



THE DETERMINANTS OF INFORMAL ECONOMY IN EASTERN EUROPEAN COUNTRIES

DOI: <https://doi.org/10.36004/nier.es.2024.2-02>

JEL Classification: E26, E60, E70, H26, J46.

UDC: 343.53+343.359.2](4)

Nicoleta ONOFREI

PhD, University of Bucharest

<https://orcid.org/0000-0002-5126-1361>

onofreinicoleta.94@gmail.com

Received 29 November 2024

Accepted for publication 15 December 2024

SUMMARY

This article addresses the problem of informal economy in 11 countries from Eastern Europe. The aim of the research is to identify macroeconomic and social determinants of high levels of informality in the region and to quantify their influence on the respective phenomenon. For this purpose we carried out an econometric analysis-pooled regression, fixed effects and random effects models in R software. The models include the informal output as dependent variable calculated with the method Multiple Indicators Multiple Causes model-based by International Labor Organization, and expressed as % of official GDP. As explanatory variables we included in the models employment in agriculture, personal remittances, GDP growth per capita, rural population and the opinion regarding cheating behavior on taxes. We used secondary data from World Bank and World Values Survey for the period 2000-2020. From the three models performed we chose the model with fixed effects applying the F-test for individual effects and Hausman test. The fixed effects model succeeds to explain 40% of the variation in the informal output determining a positive influence of the variables employment in agriculture, personal remittances and the opinion towards cheating behavior on taxes, the results being consistent with other studies on this topic. The strongest influence is that of the social variable – the opinion regarding cheating on taxes, with a coefficient of 1.89. The results of the analysis have theoretical as well as practical implications for policymakers offering valuable insights for tailoring the policies aimed at lowering the level of informality in these countries.

Keywords: informal economy, Eastern Europe, macroeconomic factors, cheating on taxes, regression analysis

INTRODUCTION

Informality is a widespread problem around the world, however the transition economies are particularly fragile to this issue. It is estimated at a global level that from the total employment approximately 2/5 represents informal employment, being more prominent in some regions such as Eastern Europe and Central Asia (Ohnsorge & Shu, 2022). High rates of informality are associated on the long term with lower productivity, decreased fiscal revenues, inequality and poverty, despite their benefits regarding flexible employment. Many studies on informality focus on the methods to measure the size on the informal sector, however, understanding its determinants is equally important. The literature on the topic lack a consensus regarding the factors of influence for specific regions and economies (Buitrago, et.al, 2024).

In Europe and Central Asia, high levels of informality are considered to be the result of transition from planned economy to market economy. After 1980, many firms that entered the market were activating informally to avoid taxes, regulations and corruption (Johnson, et.al., 1997). In the last two decades informal employment has decreased due to economic, social and political changes. Also, a decrease in the informal work was registered in the recent years, during the Covid-19 pandemic, because the working conditions changed and many jobs that were performed unofficially could no longer be carried out under the conditions imposed by the authorities (Alfaro, et.al., 2020).

Although there are some positive consequences of informal employment mentioned in the literature, such as the creation of new working places and an encouragement for the small firms to resist on the

market in their harder periods, by paying less taxes, in general, this type of working relations is undesirable. From the point of view of salary, there is a gap between the salaries from the formal and informal sectors, the last one being in disadvantage (Liwiński, 2020). With the aim to eliminate any form of exploitation and inadequate working conditions, international and national authorities are trying to alleviate the informality. For example, in the country with the highest level of informality from the Eastern Europe - Republic of Moldova, the National Development Strategy “European Moldova-2030”, adopted in 2022, proposes general and specific objectives to increase the living standard in Moldova by 2030. The first general objective of the strategy addresses the increase of income and the attenuation of inequalities. One of the specific objectives consists in the improvement of working conditions and reduction of informal employment by 7%, compared with 2020, to reach the level of 20% from the total employment by 2030. Measuring the magnitude of the informal sector is challenging, due to the many forms that informality can take and the illegal aspect of the informal activities.

