) for the years 2003 to 2011 and one special supplement. The supplement is on informality and was administered to the 18th round of the RLMS between September and December 2009. We use the main RLMS panel data of the years 2003 to 2011 and combine them with the new and unique data from the supplement on informality. The supplement focuses on the main job of workers, which in the case of multiple job holding is either the job providing the largest income or the job where the worker deposits his or her labor book.<sup>2</sup>

We also distinguish in our analysis between dependent employees and the self-employed and entrepreneurs. We consider respondents as self-employed/entrepreneurs if they report to undertake entrepreneurial activities and to be either owners of firms or self-employed individuals who work on their own account with or without employees. The final sample, based on the main survey data and the data from the supplement, includes individuals between 15 and 64 years of age, who are not on military duties.

Defining informal employment is a complex issue (see, e.g., Perry et al. 2007). We predominantly focus on the “legalistic” perspective to determine informal employment in this paper, which considers an employment relationship informal if the employer does not register the

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<sup>2</sup> Respondents in the main RLMS and in the displacement supplement are asked to discuss the job that they themselves consider their main job. This can be understood by the respondents in the two ways mentioned in the text.

job in order to avoid the payment of taxes and social security contributions. The Russian labor code stipulates that all employees must sign a written contract and provide their “labor book” to the employer. Oral agreements are explicitly prohibited. Employing the “legalistic” definition, we first formulate a narrow measure of informal employment by focusing on the main job of dependent employees. A broader measure that we also formulate in this study adds second job-holders as well as informal self-employed to dependent informal main job holders. We also use one variant of the “productive” definition of informal employment, that is, workers being employed in firms with less than five employees are all considered informal.

The main RLMS data survey instrument contains questions that allow the identification of workers who have informal employment relationships. Dependent employees are asked whether they are officially registered at their job, i.e. whether they are on a “work roster, work agreement or contract?” A positive response to this question is interpreted as a formal employment relationship. Those workers who say no to this question are considered to be in an informal employment relationship. For those who are determined to be in such a relationship we can also establish whether they entered it involuntarily or voluntarily.<sup>3</sup> A broader measure adds second job-holders (employees without a formal contract/agreement) as well as informal self-employed. As in Slonimczyk (2012) self-employed are considered informal if their activity is not registered with the authorities (i.e. report to not work in an enterprise/organization) or if they respond that they are not covered officially by a work agreement or contract. From the main data set we can also recover the percentage of a worker’s salary that is paid officially, that is on which taxes and contributions are paid, thus indirectly establishing the incidence and extent of unofficial wage payments or so-called “envelope payments.” In addition, we also define informal as those who are either informal dependent employees because they have no work contract and those who reply that they do not work in an enterprise/organization, without additional restrictions regarding self-employment. Also

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<sup>3</sup> Respondents are asked whether (1) the employer did not want a registration of the job, (2) the respondent did not want to register, or (3) both employer and respondent did not want to register. Respondents giving answers (2) or (3) are deemed to be voluntarily in informal jobs.

interesting, and thus far little pursued in the literature is informality that arises from “envelope payments”, where workers who are formally employed get at least part of their income as undeclared wages. Finally, in the RLMS there is a list of 11 benefits that are provided to a worker. The absence of the mandatory three benefits, i.e., paid vacations, paid sick leave and maternity leave, is considered an indicator of informality. This information is available for dependent employees only and for both the main and the second job.

The 2009 supplement on informality allows us to establish dependent workers who have an oral contract in 2009, which we take as an additional measure of an informal employment relationship. The informality supplement also allows us to get at the issue of informal employment from additional angles, which we discuss in the next section.

### **III.2 Various Measures of Informal Employment**

Table 2 presents the different measures of informal employment that we will use in the analysis, for the whole sample and with the data sliced by gender, education and immigrant status. We present seven measures in total. The first measure is narrow and comprises only informal dependent employment at the main job, while the second measure is more general, including informal employees as main job holders, informal workers in a secondary job and all informal self-employed. The group of the informal self-employed is composed of those doing entrepreneurial activities who are either owners of firms or self-employed individuals who work on their own account with or without employees but not at a firm or organization. The third definition of informal employment includes employees without a contract and those who do not work in an enterprise/organization in the main or secondary job. We can assume that this latter group predominantly consists of informal self-employed and informal entrepreneurs, but there can be some dependent workers who do not work in an enterprise/organization. The fourth measure adds workers who have a formal job or none

at all but engage in irregular informal activities to the third group.<sup>4</sup> The fifth measure takes firm size as the defining criterion. The sixth measure is the share of all workers who receive all or part of their wages as “envelope payments”, that is where all or part of their wages are not taxed. Many of the workers with “envelope payments” can work in the formal sector and can have a formal contract. The final definition is based on the non-availability of the three mandatory benefits.

Using different measures of informality generates different estimates of its incidence. While the lowest number is given by dependent employees without a work/contract agreement (around 6 percent in 2011 relative to all employees), the highest numbers, with around 19 percent in 2011, emerge if we use definitions based on envelope payments and the most encompassing employment-based definition that includes informal employees as well as those who do not work in an enterprise/organization and those who engage in irregular activities. Another interesting fact that emerges both from Table 2 is that for all measures apart for the one based on benefits, informality is larger at the end of the period than in the beginning, which is consistent with a growth of informal employment during the 2000s reported by other studies (in some cases the difference is rather small though).

< Table 2 >

Looking across gender, educational attainment and migration status, we see a clear ranking of the measures of informal employment. Workers with “envelope payments” and the two encompassing employment-based definitions (definitions three and four) have clearly the highest incidence, followed by the second measure of all informally employed and by the measure based on benefits. The definition using firm size produces the next highest incidence of informal employment for the most part, although at times this measure gives a lower share of informal workers than the measure of informal main job holders (dependent employees) who in general have the lowest incidence.

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<sup>4</sup> Respondents who state that they are conducting irregular activities are asked whether they undertake these activities officially, “for example by an agreement, official contract or license.” If the answer is negative the activities are considered informal.

In the years 2007 and 2011 female workers have a statistically significant lower incidence of informal employment. So, like in other transition economies (see Lehmann and Pignatti 2007; Bernabè and Stampini 2008) and unlike in developing countries (see, e.g., Perry et al. 2007) female workers are less likely to have an informal job than men. However, when the criterion of firm size is used women seem to have a higher incidence of informal employment. This last result simply points to the fact that the employment of female workers tends to be concentrated in smaller firms. Thus when one contrasts this result with the lower incidence of informal employment for women using the other three measures one finds a first indication of the potential weakness of the firm size measure.

Educational attainment has a significant impact on the rate of informal employment as the central panels of table 2 demonstrate. In 2011 apart from the measure based on firm size workers with secondary education have a lower rate than workers with only primary education. In addition, in all years workers with higher education have a statistically significant lower incidence of informal employment than workers with secondary education no matter which measure of informal employment is used. Migrant status, on the other hand, is particularly relevant in 2011. As the last panel of table 2 shows, migrants are to a much greater degree involved in informal employment relationships than natives, independent of the underlying measure.

When slicing the data by gender, educational attainment and migration status, in general statistically significant differences between the groups with the expected signs are valid for all measures used. The one measure where this not always holds is firm size. The correlations between the different informality measures, calculated over the years 2003 to 2011 and 2009-2011, for which the wage measure is available, confirm this weak correspondence of the firm size measure with the other measures. While other measures are highly correlated, the measure with firm size less than 5 employees has a very low correlation with the other measures. Among employed individuals classified as informal by the four employment-based definitions of informality, more than 20 percent work in firms with less than 5 employees and over 12 percent have an informal wage share.

In the descriptive and econometric analysis that we undertake in the paper we include the firm size measure only for comparative purposes since it shows a very low correlation with the other measures and is thus covering a quite different subset of workers. Workers who declare part of their wages as informal also belong in general to a different subset than informal workers identified with an employment-based definition of informality.

Before we turn to the descriptive analysis we discuss the wide variation in the incidence of informal employment that we can additionally elicit from the rich information contained in the 2009 main data set of the RLMS and its 2009 informality supplement. The first panel of table 3 presents measures of informal employment based on responses extracted from the main questionnaire. The first cell shows the lowest incidence in the entire table, which relates to dependent employees without a work agreement or contract among all dependent employees. The next entry in the first panel puts together all dependent employees in the main or secondary job without contract as well as informal self-employed; this group reaches an incidence of about 10 percent relative to the employed population. Finally informal employees defined as workers receiving all or part of their wages as “envelope payments” amount to about 18 percent in 2009. Among the self-employed, a whopping 73 percent are informal according to the most encompassing definition of informal self-employment.

< Table 3 >

Extracting information about contract type from responses in the supplement, we use an oral agreement of dependent workers as an indication of informal employment. In this case, the incidence of informal employment among dependent workers is about 4 percentage points higher relative to the measure that uses lack of an official contract elicited from the main questionnaire (cf. 11.17% in panel 2 to 6.91% in panel 1). Dependent employees with an oral agreement in the main or in secondary jobs and non-registered self-employed constitute a slightly higher share in the supplement than the corresponding measure taken from the main questionnaire. Questions on whether employers or the self-employed pay social security contributions on the wage allow us to

arrive at an additional definition of informal employment.<sup>5</sup> Thus defined, as the entries in the next cells of the central panel indicate, slightly less than 20 percent of all dependent employees are informal. If we consider dependent employees and firm-owners who do not pay social security contributions, this definition also implies that roughly 20 percent of overall employment is informal. However, the definition from the supplement (business is not registered) gives a much lower estimate of informal self-employment among all self-employed than the definition from the main data (cf. 44.77% to 73.02%), while a bit more than half of all self-employed do not pay contributions.

