

Article

Measuring the Cohesion of Informal Economy in Agriculture in New European Union Member States

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Abstract: The present paper evaluates the size and development of the informal economy in agriculture in 10 new EU member states from 2004–2020. A novel agriculture-tailored multiple indicators Multiple Causes model was derived to estimate the size of the informal economy in agriculture. It was revealed that the share of the informal economy in agriculture has decreased from 40 to 31%. The level of cohesion of the informal economy in agriculture shows an opposite trend compared with other economic sectors, indicating an increasing divergence from mainstream economic trends.

Keywords: agriculture; informal economy; new EU member states; MIMIC; sigma-convergence

1. Introduction

Traditionally, the agricultural sector is characterized by a high level of informality (Schneider et al. 2022). A significant amount of unaccounted cooperative help (Ribašauskienė et al. 2019), family labor (Darpeix et al. 2014; Dupraz and Latruffe 2015; Chowdhury 2016), part-time agriculture (Barlett 2019), and internal consumption (Barickman 2022) are prevalent in agriculture. However, they are not considered to not be subject to taxation in the eyes of society, although they are seen in a positive light, being regarded as a part of traditional activities that should be preserved (Cooper et al. 2009). Due to this cultural aspect, some countries exclude the agricultural sector from their computations when assessing the level of the informal economy within the country. This decreased interest from the authorities towards the informal activities in agriculture may have contributed to the development of the informal economy (Bender 2001; Druzca and Peveri 2018). The agricultural sector is considered as one of the main drivers of the informal economy (Pasovic and Efendic 2018).

Due to its ambiguous nature, the informal economy can be only estimated approximately using indirect or hybrid methods. Typically, the shadow/informal/undeclared economy is estimated using variations of the multiple indicators multiple causes (MIMIC) approach (Abid 2016; Medina et al. 2017; Soares and Afonso 2019; Monarca et al. 2022), which is one of the most prevalent structural equation modelling techniques (Finch and French 2011). A significant criticism of general MIMIC models is that they fail to explicitly distinguish between exogenous and endogenous causal factors. This may sometimes compromise the ability of the derived econometric models to precisely reflect the latent construct. Additionally, the MIMIC presumes relaxed separation between exogenous and endogenous variables to a point, such that ‘the indicator and causal variables of the MIMIC model match exactly to the endogenous and exogenous variables of econometrics’ (Breusch 2005, p. 6). This approach sometimes provokes criticism from the pure econometric perspective (Feige 2016).

Another possible source of inaccuracies in the estimations of the informal economy in agriculture is the prevailing approach of applying variables used for the informal economy of the whole country also to the agricultural sector. For example, Schneider et al. (2022) directly apply the classical MIMIC model, which is extensively verified on a



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state level for studying the shadow economy in agriculture by substituting the “share of imports” variable with the “share of imports in agricultural products” variable, etc. This approach can be reasonably effective, providing convincing evidence about the prevalence and levels of the shadow economy in EU agriculture, if the researched sector (in this case—EU agriculture) is considered to be similar to the whole economy and assumed to not have distinctive characteristics. However, there is a lot of evidence pointing out the uniqueness of EU agriculture in terms of dependency on subsidies (Volkov et al. 2019; Scown et al. 2020), seasonal work (Gertel and Sippel 2014), and the prevalence of undeclared (Williams and Horodnic 2018) or family work (Mooney 2019). Continuous state-guaranteed loss coverage in the event of the manifestation of business risks, such as the closure of exports markets due to political reasons (Klomp 2020), unfavorable weather conditions, price subsidies due to market intervention measures (Alizamir et al. 2019), etc., make the agricultural sector significantly different from other economic sectors, where the common laissez-faire rules decide the supply demand equilibrium (Moschini et al. 2005). The above-mentioned conditions require a unique MIMIC model, covering the main determinants of the factors influencing the development of the informal economy in agriculture to provide a convincing argument about the real extent of the informal economy in EU agriculture and its development over time.