This paper is structured in five parts. In the introduction we present the importance and the actuality of the topic. The literature review part covers the most important concepts related to the topic and the determinants of the informal employment. The third part- research methodology contains the data sources and indicators used for this research. The fourth section includes the graphical representation and explanation of results and highlights the main observed trends, the last part being reserved for conclusions.

LITERATURE REVIEW

Terms such as black, shadow, hidden or parallel economy are associated with the informal economy. One of the most common definitions of informality states that it comprises all economic activities that are accounted for when calculating the Gross National Product but are not registered, therefore are not taxed and can be considered black or clandestine (Schneider & Enste, 2000). The reason behind the choice of deliberately hiding from the government some market-based economic activities is to not face regulation and taxation.

Informal employment can take few forms: as a subordination working relationship in which the employer and employee are involved or independent work in which the worker is on his own and he is not declaring or partially declaring the work. In the case of subordination relationship, two situations can appear: one in which the employee does not have an working contract, therefore the salary is not reported, or he is legally employed, but the salary is under-reported, a practice called “envelope wages” (Horodnic, et.al., 2020).

Analyzing the situation with informal employment in Republic of Moldova, Pfau-Effinger (2017) concludes that high level of informality is strongly linked with traditional branches of agriculture, forestry and fishing. Also, Bernabe (2002) found that in transition economies, such as Georgia, the highest share of informal workers can be found in agriculture. A high level of remittances is considered to encourage informal employment, because they offer the necessary financial capital for opening small firms, which tend to activate in the informal sector, and offer supplementary financial support for employees, allowing more persons to take the risk of under-reporting the salary (Shapiro & Mandelman, 2016, Chatterjee & Turnovsky, 2018). Analyzing the shadow economy in newly accessed EU countries Mikulic & Nagyszombaty (2013) found that

GDP growth rate has a significant impact on informal economy, because the economic downturns increase the unofficial economy. Khuong et.al. (2021) found that there is an inverse relationship between informality and economic growth, more precisely he argues that high levels of informal employment impede economic growth. However, there are studies claiming that the relationship between informality and GDP growth per capita depends upon the level of growth. In a study comprising 161 countries, over the period 1950-2010, Elgin and Birinci (2016) applied a panel data analysis and found an inverted U relationship between the size of the informal economy and GDP growth per capita. That is, little growth is associated with small and large sizes of the informal economy, while higher levels of growth correspond to medium size informal economies. Informal employment is more common in the rural areas (Flaquer & Escobedo, 2009). Belev (2003) argues that in the rural areas people have less job opportunities, being at risk of unemployment. For them the only solution is often to work in the informal sector just to maintain themselves above the poverty level. Besides the macroeconomic factors that have an impact on the size of the informal economy, there are also mentioned in the literature social and personal factors such as trust in institutions (Elgin & Solis-Garcia, 2012), attitudes, tolerance towards cheating on taxes or social norms. Trust in institutions shape people’s attitudes and behaviors towards taxes. D’Hernoncourt and Meon (2012) affirm that in developing countries higher levels of trust determine lower levels of informality. Also, political stability is an important factor for the relationship between taxes and informal economy (Elgin, 2015). Weller (2022) mentions individual characteristics as another determinant of informality. Based on the studies mentioned above we propose the following hypotheses:

H1: Employment in agriculture positively influences informal output.

H2: Personal remittances positively influence informal output.

H3: GDP growth per capita negatively influences informal output.

H4: Rural population positively influences informal output.

H5: The attitude towards cheating on taxes positively influences informal output.

RESEARCH METHODOLOGY

The aim of this research is to identify and quantify the factors that influence informality in Eastern European countries. For this purpose we used secondary data, from World Bank and World Values Survey. In total, 11 countries were included in the analysis, namely: Bulgaria (BGR), Czechia (CZE), Estonia (EST), Hungary (HUN), Latvia (LVA), Lithuania (LTU), Moldova (MDA), Poland (POL), Romania (ROU), Slovakia (SVK) and Slovenia (SVN). The criteria for including the countries in the analysis consist first of all in the geographical location, but also in the similarities that these countries share, one of them being the experience with the communist regime, meaning that their economies passed through the transition from the planned economy to the market

economy. The data covers the period from 2000 to 2020 and it is related mainly to the availability of data for all indicators included in the analysis.