We develop a final and non-standard definition of informal dependent employment by taking into consideration the attitudes of employers versus labor laws and work agreements available in the 2009 supplement. Not respecting labor laws and work agreements one hundred percent will affect the security of jobs to some degree and can introduce an element of informality into jobs. On the measure of not respecting one hundred percent labor laws we arrive at a share of informal dependent employment of roughly 45 percent, the informality rate based on not respecting one hundred percent work agreements reaches about 40 percent. While we will not pursue this definition of informal employment any more in the paper, we find it worthwhile to highlight the two statistics based on this non-standard definition as they can demonstrate the multi-faceted nature of informal employment relationships in the Russian labor market.

When estimating correlations between some of the more standard measures of informal employment coming from the main data set and from the supplementary data in 2009, we find the particularly important result of a high correlation between measures that rely on non-registration of the job, on one hand, and on oral type of contract, on the other hand. The high correlation between “job without contract” and “oral contract” thus implies that it is legitimate to use these two measures of informal employment interchangeably. It is also noteworthy but unsurprising that only

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<sup>5</sup> We define employment as informal if the employer or the self-employed does not pay, at least in part, the social security contributions commensurate with an employee’s or a self-employed person’s wage.



the measure of informality based on “envelope payments” has a relatively low correlation with the other measures while the measure derived from responses regarding the unwillingness of employer to pay social security contributions shows a relatively high correlation with all other measures.

### **III.3 Descriptive analysis**

We start off with a discussion of time trends of informal employment and non-employment and whether they behave as substitutes or as compliments over time. When informal employment is a substitute (compliment) for non-employment, it behaves pro-cyclically (anti-cyclically) over the business cycle. A pro-cyclical behavior of informal employment is often associated with an integrated labor market, while informal employment that moves anti-cyclically is thought to show labor market segmentation (see Maloney 2004). We discuss the trends of informal employment and non-employment here to demonstrate that the scenario we get depends crucially on the definition of informal employment. With some measures we get a pattern of substitution between non-employment and informal employment, while other measures point to their complementarity over time.

The evolution of the incidence of informal employment, relying on various measures, and of the non-employment rate<sup>6</sup> for the period 2003 to 2011 can be derived from the main RLMS data (see Figures A1-A4 in the Appendix). Until 2008, the year of the financial crisis, non-employment shows a clear downward trend from 38 to roughly 33 percent, with a reversal after the crisis year and a slight rise to about 34 percent in 2011. Using non-registration (no contract) in the main job and non-registration of main or secondary job or informal self-employment as our measures of informal employment, both measures rise between 2003 and 2006 and fall between 2009 and 2011. Thus for most of the period informal employment and non-employment are substitutes and not complements. This is also the case for the informality definition based on dependent employment

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<sup>6</sup> Since the border between unemployment and inactivity is rather blurred in the Russian labor market and unemployment benefits are below the subsistence minimum if available at all, we report the non-employment rate and not the unemployment rate.

and not working in an enterprise/organization either in the main job or in the main or the secondary job.

When we use firm size as our criterion for informal employment, informal employment tracks non-employment. Thus when firm size underlies our measure of informal employment, this labor market state seems to behave complementary to non-employment. Taking the absence of the three mandatory benefits, which we discussed above, as an additional indicator of informality, we also find that informal employment thus defined is complementary to non-employment whether the measure is derived for the main job only or for the main job or the secondary job.

< Figure 1 >

< Figure 2 >

Next, we slice the data by sector and occupation and show the shares of informal employment using three “legalistic” definitions in figures 1 and 2, and the firm size definition in figures 3 and 4.<sup>7</sup> Figure 1 demonstrates the large variation in the incidence of informal employment by sector, with *construction* and *trade and related services* showing by far the largest shares of informal employment. In addition, in *light and food industry*, *transport*, *agriculture* and in *other sector* we also find a relatively large incidence of informal employment (panels b and c of figure 1). Service workers, workers in crafts and related trades as well as unskilled workers have far higher shares of informal employment in the main job than other occupations (panel a of figure 2). When we add non-registered secondary jobs and self-employment, *skilled agricultural and fishery workers* as well as *legislators*, *senior managers and officials* are additional occupational categories with a high incidence of informal employment, as panel b of figure 2 attests. Thus, these two groups seem to be particularly involved in unofficial work when they have a secondary job or are self-employed. When we use the answer “not in an enterprise/organization at the main or second job” to

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<sup>7</sup> The figures showing occupations need to be interpreted with caution, since the number of observations for some occupations is very small .

get at informal self-employment and entrepreneurship (panel c) we get the same dominant occupations as in panel b.

The sector *trade and related services* has by far the highest incidence of informal employment when we use firm size as our measure (see figure 3). Apart from *other sector* we now also find *public administration* and *science and culture* exhibiting relatively high shares of informal employment. These relative magnitudes strike us as another indication that firm size might not be a good measure for informal employment. The same caveat seems to apply when we look at informal employment by occupation using firm size as our criterion (see figure 4). While we find it reasonable that *service workers* and *skilled agricultural and fishery workers* have a high incidence of informal employment, it is hard to believe that legislators, senior managers and officials have an incidence that is thrice as large as that of unskilled workers. Hence, the measure using firm size less than 5 seems problematic when trying to link occupations with informal employment.

< Figure 3 >

< Figure 4 >

## **IV Determinants of informal employment**

### **IV.1 Determinants of overall informal employment using various measures**

Which factors are the main determinants of informal employment? Are the identified determinants stable across a spectrum of different definitions of informal employment? These questions are answered in table 4, which presents the signs of marginal effects across five definitions of informal employment.<sup>8</sup> The first 5 demographic factors show some interesting patterns. Informal employment decreases in age when we take the four “legalistic” measures, but increases in age when we use the firm size measure. On this last measure male workers are less likely to be

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<sup>8</sup> Table 4 is based on the complete results of probit regressions shown in tables A2-A6 in the appendix of the initial version of this paper (see Lehmann and Zaiceva 2013).

informally employed, while we find a higher probability of informal employment for male workers in the case of the first four measures. Being married and more educated decreases the likelihood of being informally employed no matter which measure of informal employment is used.

As far as location is concerned it is noteworthy that apart from the East dependent employees in Moscow and St. Petersburg have a higher probability to be informal than their counterparts in the rest of the country. When we extend the measure to informal self-employed and entrepreneurs (encompassing informal employment) the relative incidence is reversed for virtually all regions. It is also striking that residing in a village lowers the probability of being informally employed for the first four measures while this probability is increased if we use the criterion of firm size instead.

Industry affiliation and occupation show the same relative patterns that were shown in figures 1-4. Holding other observable factors constant, relative to workers being employed in *light and food industry* workers employed in the industries *construction* and *trade and related services* as well as *other industry* have a higher incidence of informality no matter which measure is used. When we use the encompassing measure of informal employees and self-employed/entrepreneurs *transport and communication* becomes an industry with a higher incidence of informality. Relative to *unskilled workers* most other occupations have a lower incidence of informal employment as long as the first four measures are used. This does not hold for *legislators, senior managers, officials* when secondary jobs are included (measure 2 in table 2) which points to informal work in secondary jobs for this group of professionals. Also, *skilled agricultural and fishery workers* are more involved in informal secondary jobs and as self-employed. Using the encompassing measure, *service workers* have a higher incidence of informal employment than *unskilled workers*.

When we compare the marginal effects of occupation using the first four measures and the firm size measure it becomes clear why firm size might not be a good criterion when defining informal employment. Using firm size, virtually all occupations have a higher incidence of informal

employment than unskilled workers. This result might be explained by the fact that in an emerging transition economy like Russia's the majority of unskilled workers, if they are employed, has jobs in large firms. At least when it comes to occupations firm size is not a criterion that allows us to tell anything about the distribution of formal and informal jobs.

An important upshot of the results presented in table 4 is that the affirmation by Kapeliushnikov (2012) of a non-robust picture regarding the determinants of informal employment needs to be qualified. While the measure based on firm size does indeed produce a different set of determinants than the other measures, when we concentrate on the first four measures we find for the most part a broad congruence regarding the drivers of informal employment; thus one can speak of a roughly robust picture with respect to the determination of informal employment when considering these first four measures.

< Table 4 >

#### **IV.2 Determinants of informal employment by employment state**

In most labor markets, there are some workers who are forced to take an informal job, while there are others who deliberately choose to take such a job (for Latin American labor markets, see Perry et al. 2007). It is, therefore, insightful to divide informal dependent employment into two states, involuntary and voluntary informal employment and estimate their determinants. Our data set makes this distinction possible.<sup>9</sup> In addition, self-employed workers might behave differently from dependent employees when selecting an employment state. In table 5 we, therefore, divide employment into five states: involuntary informal dependent employment, voluntary informal dependent employment, informal self-employment, formal self-employment and formal dependent employment. We assume informal self-employment to be voluntary.