One of the main benefits for the new EU member states after accession to the EU is the initiation of a convergence process (Kutan and Yigit 2009; Borsi and Metiu 2015). This is also true for the agricultural sector (Baráth and Fertő 2017). Some economic sectors show the opposite tendencies and even exhibit the divergence process in particular economic areas in the EU (Bulmer 2020). This trend is amplified during various crises or economic shocks (Boeri and Jimeno 2016). To determine whether the informal economy in agriculture in the new EU member states follows the mainstream cohesion trend or is among the economic aspects that show the opposite tendencies, we measure the level of sigma convergence among the researched countries from 2004–2020.

This paper aims to investigate the possible convergence process in the development of the informal economy in the new EU member states agriculture based on a newly created agriculture-oriented MIMIC model.

The current paper is structured as follows: the first part provides a brief overview of the literature concerning the possible drivers of the informal economy in agriculture and develops a theoretical background for the research hypotheses. The method section introduces the research approach and data used for the investigation. The results and discussion section provides the main results and compares them with the current prevailing theories. The conclusion section generalizes the findings and provides some policy implications.

2. Literature Review

The informal economy has different definitions. It is often described as an unobserved (non-observed) economy (Feige and Urban 2008), a shadow economy (Schneider and Enste 2013), an informal economy (Chen 2012), etc. In general, all these terms do not differ significantly, covering the production of goods and the provision of services which are legal by nature but are not declared to governmental authorities. This can be due to various reasons, such as avoiding taxation, licenses, not being eligible to work additional hours, etc. In the developed world, the informal economy mostly consists of un(der)declared work (Pfau-Effinger 2009). In this study, we refer to the informal economy concept as it is presented by Schneider et al. (2022), stating that the informal economy in agriculture is mainly composed of various forms of informal work in agriculture.

Papadopoulos (2015) shows that, due to the small size of agricultural holdings in new EU member states, almost all work on farms is being performed by family members. Family farming is one of the prerequisites for the informal economy in agriculture (Schneider et al. 2022). Part-time agricultural activities that are typically conducted on a small scale can be characterized by low accountability (Gasson 1986). This is true not only in the form of undeclared labor but also in the form of high internal or shared consumption, both of

which go unaccounted for (Hirvonen 2016). Due to the abovementioned evidence and the fact that bigger agricultural companies are forced to be more dependent on hired labor compared to small-scale or part-time agriculture, we formulate our first hypothesis:

H1. *The larger the agricultural holdings are in the country, the smaller the informal economy is in agriculture.*

The growing of greenhouse vegetables is the most labor-intensive agricultural activity in the EU (Colnago and Dogliotti 2020; Morkūnas et al. 2022), followed by open-air vegetables and fruits and berries production (Avallone 2016). Animal husbandry, especially on dairy farms (Sakuramoto et al. 2008), is also considered to be a labor-intensive sector in European agriculture (Wiśniewski and Rudnicki 2016). The activities which require the least amount of labor input in Europe are the growing of canola, rye, wheat, and other low-management crops (Dupraz and Latruffe 2015). If there is a lower demand for overall labor, then the amount of unaccounted labor will also be lower compared to more labor-intensive agricultural activities. Based on this assumption we formulate our second hypothesis:

H2. *The larger the share of crops is in the country's agricultural portfolio, the smaller the informal economy is in agriculture.*

There is a prevailing theoretical ideology where unaccounted work on a family-owned farm (especially if it is small) is considered by society to not be a negative phenomenon (Suess-Reyes and Fuetsch 2016) and sometimes receives a level of support (Strange 2008; Sourisseau 2015). A positive effect on the social development of rural regions (Wuepper et al. 2021) and slowing depopulation of the countryside are reasons being discussed (Koutsou et al. 2011; Toader and Roman 2015) when considering the effects of part-time agriculture that typically go unaccounted for. Part-time agricultural activities are also praised for maintaining urban–rural connections. From the economic point of view, however, the undeclared labor input in agriculture is seen from a negative perspective (Schneider et al. 2022) because it not only compromises the tax collection but also distorts fair competition, putting farms with high tax morale (where all work is declared) in a less favorable position. It should be noted that, typically, not all the work input is being undeclared because of some incentives to avoid taxation (Williams et al. 2013). Rather, this may also be but also because of positive intrinsic motives, such as considering some agricultural work to be a hobby or as an everyday routine that a person does not consider as work, but rather as physical activity in the open air, required for maintaining health, etc.