We expressed informality through the variable informal output, which measures the economic result of the informal employment, calculated with the method Multiple Indicators Multiple Causes model-based (MIMIC) by International Labor Organization (ILO), and expressed as % of official GDP. In a meta-analysis comprising relevant articles for the topic of informal economy Elgin and Erturk (2019) affirm that the majority of studies express the size of informal output as % of formal GDP. The explanatory variables are:

- Employment in agriculture (% of total employment),
- Personal remittances, received (% of GDP),
- GDP growth per capita (annual %),
- Rural population (% of total population),
- Justifiable: cheating on taxes (measured on a scale from 1 to 10). World Values Survey asks whether cheating on taxes is justifiable (1 is “never justifiable” and 10 is “always justifiable”) and reports average responses at the country-year level. A higher level suggests that the country is more tolerant toward the informal sector. This variable was selected from the results of the questionnaires conducted by WVS from the wave 4 (2000-2004) to wave 7 (2017-2022). For the countries that did not participate in all the waves and data was not available for a specific period, the result from the previous wave was considered relevant also for the following unavailable years.

To analyze the data, we conducted a multiple regression analysis specific for panel data, using for this purpose R software, with R Studio interface. This approach is most common in the studies on informal economy that seek to approximate the influence of macroeconomic factors on informality (Elgin & Erturk, 2019). Vidovic and Ritan (2022) used a cross-section multiple regression analysis to explain the effects of GDP growth, unemployment

rate and exports on the size of the informal labor market.

As recommended in the case of panel data, three types of regression were performed – pooled model (OLS), a model with fixed effects and a model with random effects, using “plm” package. The models are described by the following equations:

(1) Pooled (OLS) Model

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \beta_4 x_4 + \beta_5 x_5 + u, \text{ where}$$

y = informal output

$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5$ = parameters estimated by the model

x_1 = Employment in agriculture

x_2 = Personal remittances

x_3 = GDP growth per capita

x_4 = Rural population

x_5 = Cheating on taxes

u = error term

(2) Fixed effects model

$$y_{it} = \beta_0 + \beta_1 x_{it1} + \beta_2 x_{it2} + \beta_3 x_{it3} + \beta_4 x_{it4} + \beta_5 x_{it5} + \alpha_i + u_{it},$$

where $i=1,2,\dots,11$, $t=1, 2,\dots,21$, α_i is an unobserved individual effect constant over time.

$$\bar{y}_i = \beta_0 + \beta_1 \bar{x}_{i1} + \beta_2 \bar{x}_{i2} + \beta_3 \bar{x}_{i3} + \beta_4 \bar{x}_{i4} + \beta_5 \bar{x}_{i5} + \alpha_i + \bar{u}_i,$$

where \bar{y}_i is the average of y_{it} , \bar{u}_i is the average of u_{it} .

$$\hat{y}_{it} = y_{it} - \bar{y}_i = \beta_1 \hat{x}_{it1} + \beta_2 \hat{x}_{it2} + \beta_3 \hat{x}_{it3} + \beta_4 \hat{x}_{it4} + \beta_5 \hat{x}_{it5} + \hat{u}_{it}$$

(3) Random effects model

$$\hat{y}_{it} = y_{it} - \theta \bar{y}_i = \beta_0(1 - \theta) + \beta_1 \hat{x}_{it1} + \beta_2 \hat{x}_{it2} + \beta_3 \hat{x}_{it3} + \beta_4 \hat{x}_{it4} + \beta_5 \hat{x}_{it5} + \hat{v}_{it},$$

where θ is a fraction of individual averages, $\hat{v}_{it} = \alpha_i + u_{it}$

The final model was chosen with the specific tests conducted with “lmtest” package. The results of the analysis are presented in the following section.