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<sup>9</sup> Most studies that present MNL estimates of the probability to be in various employment states cannot distinguish between the voluntary and involuntary nature of informal employment because this dimension is not available in most data sets.

While males have a higher incidence of both dependent informal employment and informal self-employment, the marginal effects of age, marital status and educational attainment have opposite signs when we distinguish between dependent and self-employment: these factors increase the likelihood to engage in informal self-employed activities, but decrease it for both voluntary and involuntary informal dependent employment. While being an immigrant from the Caucasus or Central Asia raises the likelihood of informal self-employment, immigrants from other parts of the former Soviet Union do not seem to be more involved in self-employment than natives, but seem to have a particularly high incidence of involuntary informal dependent employment. Working in *construction* and in *trade and related services* raises the probability of being employed in both types of informal dependent employment, as well as in both types of self-employment, while a worker in *other industry* has a particularly high incidence of informal self-employment. Finally, compared to *unskilled workers* virtually all occupations seem to have a higher propensity to be engaged in informal self-employment and a lower incidence of working in voluntary and involuntary informal dependent employment.

### **IV.3 Risk attitudes and informal employment**

There is a growing empirical literature that looks at the impact of risk attitudes on economic behavior at the micro level. Regarding informality, we moot that workers that have a higher tendency to take risks are more likely to engage in informal employment. In order to test this supposition we take advantage of the 2009 supplement on informality that contains a module on risk attitudes in general and risk attitudes in different life domains. Figures 5 and 6 show the scale of risk attitudes in general and of risk attitudes in financial matters: the scales go from 0 (“completely unwilling to take risks”) to 10 (“completely willing to take risks”).<sup>10</sup>

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<sup>10</sup> These risk measures have been experimentally validated in the context of the German Socioeconomic Panel (GSOEP), where they have been introduced first, but intensive analysis of risk attitudes in Ukraine by Dohmen, Khamis

Inspection of the two figures seems to indicate that relatively risk-averse workers tend to prefer formal employment. It is also striking that persons who are more inclined to take risks have an especially high incidence of self-employment. Also, most of the mass for informal employees can be found in the upper part of the distribution, that is, from 5 to 10. So, informal employment and more risk-loving behavior seem to be positively associated. Since we use a cross section here we cannot establish whether we deal here with a correlation or a causal effect. However, the work on Ukraine undertaken in Dohmen, Khamis and Lehmann (2013) shows that risk attitudes have a very long gestation period. In addition, having a panel data set that includes two data points with the module on risk attitudes, the authors are able to establish that a labor market experience that spans six years does not alter workers' risk attitudes. Rather, risk attitudes seem to have a causal impact on the selection of labor market states in Ukraine. The marginal effects on the risk measures in the cross-section probit regressions that we present in table 6 thus can be given a causal interpretation in our opinion.

We look at two measures of risk attitudes, the measure already presented that has a scale from 0 to 10 and a risk indicator, which takes the value 1 if the risk measure takes a number between 6 and 10 and takes the value 0 otherwise. These two measures are used for both the general and the financial domain. The estimates with the general risk measure and a full set of controls (column 2) show that an increase of the risk measure by one unit will raise the probability of being informally employed by one fifth of a percentage point. The same result holds when risk attitudes are proxied with the risk measure in the financial domain. Persons who are risk loving, that is who find themselves on the scale between 6 and 10, have a probability that is 1.3 percentage points higher in case of the general risk indicator and 2.2 percentage points higher in the case of the financial indicator to find themselves in informal employment than persons who are relatively risk

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and Lehmann (2013) seem to indicate that in this transition country the drivers of risk attitudes are virtually identical to those in Germany. We, therefore, think that these measures of risk attitudes have some validity in Russia.

averse (see columns 4 and 8). These percentage point increases are large if one considers that in 2009 the observed incidence of informal employment in the main job was slightly below 7 percent (see table 3). Thus risk attitudes have to be thought of as an important predictor of employment along the informal-formal divide in the Russian labor market.

## **V. Conclusions**

Using the regular waves of the Russian Longitudinal Monitoring Survey (RLMS) for the years 2003 to 2011 and a supplement on informality administered to the RLMS in 2009 we document the incidence of informal employment in the Russian labor market. The incidence varies widely according to the measure of employment used, with dependent informal lying between roughly 7 and 20 percent of all employees and informal self-employment having a minimum value of 45 percent and a maximum value of 73 percent of all self-employed. We also call employment informal if in the formal sector firms do only declare a part of wages to the authorities and thus do not pay all the due taxes or the social security contributions to the government. We show that this type of informal employment is wide-spread in the Russian labor market, hovering around 20 percent for dependent employees and reaching roughly 50 percent for the self-employed.

Probit regressions that use different measures of informal employment as the dependent variable establish that younger workers, males, workers with primary education or less, persons with low skills, workers in construction and trade and related services have a substantially higher likelihood of being informally employed. It is noteworthy that these drivers of informal employment dominate with nearly all definitions; only when we use firm size (less than five employees) are the listed determinants not necessarily good predictors. For example, with the firm size definition females are more likely to be informally employed. From our probit estimates we draw two conclusions. First, the conjecture that the determination of informal employment is not



robust needs to be qualified in that our estimations show that we do have robustness with all measures apart from the firm size measure. Second, the criterion of firm size does not capture informal employment well, at least in an emerging transition economy like Russia

We also have information that allows us to divide employment into five states. Estimating multinomial logit models we find some very robust results. The vast majority of university graduates take informal dependent jobs out of their own volition, while immigrants from regions other than the Caucasus and Central Asia are particularly affected by involuntary dependent informal employment. Finally, it is above all unskilled workers who are involuntarily informal employees. While males have a higher incidence of both dependent informal employment and informal self-employment, the marginal effects of age, marital status and educational attainment have opposite signs when we distinguish between dependent employment and self-employment: these factors increase the likelihood to engage in informal self-employed activities, but decrease it for both voluntary and involuntary informal dependent employment. Finally, all occupations compared to unskilled workers have a higher propensity to be engaged in informal self-employment and a much lower one to be involved in dependent informal employment. Our descriptive evidence also suggests that informal employment has increased after the 2008 economic downturn in particular for low-skilled individuals suggesting the need to develop social policies that attenuate the worsening position of this group in the Russian labor market.

We also relate risk attitudes to informal employment and show that, as expected, persons who are more risk-loving tend to have a higher propensity to select themselves into informal employment. Moving from a risk averse to a risk-loving person will increase the likelihood to be informally employed by a substantial amount. Thus risk attitudes need to be considered an important factor that helps explain the distribution of employment along the formal-informal divide in the Russian labor market.

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## TABLES

Table 1: Employment in informal sector in the Russian Federation, 2003 and 2010 (Official Data).

	Total individuals, thous.		Main job, %		Additional job, %		Total employed in the informal sector in % of total employed population	
	2010	2003	2010	2003	2010	2003	2010	2003
Russian Federation	11583	10586,8	88.8	82.4	11.2	17.6	16.6	16.1
Central region	2443	2304	90.3	79	9.7	21	12.7	13.2
Moscow	299	146.2	94.5	83.4	5.5	16.6	5	3.4
Norh-Western region	618	897.3	87.9	85.1	12.1	14.9	8.7	12.7
Sankt-Petersburg	58	85.8	85.3	90.6	14.7	9.4	2.2	3.6
Southern region	1477	1851	88.7	87.7	11.3	12.3	23	22.4
North-Caucasus region	1372	-	94.1	-	5.9	-	37.9	-
Volga region	2585	2645.3	85.5	77.2	14.5	22.8	17.5	18.2
Ural region	797	986.4	91	85.3	9	14.7	13	14
Siberia region	1791	1518.8	86.9	86.4	13.1	13.6	19.2	16.8
Far East region	499	499.9	88.9	83.8	11.1	16.2	15.5	14.4

Source: Rosstat, “Social Situation and Life of the Population of Russia”, 2011 and 2004. (rus: “Socialnoje polozhenije I uroven zhizni naselenija Rossii”). [www.gks.ru](http://www.gks.ru)

Notes: in 2003 North Caucasus was included within Southern region, thus these regions are not directly comparable across two years.