H3. *The larger the share of family work is with respect to all employment in agriculture, the larger the informal economy is in agriculture.*

Although subsidies are considered to be one of the main drivers of the shadow economy (Pasovic and Efendic 2018), almost all developed nations provide generous financial support for their respective agricultural sectors (Kirwan and Roberts 2016; Hopewell 2019; Ciaian et al. 2021). New EU member states are extremely dependent on the subsidies provided under the Common Agricultural Policy (CAP) (Rizov et al. 2013; Jaime et al. 2016). In some of the new EU member states, direct payments under the CAP comprise more than two-thirds of all agricultural factor income (Volkov et al. 2019). Such a high dependency on external financial support is not welcomed since there is evidence of the negative effects of subsidies on efficiency in agriculture. The share of subsidies in the economic sector has a strong correlation with informal economic activities (Thiessen 2003; Buehn and Schneider 2012) Agriculture is not an exception, and it is considered true that high subsidies in agriculture under particular conditions are also encouraging shadow economy activities (Davies and Thurlow 2010). Considering the abovementioned ideologies, we expect that the subsidies may have an impact on the extent of the informal economy in the new EU member states' agriculture:

H4. *The larger the share of subsidies is in the agricultural factor income, the larger the informal economy is in agriculture.*

Various state interventions in the functions of the economic system are typically followed by market distortions (Pryce 2003; Lang 2019; Cutamora 2021). This is also true with agriculture (Beghin et al. 1996; Anderson et al. 2013; Haß 2022). Within the EU, the agricultural sector can be characterized as having the most frequently occurring market interventions (Cooper et al. 2009; Feindt 2018; Kiryluk-Dryjska and Baer-Nawrocka 2019) compared to other economic sectors. In several new EU member states, these interventions have caused significant side effects (Csáki and Jám bor 2013). In general economic theory, it is shown that the higher the degree of state intervention in the economy, the higher the share of the shadow economy (Dell'Anno 2007; Williams 2014). Therefore, we presume that:

H5. *The larger the state interference is in the agriculture sector, the larger the informal economy is in agriculture.*

3. Methodology

3.1. MIMIC Estimations

This paper utilizes the classical MIMIC approach, which is one of the most widely employed scientific tools for measuring various forms of the unobserved economy (Schneider and Enste 2013; Dell'Anno 2016; Dybka et al. 2019). The typical MIMIC model can be described by the following system of equations:

$$\eta = \gamma_1 X_1 + \gamma_2 X_2 + \dots + \gamma_q X_q + \zeta \quad (1)$$

$$Y_1 = \lambda_1 \eta + \varepsilon_1 \quad (2)$$

$$Y_2 = \lambda_2 \eta + \varepsilon_2 \quad (3)$$

$$\vdots$$

$$Y_p = \lambda_p \eta + \varepsilon_p \quad (4)$$

where:

η —unobserved latent variable

X' (X_1, X_2, \dots, X_q)—the causes' vector of η

Y' (Y_1, Y_2, \dots, Y_q)—the indicators' vector of η

λ and ζ —vectors of parameters.

A graphical representation of a derived MIMIC model and expected signs of the indicators are presented in Figure 1.