RESULTS AND DISCUSSIONS

General descriptive results

A first look into the data reveals the descriptive statistics for the indicators included in the analysis (Table 1). The mean of the informal output for the 11 countries from Eastern Europe in the period 2000-2020 is 28.26 % of GDP. The minimum value 16.60 % of GDP was registered in Slovakia in 2018 and 2019, while the maximum value 45.10 describes the informal output in Republic of Moldova in 2000. With regard to the share of population working in the agricultural sector, the situation is very polarised, although the countries are situated in the same geographical location. The mean of the employment in agriculture represented 13.83 % of total employment, for all the countries considered for the analysis, with a minimum value of 2.29 % registered also in Slovakia in 2018 and a maximum value of 60.39 % - in Moldova in 2016. Personal remittances received in this area represented 3.89% of GDP, with a range between 0.06% (Slovakia, 2000) and a maximum value

of 34.5% (Moldova, 2006). With respect to economic development, the variable GDP growth per capita shows that some countries encountered a negative value such as Estonia in 2006 (-14.46%), while others had opposite results – Latvia, 2006 (13%), the mean in the region being 3.67% per year. As expected, the rural population has an important share from the total population (37.92%), due to the predominance of the agricultural activities. The minimum value was registered in Bulgaria in 2020 (24.31%) and the maximum value of more than half of the total population was registered in Moldova, 2015 (57.51%). The variable which measures the tolerance towards cheating on taxes has a mean of 2.4 indicating a low degree of tolerance. The least tolerant were people from Hungary in the period 2017-2020 having a score of 1.52, while the most tolerant towards cheating on taxes were people from Moldova in the period 2000-2004 with a score of 4.19.

Table 1

Descriptive statistics

| Variable | Unit | Min | Median | Mean | Max | Standard deviation |
|--------------------------------|---|--------|--------|-------|-------|--------------------|
| Informal output | % of GDP | 16.60 | 28.02 | 28.26 | 45.10 | 6.97 |
| Employment in agriculture | % of total employment | 2.29 | 7.96 | 13.83 | 60.39 | 14.94 |
| Personal remittances | % of GDP | 0.06 | 1.89 | 3.89 | 34.5 | 6.36 |
| GDP growth per capita | annual % | -14.46 | 4.11 | 3.67 | 13 | 4.26 |
| Rural population | % of total population | 24.31 | 33.26 | 37.92 | 57.51 | 9.44 |
| Justifiable: Cheating on taxes | 1 = never justifiable, 10 = always justifiable; simple country averages | 1.52 | 2.34 | 2.4 | 4.19 | 0.51 |