Table 2: Incidence of informal employment: overall and by gender, education and migration status

	2003	2007	2011
		<i>Overall</i>	
Empl. inform., main job	0.053	0.059	0.060
Empl. inform. , All	0.089	0.097	0.094
Inform., not enterpr., main and sec. jobs	0.141	0.164	0.168
Inform., not enterpr., main and sec. jobs and additional irregular informal activities	0.179	0.184	0.185
Firm size <= 5	0.070	0.070	0.083
Wage informal	n.a.	0.180	0.186
No three main benefits, main and sec. jobs	0.111	0.100	0.103
		<i>Male</i>	
Empl. inform., main job	0.061	0.075	0.078
Empl. inform. , All	0.095	0.113	0.112
Inform., not enterpr., main and sec. jobs	0.155	0.188	0.199
Inform., not enterpr., main and sec. jobs and additional irregular informal activities	0.201	0.211	0.215
Firm size <= 5	0.056	0.048	0.075
Wage informal	n.a.	0.207	0.202
No three main benefits, main and sec. jobs	0.120	0.114	0.129
		<i>Female</i>	
Empl. inform., main job	0.047**	0.045***	0.046***
Empl. inform. , All	0.083	0.082***	0.077***
Inform., not enterpr., main and sec. jobs	0.130***	0.144***	0.142***
Inform., not enterpr., main and sec. jobs and additional irregular informal activities	0.161***	0.160***	0.159***
Firm size <= 5	0.081	0.086***	0.090**
Wage informal	n.a.	0.159***	0.173***
No three main benefits, main and sec. jobs	0.102**	0.087***	0.082***
		<i>Primary education</i>	
Empl. inform., main job	0.079	0.098	0.112
Empl. inform. , All	0.099	0.116	0.126
Inform., not enterpr., main and sec. jobs	0.167	0.209	0.253
Inform., not enterpr., main and sec. jobs and additional irregular informal activities	0.206	0.224	0.269
Firm size <= 5	0.090	0.075	0.106
Wage informal	n.a.	0.223	0.244
No three main benefits, main and sec. jobs	0.122	0.103	0.137
		<i>Secondary education</i>	
Empl. inform., main job	0.056**	0.063***	0.070***
Empl. inform. , All	0.096	0.104	0.103**
Inform., not enterpr., main and sec. jobs	0.151	0.181**	0.186***
Inform., not enterpr., main and sec. jobs and additional irregular informal activities	0.188	0.200*	0.201***
Firm size <= 5	0.079	0.078	0.095
Wage informal	n.a.	0.207	0.204**
No three main benefits, main and sec. jobs	0.111	0.112	0.113**
		<i>Secondary education</i>	
Empl. inform., main job	0.056	0.063	0.070
Empl. inform. , All	0.096	0.104	0.103
Inform., not enterpr., main and sec. jobs	0.151	0.181	0.186
Inform., not enterpr., main and sec. jobs and additional irregular informal activities	0.188	0.200	0.201
Firm size <= 5	0.079	0.078	0.095
Wage informal	n.a.	0.207	0.204
No three main benefits, main and sec. jobs	0.111	0.112	0.113
		<i>Higher education</i>	
Empl. inform., main job	0.024***	0.027***	0.026***
Empl. inform. , All	0.058***	0.066***	0.065***
Inform., not enterpr., main and sec. jobs	0.092***	0.096***	0.106***

Inform., not enterpr., main and sec. jobs and additional irregular informal activities	0 .129***	0 .120***	0 .125***
Firm size <= 5	0 .036***	0 .050***	0.057***
Wage informal	n.a.	0 .110***	0.140***
No three main benefits, main and sec. jobs	0.098	0.070***	0.073***
<i>Immigrant from outside Russia</i>			
Empl. inform., main job	0 .055	0 .071	0 .082
Empl. inform. , All	0 .115	0 .129	0 .149
Inform., not enterpr., main and sec. jobs	0 .175	0 .230	0 .242
Inform., not enterpr., main and sec. jobs and additional irregular informal activities	0 .224	0 .245	0 .249
Firm size <= 5	0 .059	0 .061	0 .119
Wage informal	n.a.	0 .182	0 .228
No three main benefits, main and sec. jobs	0 .144	0 .120	0 .138
<i>Natives</i>			
Empl. inform., main job	0 .053	0 .057	0 .059**
Empl. inform. , All	0 .086**	0 .094***	0 .089***
Inform., not enterpr., main and sec. jobs	0 .138**	0 .158***	0 .162***
Inform., not enterpr., main and sec. jobs and additional irregular informal activities	0 .175***	0 .178***	0 .179***
Firm size <= 5	0 .071	0 .070	0 .080***
Wage informal	n.a.	0 .180	0 .182***
No three main benefits, main and sec. jobs	0 .107**	0 .097	0 .100***

Notes: \*\*\*, \*\*, \* denotes that difference in means for a corresponding category is significant at the 1, 5 and 10 percent level. “Wage informal” is from 2009 instead of 2007; for benefits, 2010 is used instead of 2011. Immigrants refer to those born in the former USSR republics apart from Russia or in other countries.

“Empl. inform.. main job” stands for informal employees, main job. “Empl. inform. , All” stands for informal employees, main job , second job and informal self-employed (see text for exact definitions of self-employed). “Inform., not enterpr., main and sec. jobs” includes informal employees and those working not in enterprise/organization , main and second jobs. “Inform., not enterpr., main and sec. jobs and additional irregular informal activities” includes in addition those who report undertaking informal irregular/occasional additional activities. “Firm size <= 5” stands for firm size less than 5 employees. “Wage informal” refers to the share of workers who think that part or all of their wages at the main job were not official, that is, their employer did not pay taxes it. “No three main benefits, main and sec. jobs” refers to the share of workers for whom three compulsory benefits (paid vacations, paid sick leave, maternity leave) are not provided, main and second jobs.

**Table 3: Alternative measures of informal employment, 2009**

Main questionnaire					
Employed without work agreement/contract, main job, in % of all employees*	Employee without work agr/contract, informal self-employed, employee without agr/contract second job, in % of all employed	How much, you think, of your wage was official, i.e. employer paid taxes on it? (=1 if part of the wage was not official) , in % of all employees	Informal self-employed or works not in enterprise/organization*, in % of all self-employed		
6.91	10.22	18.02	73.02		
Supplement					
Oral agreement Employees, main job in % of all employees	Oral agreement employees, Not regist. Business self-employed, oral agreement or not registered second job, in % of all employed	Thinks/Knows that employer pays contributions only on part of the salary or doesn't pay contributions at all, in % of all employees	Employer or own firm does not pay social security contributions, in % of all employed	Not register. business , in % of self-employed	You /your firm does not pay soc. security contributions, in % of all self-employed
11.17	14.88	19.86	20.44	44.77	52.22
Additional (Supplement)					
Labor laws are respected<100% concerning you at this job, in % of all employees	Work agreements are respected<100% concerning you at this job, in % of all employees				
45.12	40.28				

Notes: \*this measure by definition includes some entrepreneurs who work in enterprise/organization.

\*\* entrepreneurs who work in enterprise/organization and do not have a work contract/agreement or do not work in enterprise/ organization and undertake individual/entrepreneurial activity.



Table 4: Summary of the determinants of informality by different measures

	(1) Informal employees, main job	(2) Informal employees main or sec. jobs, and informal self- employed	(3) Encompassing informal employment first measure	(4) Absence of three mandatory benefits, main and sec. jobs	(5) Firm size < 5 employees
Age	<0	<0	<0	<0	>0
Male	>0	>0	>0	>0	<0
Married	<0	<0	<0	<0	n.s.
Sec. edu. level	<0	n.s.	<0	n.s.	<0
High edu. level	<0	<0	<0	<0	<0
North-West	<0	n.s.	>0	<0	n.s.
Central-Volga	<0	<0	>0	<0	>0
South	<0	n.s.	>0	<0	>0
East	>0	>0	>0	<0	>0
City	<0	<0	n.s.	<0	n.s.
Village	<0	<0	<0	<0	>0
Machine building	<0	<0	<0	<0	<0
Military	<0	<0	<0	<0	<0
Gas and oil ind.	<0	<0	<0	<0	n.s.
Other heavy ind.	<0	<0	<0	<0	<0
Construction	>0	>0	>0	>0	>0
Transport, communication	<0	n.s.	>0	n.s.	>0
Agriculture	<0	<0	<0	<0	>0
Public administration	<0	<0	<0	<0	>0
Education	<0	<0	<0	<0	<0
Science and culture	<0	n.s.	n.s.	n.s.	>0
Health	<0	<0	<0	<0	n.s.
Defence	<0	<0	<0	<0	n.s.
Trade, related services	>0	>0	>0	>0	>0
Finance	<0	<0	<0	<0	>0
Energy ind.	<0	<0	<0	<0	<0

Housing	<0	<0	<0	<0	>0
Other ind.	>0	>0	>0	>0	>0
Legislators, senior managers, officials	<0	>0	n.s.	<0	>0
Professionals	<0	<0	<0	<0	n.s.
Assoc. Profess. with sec. spec. ed.	<0	<0	<0	<0	n.s.
Clerks	<0	<0	<0	<0	>0
Service workers	<0	<0	>0	n.s.	>0
Skilled agricultural and fishery workers	<0	>0	>0	n.s.	>0
Craft and related trades	<0	<0	<0	<0	>0
Plant/Machine operators/Ind. w-s	<0	<0	<0	<0	n.s.
Observations	50996	56100	56100	42221	36169

Notes: Signs of the marginal effects from probit regressions are reported. Specification with year, sector and occupation dummies, without immigrant dummies. Significant at the 10 percent level or better. Reference categories are: female, not married, primary education level, Moscow/St. Petersburg, large regional center, non-immigrants, year 2004, Light and food industry, Unskilled workers. “Encompassing informal employment – first measure” refers to “informal employees and not working working in enterprise/organization in primary and secondary jobs”, i.e. entry 3 in table 2. The complete regressions results can be found in tables A2-A6 in the appendix of the initial version of this paper (see Lehmann and Zaiceva 2013).