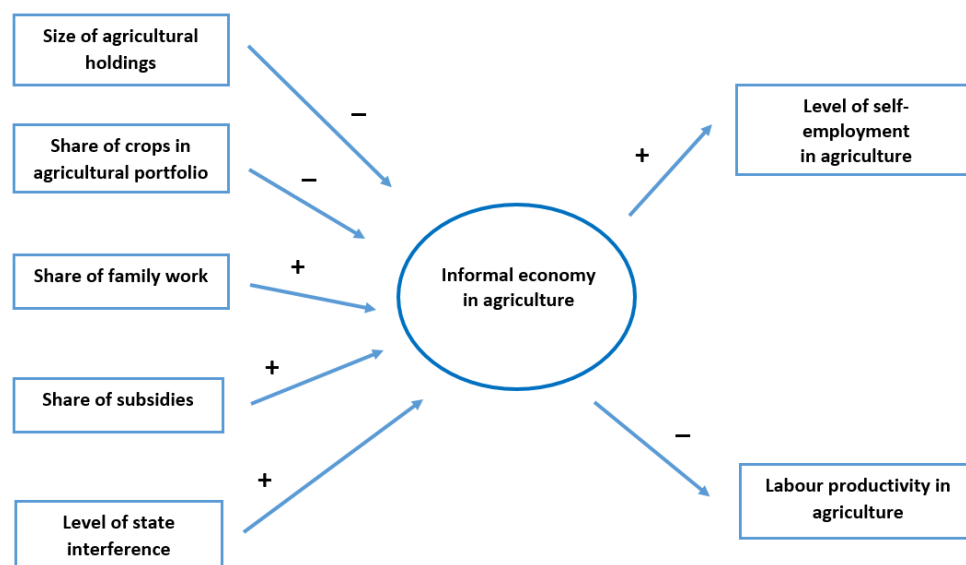


Figure 1. The MIMIC model of the informal economy in agriculture.

3.2. Measurement of the Convergence

For measuring the possible convergence process in terms of the development of the informal economy in agriculture, we refer to sigma rather than beta convergence. We are less interested in revealing if the countries performing the worst develop faster than the average (Jiang et al. 2018) during the time period, but more interested in whether these countries are similar or related in terms of the informal economy in agriculture.

First, the coefficient of variance is calculated:

$$\sigma^2 = 1/n \sum_{i=1}^n (y_i - \bar{y})^2$$

where y_i refers to the researched variables, i refers to the country (one of the 10 new EU member states), and \bar{y} refers to the arithmetic mean.

3.3. Description of the Data

The data for the research were obtained through the Eurostat Economic Accounts for Agriculture and the Farm Accountancy Data Network databases. Using unified databases for all the countries allows us to mitigate possible biases induced by the different methodological approaches taken by different data providers. All the researched countries are also subject to the same regulatory regime of the Common Agricultural Policy. This allows us to project more robust results because differences in regulatory regimes may have some effect on the final sizes of the shadow economy (Stiglitz and Pieth 2016). We limit our research to 10 new EU member states, namely the Czech Republic, Estonia, Latvia, Lithuania, Poland, Slovakia, Slovenia, Malta, Cyprus, and Hungary, all of which have joined the EU in 2004. This allows us to acquire a robust data set covering a time period from 2004–2020. It is better to employ the largest data set possible because the longer period reduces possible inaccuracies in MIMIC estimations, which are susceptible to changes in data set design (Medina and Schneider 2019). Due to large differences in the absolute sizes of agricultural sectors among the researched countries (e.g., Malta vs. Poland), all data were standardized before the econometric testing could be started.

Taking into account the specifics of agriculture, such as characteristic variation in yields (Jiménez et al. 2019) due to various climatic anomalies (droughts, floods, spring frosts, etc.), diseases, pest attacks, etc., we apply a two-year moving average of the variables for MIMIC estimations. Such an approach is necessary in econometric applications, where possible spikes in the variables are induced by exogenous non-observable shocks (Feroni et al. 2019).

The causal variables were selected according to the derived hypotheses, and they are stated as the following: the average size of agricultural holdings within the country (as data is provided for every 3 years, missing data was filled by the extrapolation), the share of crops in the agricultural portfolio of the country, the share of family work (unpaid work) with respect to overall workload in agriculture within the country, the share of subsidies in total factor income in the country, the share of all capital transfers (both from the European and national funds) and intervention purchases in respect to gross value added in the agriculture sector within the country. We have chosen the share of self-employment level and real labor productivity as indicator variables. These indicators are among the most universal in measuring various forms of the informal economy (Remeikienė et al. 2018). Descriptive statistics on the researched variables are provided in Table A1 in the Appendix A.