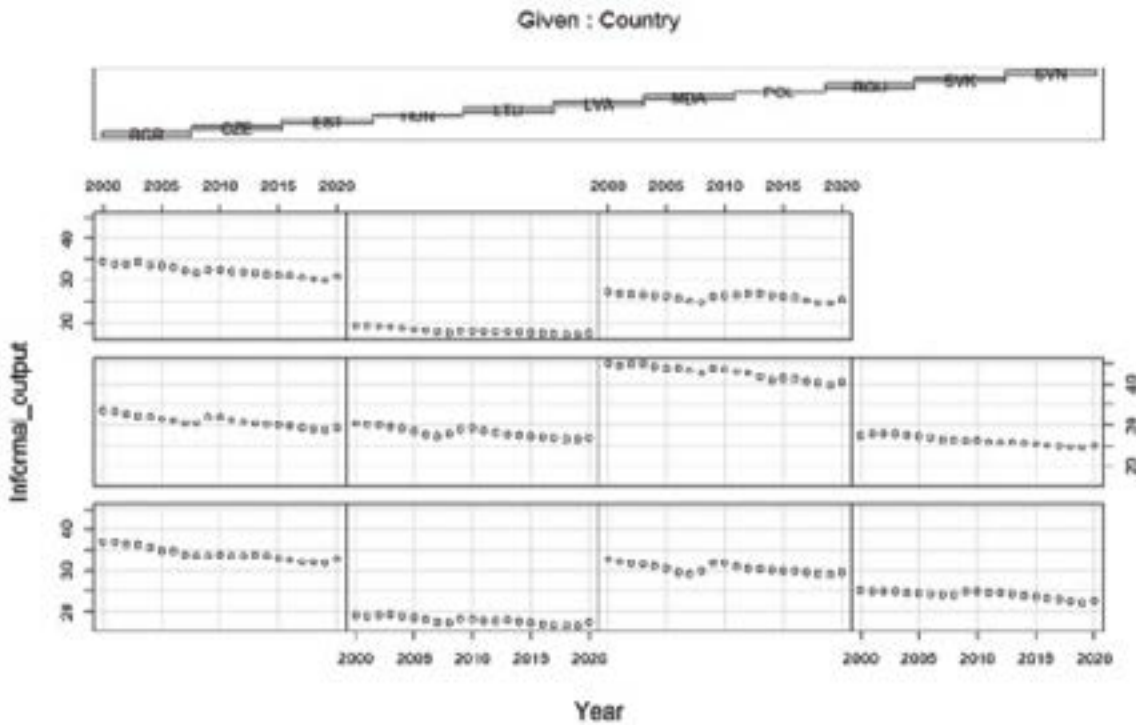
Source: Author's calculations using R

Figure 1 presents the evolution of the informal output for every country in the period 2000-2020. We can note that during this period a descending trend is characteristic for all the countries, with a slight increase in 2020, the year when the pandemic started and the working conditions changed for many working places, allowing for a more flexible schedule and less control from the authorities, which determined the increase in informal output. Also

from this figure we can classify the countries according to their levels of informality: there is a group of countries with a low level of informality, less than 20% of GDP- Czechia and Slovakia; some countries registered a level of informal output between 20 and 30% of GDP- Hungary, Latvia, Poland and Slovenia, and few countries with a high level of informal output which overpasses 30% - Bulgaria, Estonia, Lithuania, Moldova, and Romania.

Figure 1

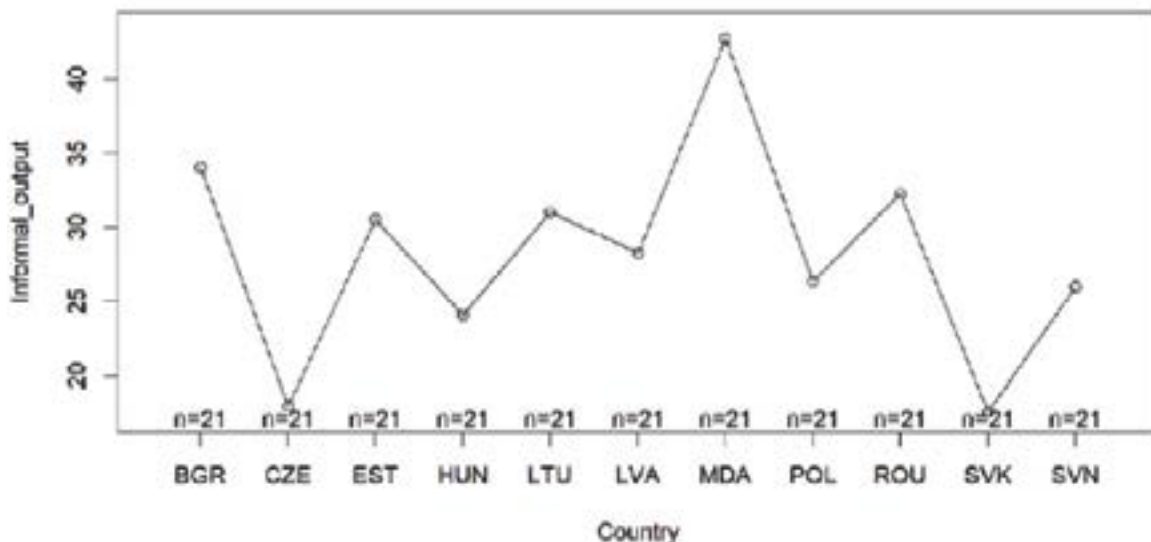
The evolution of informal output in Eastern European Countries, 2000-2020. Bars at top indicate corresponding graph from left to right starting on the bottom row.



Source: Author's contribution using R

Figure 2, which represents graphically the heterogeneity accross countries was created by calculating the mean value of the informal output for each country in the period 2000-2020. The results show that the differeces are significant in the region with a minimum value registered in Slovakia and a maximum value in Republic of Moldova.