Table 5: Determinants of informal employment by informality status, main job and self-employment, 2004-2011. Multinomial logit, Marginal effects

	(1)	(2)	(3)	(4)	(5)
	Involuntary informal employee	Voluntary informal employee	Informal self- employed	Formal self- employed	Formal employee
Age	-0.0002*** (.00004)	-0.0001*** (0 .00002)	0.0001*** (0.00001)	0 .00001 (0 .00001)	0 .0003*** (0 .00005)
Male	0 .0031*** (0 .0008)	0 .0019*** (0 .0006)	0 .0027*** (0 .0004)	0 .0012*** (0 .0002)	-0.0088*** (0 .0012)
Married	-0.0042*** (0 .0009)	-0.0021*** (0 .0006)	0 .0015*** (0 .0003)	0 .0007*** (0 .0002)	0 .0041*** (0 .0011)
Sec. edu. level	-0.0018** (0 .0009)	-0.0012* (0 .0006)	0 .0011*** (0 .0004)	0 .0007** (0 .0003)	0 .0011 (0 .0012)
High edu. level	-0.0061*** (0 .0013)	-0.0026*** (0 .0008)	0 .0010* (0 .0006)	0 .0012** (0 .0005)	0 .0064*** (0 .0017)
North-West	-0.0035** (0 .0014)	-0.0020** (0 .0008)	0 .0021** (0 .0009)	-0.00004 (0 .0003)	0 .0035* (0 .0020)
Central-Volga	-0.0008 (0 .0010)	-0.0045*** (0 .0006)	0 .0024*** (0 .0005)	0 .0004* (0 .0002)	0 .0025* (0 .0014)
South	-0.0020* (0 .0012)	-0.0038*** (0 .0006)	0 .0044*** (0 .0009)	0 .00005 (0 .0003)	0 .0014 (0 .0017)
East	0 .0037*** (0 .0012)	-0.0017*** (0 .0006)	0 .0022*** (0 .0006)	0 .00003 (0 .0002)	-0.0042*** (0 .0016)
City	-0.0032*** (0 .0008)	-0.0030*** (0 .0005)	0 .0025*** (0 .0004)	-0.00004 (0 .0002)	0 .0037*** (0 .0011)
Village	-0.0044*** (0 .0008)	-0.0049*** (0 .0006)	-0.0001 (0 .0004)	-0.0001 (0 .0002)	0 .0096*** (0 .0011)
Immigrant Caucasus, CA	0 .0059*** (0 .0021)	0 .0032** (0 .0015)	0 .0089*** (0 .0013)	0 .0013*** (0 .0005)	-0.0193*** (0 .0030)
Immigrant not CCA, not Russia	0 .0134*** (0 .0030)	0 .0029* (0 .0017)	0 .0013 (0 .0009)	0 .0003 (0 .0004)	-0.0179*** (0 .0037)
Other immigrants	0 .0006 (0 .0008)	0 .0017*** (0 .0006)	-0.0001 (0 .0003)	-0.0002 (0 .0002)	-0.0021* (0 .0011)
2005	0 .0006 (0 .0015)	0 .0010 (0 .0013)	-0.0005 (0 .0006)	0 .0010* (0 .0006)	-0.0021 (0 .0022)
2006	0 .0025 (0 .0016)	0 .0034** (0 .0015)	-0.0003 (0 .0006)	0 .0008* (0 .0005)	-0.0063*** (0 .0024)
2007	-0.0025* (0 .0013)	0 .0023* (0 .0014)	-0.0006 (0 .0005)	-0.0021*** (0 .0003)	0 .0030 (0 .0020)
2008	-0.0031** (0 .0013)	0 .0022 (0 .0014)	0.0008 (0 .0006)	0 .0005 (0 .0004)	-0.0004 (0 .0021)
2009	0.0003 (0 .0015)	0 .0059*** (0 .0017)	0 .0003 (0 .0006)	0 .0013** (0 .0006)	-0.0078*** (0 .0025)
2010	0 .0001 (0 .0014)	0 .0038*** (0 .0014)	0 .0007 (0 .0006)	0 .0027*** (0 .0008)	-0.0073*** (0 .0022)
2011	-0.0006 (0 .0013)	0 .0042*** (0 .0014)	0 .0006 (0 .0006)	0 .0024*** (0 .0007)	-0.0066*** (0 .0022)
Machine building	-0.0105*** (0 .0011)	-0.0042*** (0 .0010)	-0.0051*** (0 .0005)	-0.0013*** (0 .0003)	0.0211*** (0 .0015)
Military	-0.0141*** (0 .0008)	-0.0102*** (0 .0006)	-0.0046*** (0 .0006)	-0.0012*** (0 .0003)	0 .0302*** (0 .0012)
Gas and oil ind.	-0.0125*** (0 .0010)	-0.0064*** (0 .0007)	-0.0080*** (0 .0006)	-0.0005 (0 .0004)	0 .0274*** (0 .0014)
Other heavy ind.	-0.0108*** (0 .0010)	-0.0050*** (0 .0008)	-0.0053*** (0 .0004)	-0.0012*** (0 .0003)	0 .0223*** (0 .0013)
Construction	0.0044*** (0 .0017)	0.0053*** (0 .0015)	0 .0084*** (0 .0020)	0 .0008* (0 .0005)	-0.0189*** (0 .0031)
Transport,	-0.0035***	-0.0017*	0 .0068***	-0.0002	-0.0014

communication	(0 .0012)	(0 .0009)	(0 .0018)	(0 .0003)	(0 .0024)
Agriculture	-0.0067***	-0.0037***	0 .0015	-0.0007**	0 .0096***
	(0 .0012)	(0 .0009)	(0 .0012)	(0 .0003)	(0 .0020)
Public	-0.0128***	-0.0069***	-0.0043***	-0.0016***	0 .0257***
administration	(0 .0012)	(0 .0008)	(0 .0006)	(0 .0002)	(0 .0015)
Education	-0.0160***	-0.0076***	-0.0027***	-0.0021***	0 .0283***
	(0 .0009)	(0 .0007)	(0 .0007)	(0 .0003)	(0 .0014)
Science and culture	-0.0073***	0 .0004	-0.0007	-0.0008***	0 .0083***
	(0 .0016)	(0 .0017)	(0 .0013)	(0 .0003)	(0 .0027)
Health	-0.0126***	-0.0069***	-0.0028***	-0.0005	0 .0227***
	(0 .0010)	(0 .0007)	(0 .0008)	(0 .0004)	(0 .0015)
Defence	-0.0122***	-0.0059***	-0.0040***	-0.0013***	0 .0234***
	(0 .0010)	(0 .0007)	(0 .0006)	(0 .0002)	(0 .0013)
Trade, related	0 .0062***	0 .0047***	0 .0210***	0 .0023***	-0.0342***
services	(0 .0016)	(0 .0013)	(0 .0031)	(0 .0007)	(0 .0038)
Finance	-0.0088***	-0.0027*	-0.0010	-0.0011***	0 .0135***
	(0 .0018)	(0 .0015)	(0 .0015)	(0 .0003)	(0 .0029)
Energy ind.	-0.0128***	-0.0060***	-0.0050***	-0.0015***	0 .0253***
	(0 .0010)	(0 .0008)	(0 .0004)	(0 .0002)	(0 .0014)
Housing	-0.0113***	-0.0046***	-0.0028***	-0.0011***	0 .0199***
	(0 .0010)	(0 .0008)	(0 .0007)	(0 .0003)	(0 .0015)
Other ind.	-0.0028	0 .0012	0 .0224***	0 .0019*	-0.0226***
	(0 .0019)	(0 .0017)	(0 .0051)	(0 .0010)	(0 .0059)
Legisl., senior	-0.0143***	-0.0073***	0 .1094***	0 .2387***	-0.3266***
manag., officials	(0 .0009)	(0 .0005)	(0 .0218)	(0 .0924)	(0 .0796)
Professionals	-0.0154***	-0.0088***	0 .0094***	0 .0150**	-0.0001
	(0 .0011)	(0 .0006)	(0 .0026)	(0 .0074)	(0 .0078)
Assoc. Profes-s	-0.0122***	-0.0057***	0 .0042**	0 .0070*	0 .0067
with sec. spec.ed.	(0 .0010)	(0 .0006)	(0 .0016)	(0 .0039)	(0 .0043)
Clerks	-0.0113***	-0.0068***	-0.0037***	0 .0014	0 .0205***
	(0 .0009)	(0 .0005)	(0 .0009)	(0 .0023)	(0 .0026)
Service workers	-0.0047***	-0.0035***	0 .0241***	0 .0186**	-0.0344***
	(0 .0009)	(0 .0006)	(0 .0044)	(0 .0092)	(0 .0099)
Skilled agric. and	-0.0127***	-0.0029	0 .2187***	0 .1154*	-0.3185***
fishery workers	(0 .0013)	(0 .0024)	(0 .0483)	(0 .0649)	(0 .0651)
Craft and related	-0.0046***	-0.0032***	0 .0256***	0 .0109*	-0.0287***
trades	(0 .0009)	(0 .0005)	(0 .0046)	(0 .0058)	(0 .0072)
Plant and Machine	-0.0078***	-0.0044***	0 .0123***	0 .0039	-0.0040
operators/Ind. w-s.	(0 .0009)	(0 .0005)	(0 .0026)	(0 .0026)	(0 .0038)
Observations		55232			

Notes: Robust standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1 Reference categories: female, not married, primary education level, Moscow/St. Petersburg, large regional center, non-immigrants, year 2004, light and food industry, unskilled workers.