4. Results and Discussion

All our hypotheses were confirmed at $p < 0.05$, which is an acceptable level for acquiring significant results (Benjamin et al. 2018). As seen in Table 1, all causal variables and indicators show the expected theoretical signs.

Table 1. The results of MIMIC estimations.

Model; Latent Variable—Informal Economy in Agriculture (IEAg)	1	2
<i>Causes</i>		
Size of agricultural holdings	−0.241 *	−0.212 **
Share of crops in agricultural portfolio	−0.064 **	−0.077 **
Share of family work	0.584 ***	0.602 ***
Share of subsidies	0.304 ***	0.312 ***
Level of state interference	0.021 *	0.025 **
Dummy variable for Cyprus		0.442 ***
<i>Indicators</i>		
Level of self-employment in agriculture	0.102 ***	0.113 ***
Labor productivity in agriculture	−0.714 ***	−0.736 ***
<i>Statistical tests</i>		
RMSEA	0.065	0.058
CFI	0.912	0.943
SRMR	0.017	0.015
Observation	170	170

* significant at 0.05; ** significant at 0.01; *** significant at 0.001.

Although both of the derived models exhibit sufficient reliability, with RMSEA lower than 0.08, CFI higher than 0.9, and SRMR lower than 0.05, we have chosen the second model for further investigation. This is because it shows slightly better statistical reliability indicators, and some of its causal indicators (size of agricultural holdings and level of state interference) have lower p values. We are aware of a possible dummy variable trap (Fergusson et al. 2022), although in our case this risk is not extremely relevant. A close output of the coefficient values from both models confirms the reliability of our estimations.

Since the MIMIC estimations provide only relative values, a calibration procedure is required (Schneider et al. 2022). We refer to a study by Williams and Horodnic (2018, p. 18), which provides information about the extent of the undeclared labor in EU agriculture in 2015. The calibrated results are presented in Table 2.

The mean value for the share of informal economy in agriculture in 10 new EU member states for the researched period is 33%, while the median value is 32%. Such a close distribution between mean and median values confirms the narrow distribution of the results, indicating that there is no significant impact for the outliers (Sarstedt and Mooi 2019). The countries with the smallest informal economies were Slovakia (5%), Czechia (9%) and Estonia (10%). The countries with the largest informal economies were Cyprus (86%), Poland (57%) and Slovenia (56%). The Czech Republic and Slovakia were among the countries with the most cohesion between informal and overall economies in Central and Eastern Europe (Medina and Schneider 2019), and thus we can state that our findings correspond with the existing literature. On the other hand, Slovenia is among the countries with the largest share of an informal economy in agriculture, although in general, its economy is considered to be one of the least affected by informal activities compared with other new EU member states. This discrepancy can be explained by the very small agricultural holdings in Slovenia and a high proportion of unregistered seasonal workers (Neef 2020) from other former Yugoslavia countries. The high share of informal economy in Poland's agriculture can be explained by an agricultural sector dominated by small-scale production, a low tax morale (Horodnic 2018) and a high level of informality in the whole economy (Kelmanson et al. 2019). These contradictions between the informal economy levels in agriculture and the informal economy levels in the whole economy once again confirm the specifics of the agricultural sector and the need for an agriculture-tailored model that accurately reflects the local unobserved economy.

Table 2. The share of informal economy in agriculture in 10 new EU member states in 2004–2020.

Country/Year	Average	Minimum Value	Maximum Value	2004	2005	2006	2007	2008	2009	2010	2011
Czechia	9%	6%	15%	15%	12%	12%	10%	8%	11%	10%	10%
Estonia	10%	6%	17%	17%	14%	13%	11%	10%	14%	12%	11%
Cyprus	86%	80%	91%	91%	90%	88%	87%	86%	91%	88%	87%
Latvia	45%	35%	54%	54%	54%	52%	49%	47%	51%	49%	47%
Lithuania	15%	11%	27%	27%	24%	20%	17%	14%	18%	16%	14%
Hungary	19%	18%	24%	24%	21%	18%	19%	18%	21%	21%	20%
Malta	22%	20%	27%	27%	26%	24%	21%	21%	23%	22%	21%
Poland	57%	54%	68%	68%	66%	61%	57%	55%	56%	56%	56%
Slovenia	56%	52%	62%	62%	61%	58%	57%	56%	59%	58%	57%
Slovakia	5%	3%	11%	11%	8%	7%	5%	4%	7%	7%	6%
Total (unweighted average)	33%	29%	40%	40%	38%	35%	33%	32%	35%	34%	33%