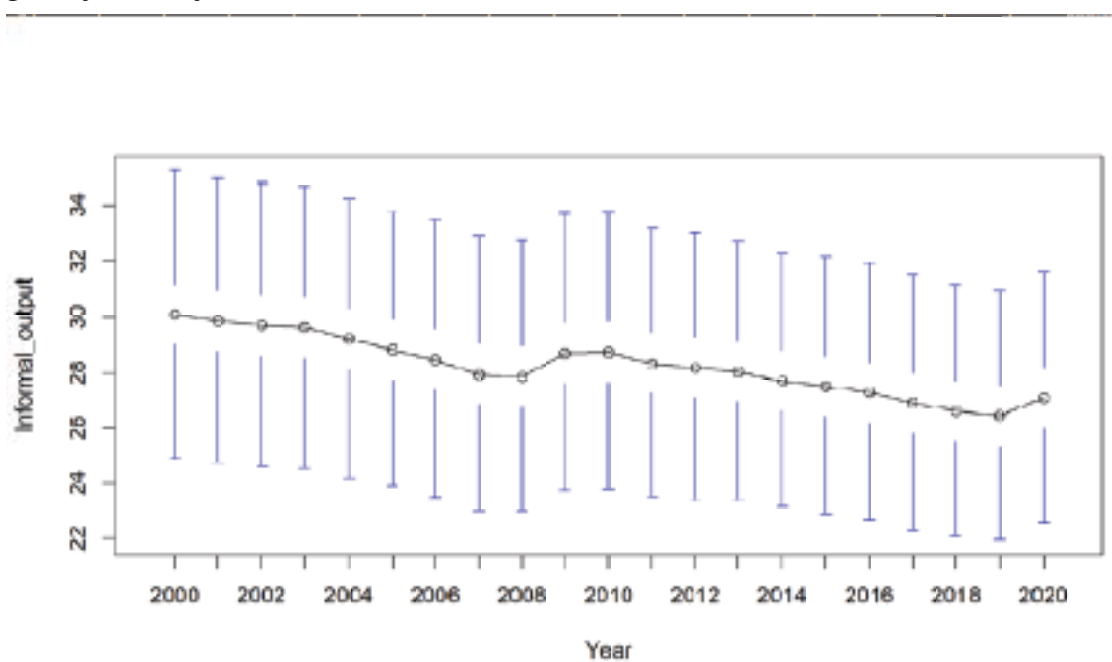
Figure 2
Heterogeneity across countries



Source: Author's contribution using R

Figure 3 represents the heterogeneity across years and was created by calculating the mean value of the informal output for every year in all the countries included in the analysis. As we can note from the figure, the minimum value was registered in 2008 and the maximum value in 2000.

Figure 3
Heterogeneity across years



Source: Author's contribution using R

REGRESSION RESULTS

The results of the regressions performed are summarized in the table 2. The first, pooled model, has the highest explanatory power with a value of 66% for the R squared. From all the variables included in the models, employment in agriculture, personal remittances and rural population are statistically significant in this model. The second, fixed effects model has the lowest explanatory power of 40 % with three statistically significant variables: employment in agriculture, personal remittances and cheating on taxes. The random effects model has a slightly higher explanatory power than the fixed effects model- 42 % with the same variables accepted as statistically significant. Also, the results of the F-test indicate that all the models have a p-value less than 0.05, meaning that all the coefficients in the models are different than zero.

Table 2

Results of the regression analysis

| Model | Pooled model | Fixed effects | Random effects |
|---------------------------|--------------------------------|--------------------------------|--------------------------------|
| Variable | Informal output | Informal output | Informal output |
| Intercept | 30.64 *** (t-value=14.71) | - | 18.46 *** (t-value=7.95) |
| Employment in agriculture | 0.39 *** (t-value=11.16) | 0.2 *** (t-value=9.1) | 0.2 *** (t-value=9.51) |
| Personal remittances | 0.22 ** (t-value=2.82) | 0.14 *** (t-value=4.43) | 0.15 *** (t-value=4.65) |
| GDP growth per capita | 0.05 (t-value=0.80) | -0.01 (t-value=-0.89) | -0.01 (t-value=-0.87) |
| Rural population | -0.27 *** (t-value=-6.33) | 0.07 (t-value=1.23) | 0.04 (t-value=0.86) |
| Cheating on taxes | 0.62 (t-value=0.7) | 1.89 *** (t-value=1.89) | 1.93 *** (t-value=6.21) |
| R-Squared | 0.66 | 0.4 | 0.42 |
| Adj. R-Squared | 0.65 | 0.36 | 0.40 |
| F-statistic | 87.56 (p-value: < 2.22e-16) | 29.24 (p-value: < 2.22e-16) | 159.9 (p-value: < 2.22e-16) |