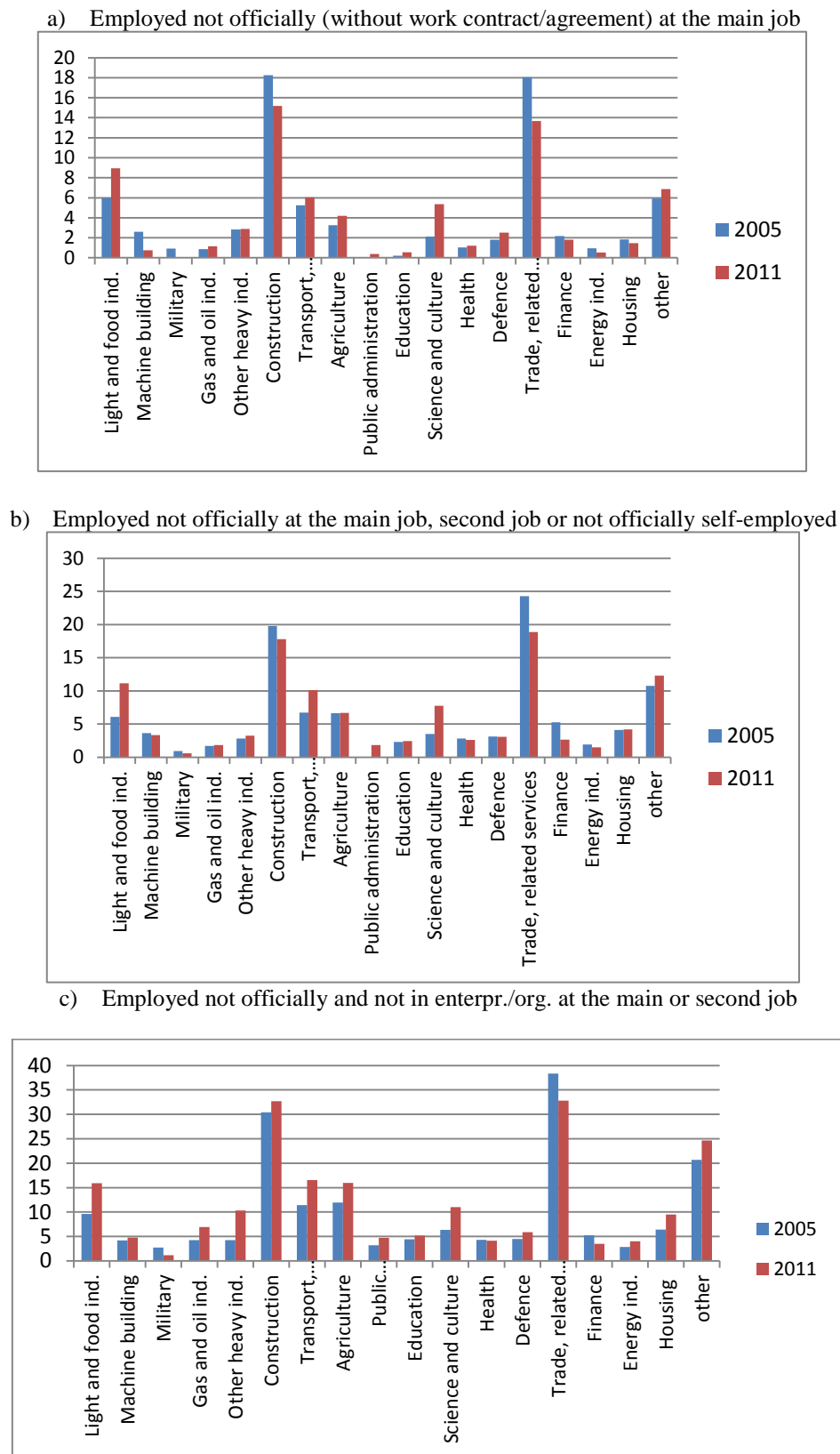
Table 6: Risk Measures and Informal Employment, Main job, 2009: Probit Regressions, Marginal Effects

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Emplinform, Probit	Emplinform, Probit	Emplinform, Probit	Emplinform, Probit	Emplinform, Probit	Emplinform, Probit	Emplinform, Probit	Emplinform, Probit
General risk attitudes	0.002*** (0.001)	0.002*** (0.001)						
General risk indicator			0.015*** (0.006)	0.013** (0.005)				
Financial risk attitudes					0.002*** (0.001)	0.002*** (0.001)		
Financial risk indicator							0.023*** (0.008)	0.022*** (0.008)
Age	-0.000** (0.000)	-0.001*** (0.000)	-0.000** (0.000)	-0.001*** (0.000)	-0.000** (0.000)	-0.001*** (0.000)	-0.000** (0.000)	-0.001*** (0.000)
Male	0.013** (0.005)	0.013** (0.005)	0.014** (0.005)	0.014*** (0.005)	0.014** (0.005)	0.014** (0.005)	0.014*** (0.005)	0.014*** (0.005)
Married	-0.008 (0.005)	-0.009* (0.005)	-0.008 (0.005)	-0.009* (0.005)	-0.007 (0.005)	-0.007 (0.005)	-0.006 (0.005)	-0.007 (0.005)
Sec. edu.	-0.007 (0.006)	-0.006 (0.006)	-0.006 (0.006)	-0.006 (0.006)	-0.008 (0.006)	-0.007 (0.006)	-0.007 (0.006)	-0.007 (0.006)
High edu.	-0.018** (0.008)	-0.017** (0.008)	-0.018** (0.008)	-0.017** (0.008)	-0.020*** (0.007)	-0.019** (0.007)	-0.019*** (0.007)	-0.019** (0.007)
City	-0.010** (0.005)	-0.011** (0.005)	-0.010** (0.005)	-0.011** (0.005)	-0.010** (0.005)	-0.011** (0.005)	-0.010** (0.005)	-0.011** (0.005)
Village	-0.015*** (0.005)	-0.016*** (0.005)	-0.015*** (0.005)	-0.016*** (0.005)	-0.015*** (0.005)	-0.016*** (0.005)	-0.015*** (0.005)	-0.016*** (0.005)
Ln hh. income	-0.009** (0.004)	-0.009** (0.004)	-0.009** (0.004)	-0.009** (0.004)	-0.009** (0.004)	-0.009** (0.004)	-0.009** (0.004)	-0.009** (0.004)
Immigr. Not CCA, not Russia		0.035* (0.019)		0.035* (0.019)		0.038** (0.019)		0.039** (0.019)
Immigr. Caucasus, CA		0.019 (0.014)		0.019 (0.014)		0.023 (0.014)		0.023 (0.014)
Immigr. other		0.010** (0.005)		0.010** (0.005)		0.010* (0.005)		0.010* (0.005)
Observations	5272	5234	5272	5234	5281	5244	5281	5244

Notes: Robust standard errors in parentheses. \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. Additional controls include sector, occupation and region dummies. General/Financial risk attitudes scales map into General/Financial risk indicator: 0-5 is 0, and 6-10 is 1.

## FIGURES

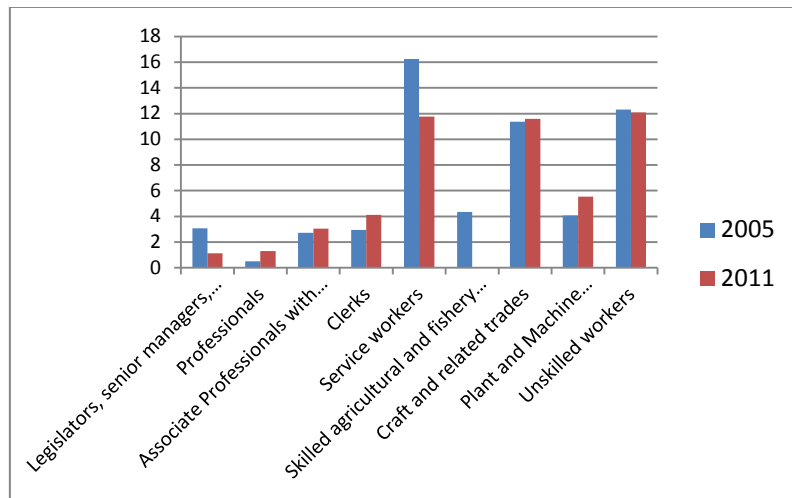
Figure 1: Proportion of informal employment by industry, 2005 and 2011



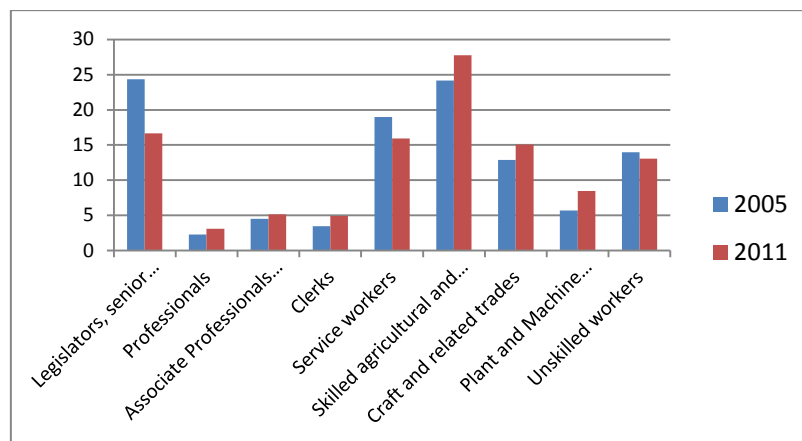
Source: Authors' calculations. Nota bene: these figures have to be interpreted with caution due to very few observations per sector for informal employees and entrepreneurs.