Country/Year	2012	2013	2014	2015	2016	2017	2018	2019	2020
Czechia	9%	8%	7%	7%	7%	6%	7%	7%	8%
Estonia	9%	9%	8%	6%	6%	6%	7%	7%	9%
Cyprus	87%	86%	85%	85%	83%	83%	80%	82%	87%
Latvia	45%	43%	40%	40%	40%	38%	36%	35%	37%
Lithuania	13%	13%	12%	11%	12%	12%	11%	11%	13%
Hungary	18%	19%	18%	18%	18%	18%	19%	19%	21%
Malta	22%	21%	21%	21%	21%	20%	20%	20%	22%
Poland	55%	56%	56%	56%	55%	56%	56%	54%	57%
Slovenia	57%	56%	55%	55%	53%	53%	52%	53%	55%
Slovakia	6%	5%	4%	3%	3%	4%	3%	3%	5%
Total (unweighted average)	32%	32%	31%	30%	30%	30%	29%	29%	31%

The development of the informal economy in the 10 EU countries through the period of 2004–2020 is presented in Figure 2.

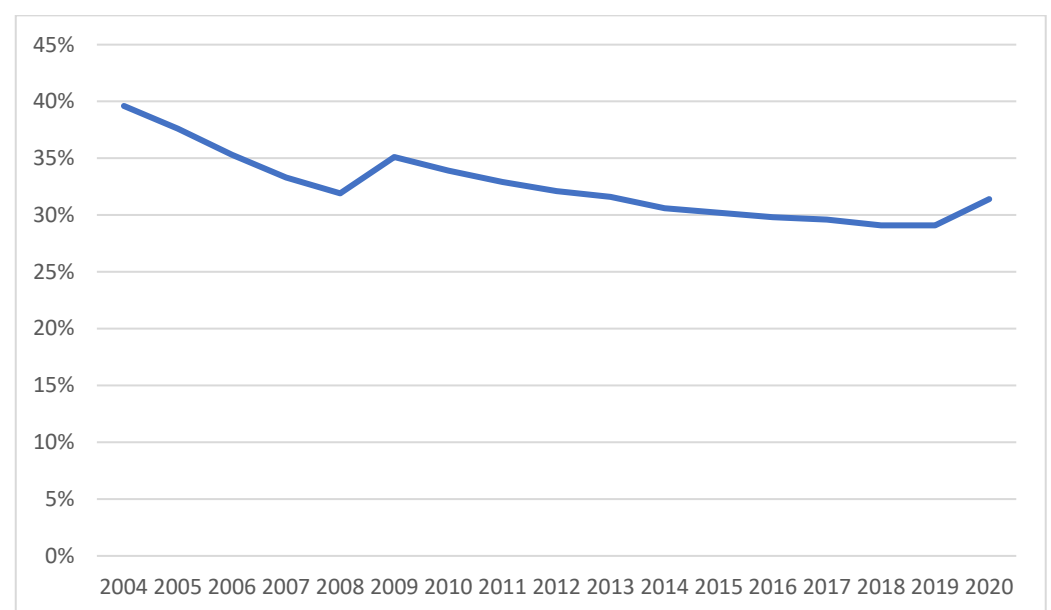
**Figure 2.** The development of the informal economy in agriculture in 10 new EU member states in 2004–2020.

Figure 2 indicates the decreasing trend in the level of the informal economy in new EU member states. This corresponds to the insights of Bayar et al. (2018) regarding the decreasing trends in the informal economy in the EU. The decrease can be attributed to increasing standards of living, stronger institutions, both of which increased in quality in Central and Eastern Europe after accession to the EU (Agostino et al. 2020), and increased tax morale. The observed spikes in the informal economy in 2009 and 2020 may correspond to crisis periods. Notably, an increase in the informal economy in agriculture during economic crises is lower compared to the increase in the informal economy in the whole country (Medina and Schneider 2019). This allows us to presume the relative resilience of agriculture to various crisis side effects compared with other economic sectors.