Source: Author's calculations using R

Note: *, **,*** denote 1%, 5% and 10% confidence level. Standard errors in brackets.

In order to decide which model performs better in explaining the variations in informal output, the specific tests were performed, detailed in the table 3. F test for individual effects helps to choose between the pooled model and the fixed effects model. With a p-value less than 0.05 the test confirms that the fixed effects model explains better the informal output than the pooled model. To decide between fixed effects and

random effects models we run a Hausman test. The null hypothesis of the test assumes that the unique errors are not correlated with the predictors, and the alternative hypothesis states that unique errors are correlated with the predictors, respectively. A significant p-value, less than 0.05 as in this case leads to the acceptance of the alternative hypothesis and the use of the fixed effects model.

Table 3
Robustness check

| Name of the test | Result | Accepted hypothesis |
|--------------------------------------|----------------------------|---|
| F test for individual effects | 424.67 (p-value < 2.2e-16) | Alternative hypothesis: significant effects |
| Hausman Test | 3.2778 (p-value = 0.6572) | Alternative hypothesis: one model is inconsistent |

Source: Author's calculations using R

The coefficients of the fixed effects model indicate how much the explained variable i.e. informal output changes overtime, on average per country, when the explanatory variable increases by one unit. In this case, the increase of employment in agriculture by 1%, keeping all other variables constant leads to an increase in the informal output by 0.2%. Personal remittances have also a positive effect on informal output: an increase by 1% in

personal remittances leads to an increase by 0.14% in the informal output. The variable cheating on taxes has the strongest influence on informal output: an increase by one unit in the score cheating on taxes leads to an increase by 1.89% in the dependent variable. These three variables are statistically significant at 99.9% confidence level. The variables GDP growth per capita and rural population are not statistically significant in this model.

DISCUSSION AND CONCLUSION

The econometric analysis allowed us to confirm three out of five hypotheses stated in this article. We proved the positive influence on informal output of employment in agriculture, personal remittances and the opinion regarding cheating behavior on taxes. Overall, the results are consistent with studies on the topic that find evidence on the factors affecting informal economy (Torgler & Schneider, 2007; Beręsewicz & Nikulin, 2018). Among other variables, Torgler and Schneider (2007), using a large panel data set, found that the willingness to pay taxes has an important influence on the size of the informal economy. Relying on a fixed effects estimations model, they conclude that moral dimension, more precisely the tax morale is one of the main determinants of informality.

Although the econometric analysis was carried out respecting the specificities of regression models with panel data, the results could be influenced by lack of updated data on the variable “cheating on taxes” from the World Values Survey. Also, it is important to note that the score represents a characteristic for the whole population of a country. For a more accurate analysis,

it would be recommended to apply a questionnaire and to measure the opinion towards cheating on taxes as a latent variable.

This research contributes to the understanding of the factors determining high levels of informality in the Eastern part of the Europe. One interesting result, that can be further analyzed and with potential for the topic is the influence of people’s opinion towards cheating on taxes. This factor has the strongest influence on informal output from the factors included in the analysis and further research could bring into attention another important characteristics. For example, the application of the Theory of Planned Behavior, previously used to explain a wide range of economic behaviors (Onofrei, Cociorva & Paşa, 2022), could explain whether to cheat on taxes is an accepted social norm in this region, being one of the drivers of people’s choice to under-declare their work.

This research was supported by a Marie Curie Research and Innovation Staff Exchange scheme within the H2020 Programme (grant acronym: PRELAB, GA: 101129940)

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