**Figure 2: Proportion of informal employment by occupation, 2005 and 2011**

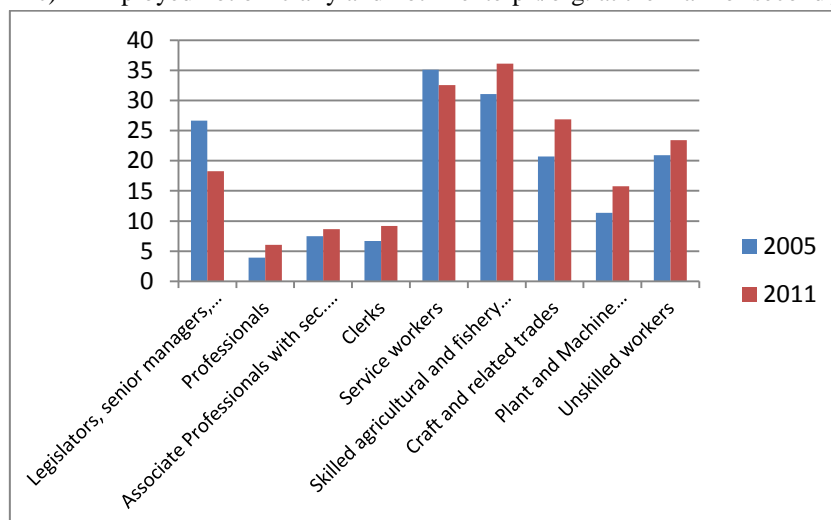
a) Employed not officially (without work contract/agreement) at the main job



b) Employed not officially at the main job, second job or not officially self-employed

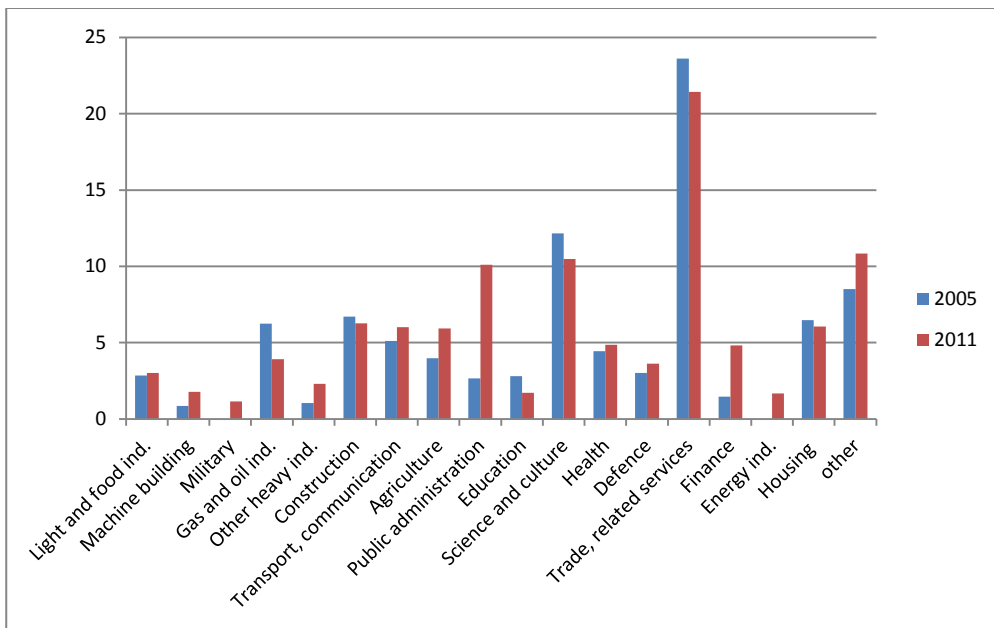


c) Employed not officially and not in enterpr./org. at the main or second job



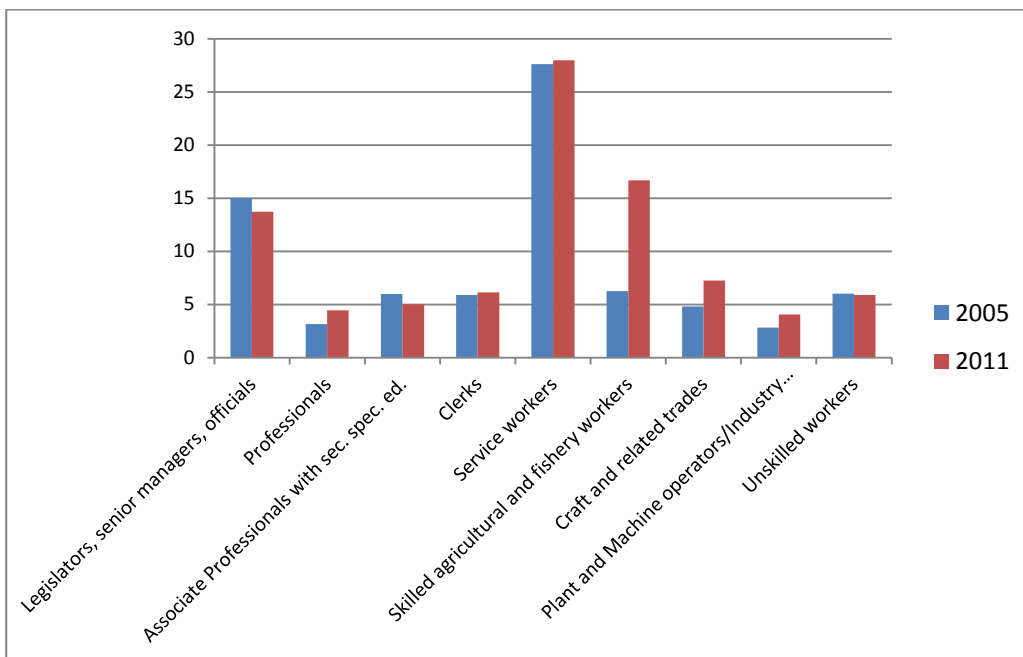
Source: Authors' calculations.

**Figure 3: Informality as defined by firm size (< 5 employees) by sectors:**



Source: Authors' calculations.

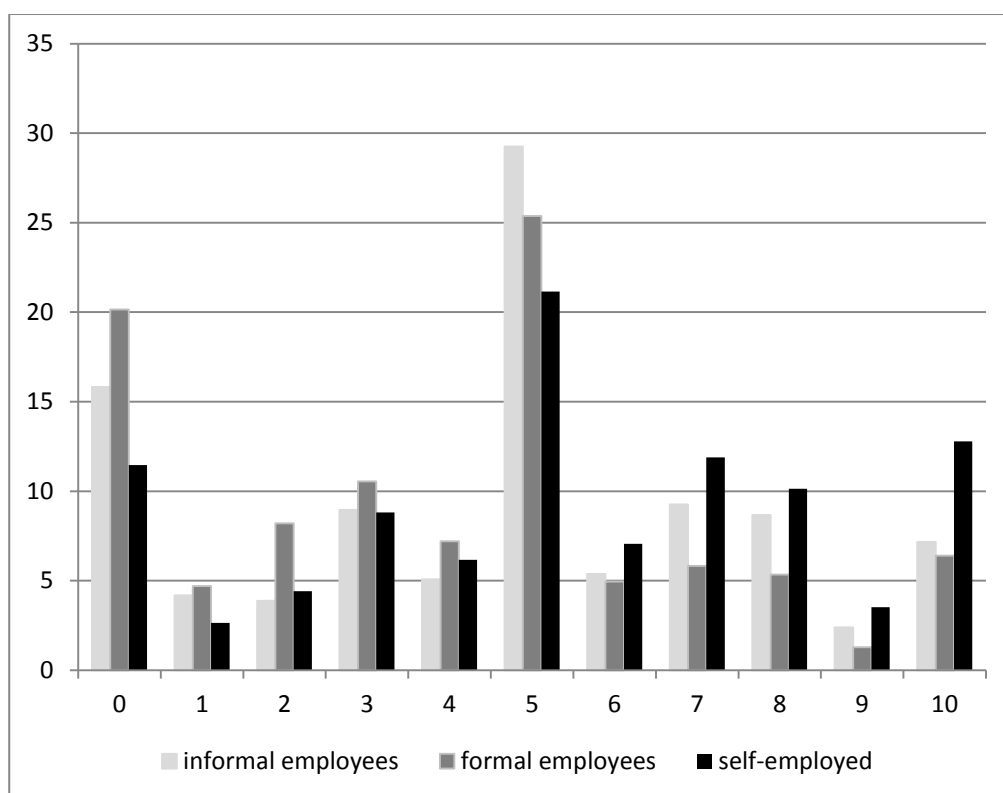
**Figure 4: Informality as defined by firm size (< 5 employees) by occupations:**



Source: Authors' calculations.