After investigating the sigma convergence process among the 10 new EU member states in terms of informal economy in agriculture, we can confirm an ongoing divergence process, as shown in Figure 3.

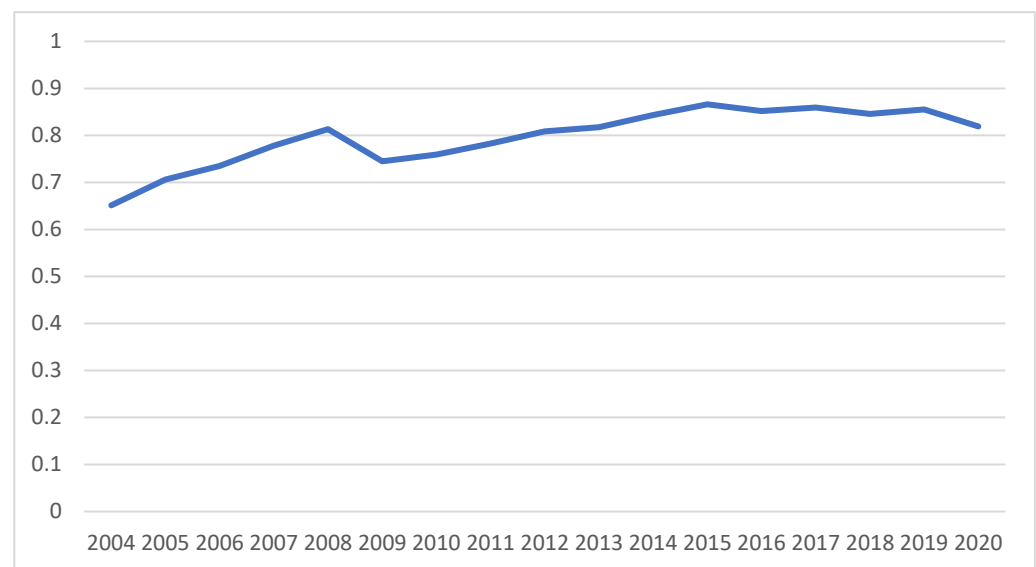


Figure 3. The level of sigma convergence of the informal economy in agriculture in 10 new EU member states in 2004–2020.

A low level of cohesion among the new EU member states in terms of informal economy in agriculture can be observed, where the index of sigma convergence ranges from 0.651 in 2004 to 0.866 in 2015. Such an increase in divergence among newly acceded EU member states indicates that not all countries managed to employ benefits provided after the accession, such as intensive financial support, clear and transparent procedures, etc., in a way that would best facilitate the development of the agricultural sector. The differences in the share of subsidies in the factor income of farms imply that subsidies act as a production factor in the best performing countries (Slovakia, Czechia, Estonia), whereas it acts as a facilitator of the informal economy in others (Cyprus). These findings correspond to the contradicting theoretical concerns about the role of subsidies in agriculture, indicating both positive (Vozarova and Kotulic 2016; Guo et al. 2021) and mixed results (Kirwan and Roberts 2016; Garrone et al. 2019).

Similar what was shown in Figure 2, periods of financial crises (2009–2010 and 2020) can be observed while analyzing the level of cohesion among the countries in terms of the informal economy in agriculture (Figure 3). During the 2009 and 2020 economic downturns, the level of cohesion increased, indicating that the informal economy in agriculture may have increased more in countries where levels of informal economy were otherwise lower. This corresponds with Schneider (2005), concerning the development of the shadow economy in a whole economy during a period of crisis. He argues that the informal economy is

larger in less developed countries, but the increase in the unobserved economy is larger among the more developed countries during a crisis.