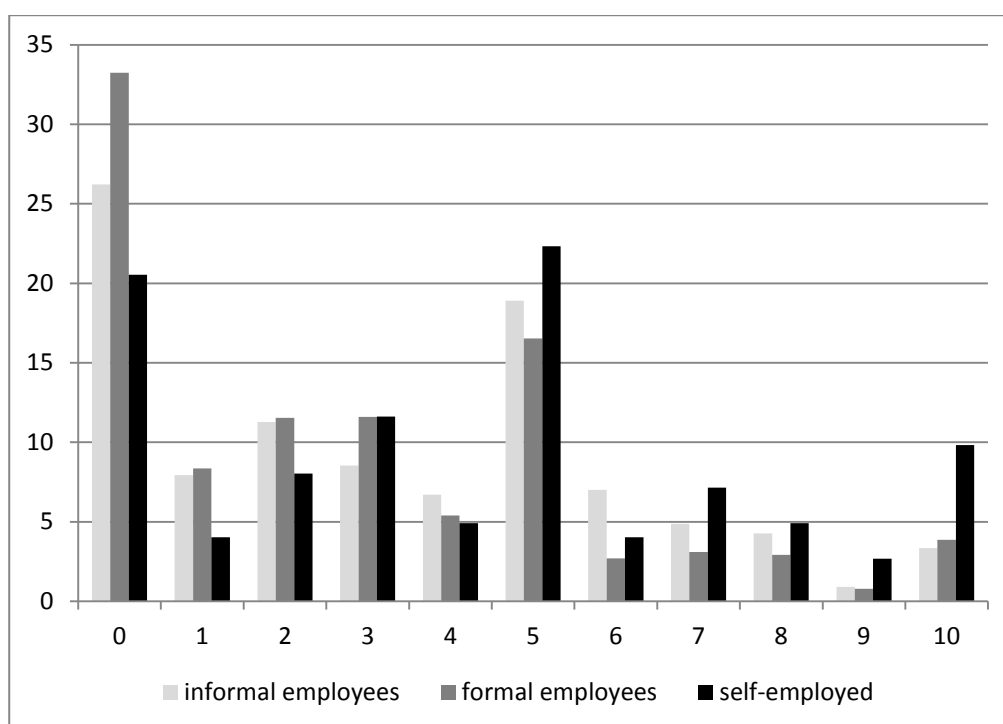


**Figure 5: General risk attitudes and employment state - 2009**



Notes: final sample used in the regressions.

**Figure 6: Risk attitudes in financial domain and employment state - 2009**

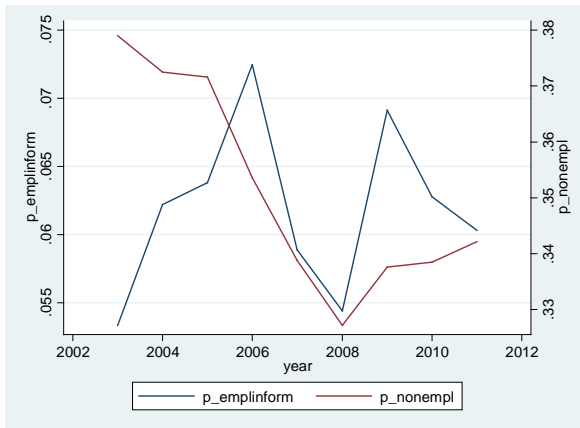


Source: Authors' calculation based on RLMS informality supplement 2009.

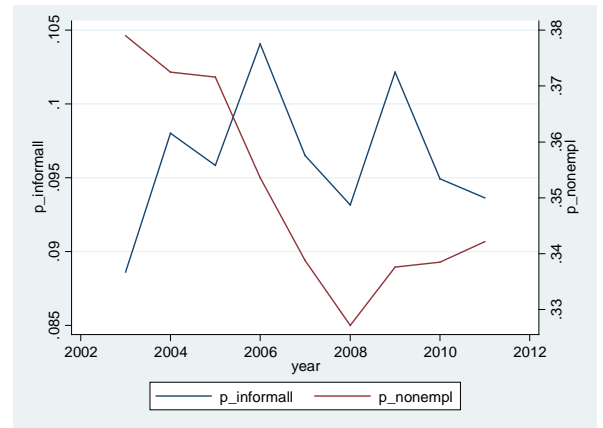
**APPENDIX**

**Figure A1: Informal employment and non-employment, 2003-2011**

a) Main job

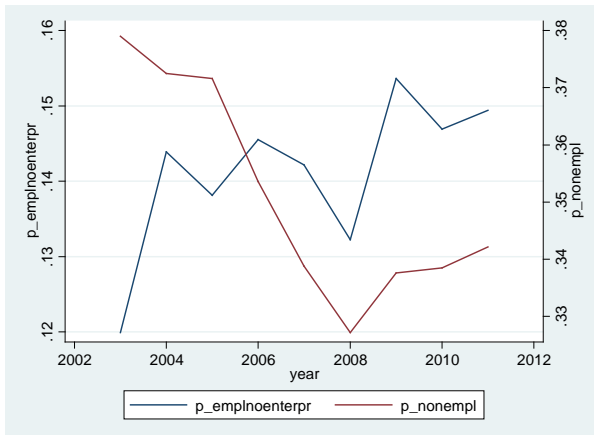


b) Main job, second job, self-employment

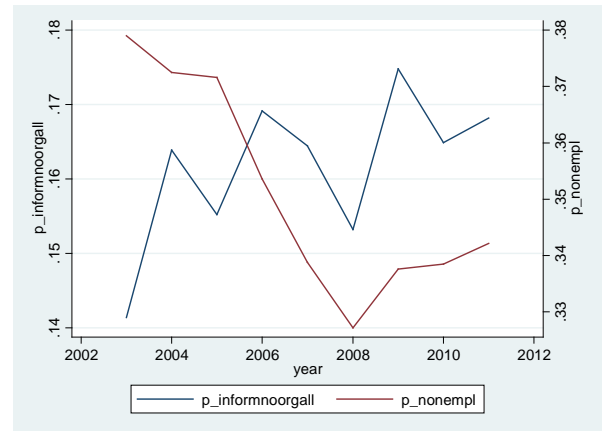


**Figure A2: Informal employment and non-employment, 2003-2011**

a) Informal employees and not working in enterprise/organization, Main job



b) Informal employees and not working in enterprise/organization, Main or second job



Source: authors' calculations.

a) Figure A3: Informality defined by firm size (less than or equal to 5 employees)

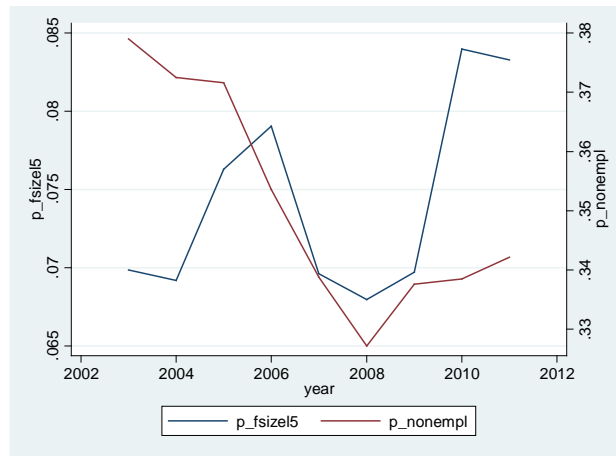
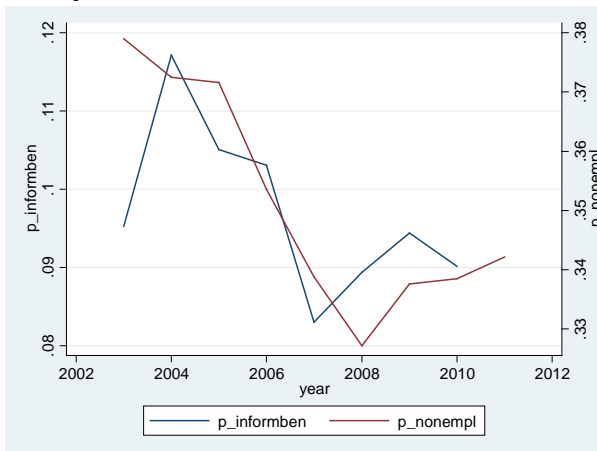
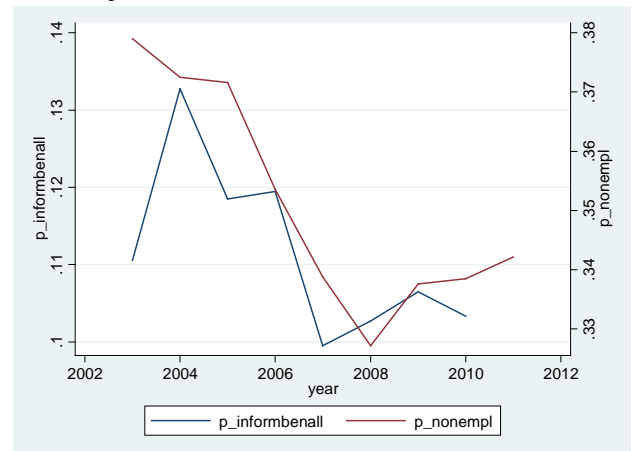


Figure A4: Informal employment defined as lack of provision of benefits, 2003-2011

a) Main job



b) Second job



Source: authors' calculations.