5. Conclusions and Policy Implications

The agricultural sector of the new EU member states can be characterized by a high prevalence of the informal economy. The accession to the EU had a positive effect on the agricultural sectors of new EU member states, and the average level of the informal economies in 10 new EU member states decreased from 40% in 2004 to 31% in 2020. Financial crises have a negative impact on the development of the informal economy in agriculture, because the informal economy level in agriculture tends to increase during a crisis. This increase is higher in countries where the overall level of informality in agriculture is lower. Some countries that are characterized by a low overall level of informality in their economy exhibit quite a high level of informal economy in agriculture. This is determined by the specifics of their individual agricultural activities and culture (dependency on seasonal work, high proportion of family farming, part-time/hobby agriculture, etc.). Due to these specifics, an unobserved economy evaluation model should be tailored to fully reflect the uniqueness of the agricultural sector. This discrepancy in the levels of the informal economy between agriculture and the whole economy also hinders the development of the research on this subject. It appears impossible to use the level of informal economy in the whole country as a starting value for the calibration of the results obtained by MIMIC-based econometric modelling aimed at revealing the level of the informal economy in agriculture.

The divergent path in the informal economy of the new EU member states not only confirms the insights of [Herwartz et al. \(2015\)](#) regarding the divergent paths of the development of the non-observed economy in different EU regions, but also echoes the arguments about the two-speed Europe ([Adler-Nissen 2016](#)). This is a new insight, because agriculture was considered to be among the first to experience a cohesion process within the EU ([Volkov et al. 2019](#)).

The significant differences in the levels of informal economy in agriculture in new EU member states can be explained, at least partially, by the different agricultural portfolios of its countries. Cyprus agriculture, dominated by fruits and vegetable production, requires more manual labor input compared to crop production in the Czech Republic, Lithuania and Estonia. Since labor levies are among the most easily concealable compared to other agricultural costs, naturally, farmers sometimes cannot resist the temptation to increase their competitiveness by not declaring all the labor input, especially in countries where tax morale is not high.

One of the easiest ways to significantly reduce the informal economy in EU agriculture is to focus on part-time agriculture. Usually, part-timers are people who have an everyday job that is not related to agriculture, but they spend their free time on their farms or plots. Depending on the laws of different countries, a person cannot work more than 36–42 h a week. Therefore, part-time farmers cannot declare their agricultural activities in order to avoid legal prosecution. Allowing some flexibility in expanding working time may help to reduce the informal economy level in EU agriculture.

Some of the limitations of our study may be attributed to the methodology applied. The MIMIC approach does not unconditionally confirm the causality. Although the theoretical setting of our hypotheses hardly assumes the opposite direction of the relationships between our causal and indicator variables.

Considering potential future research avenues, an investigation deeper into the specific determinants causing such high differences in the level of the informal economy in agriculture in the new EU member states would be beneficial. Comparing the levels of informal economy in agriculture in the new and old EU member states could also benefit the development of scientific knowledge in the area. Another future research direction may be an investigation of micro-level factors, such as psychological and behavioral determinants affecting farmers' behavior and inclinations towards informal economic activities.

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Data Availability Statement: Not applicable.

Conflicts of Interest: The author declare no conflict of interest.

Appendix A

Table A1. Descriptive statistics of the researched variables.

Variable	Calculation Formula	Unit of Measure	Mean	Standard Deviation	Minimum Value	Maximum Value
Size of agricultural holdings	Utilized agricultural area/farm number	ha	41.35	49.41	0.91	158.57
Share of crops in agricultural portfolio	Crop area/Utilised agricultural area	percent	35.4	17.09	0	68.76
Share of family work	AWUs non-salaried/ All AWUs	percent	68.09	23.51	16.84	94.33
Share of subsidies	Subsidies/factor income of farms	percent	43.23	18.36	5.05	90.55
Level of state interference	Sum of all capital transfers and state intervention purchases except subsidies/Cross value added in agriculture	percent	2.16	1.12	0	4.13
Level of self-employment in agriculture	All employment in agriculture minus salaried and non-salaried work	percent points	−2.46	2.28	−9.43	3.66
Labor productivity in agriculture	Gross value added/total hours worked in agriculture	EUR per hour	4.59	2.25	1.11	9.58

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