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Explaining the Shadow Economy in Europe: Size, Causes and Policy Options

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Explaining the shadow economy in Europe: size, causes and policy options

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Abstract

This paper examines the drivers, and reestimates the size of shadow economies in Europe, with a focus on the emerging economies, and recommends policies to increase formality. The size of shadow economies declined across Europe in recent years but remains significant, especially in Eastern Europe. In the emerging European economies, the key determinants of shadow economy size are regulatory quality, government effectiveness, and human capital. The paper argues that a comprehensive package of reforms, focused on country-specific drivers, is needed to successfully combat the shadow economy. The menu of policies most relevant for Europe's emerging economies include: reducing regulatory and administrative burdens, promoting transparency and improving government effectiveness, as well as improving tax compliance, automating procedures, and promoting electronic payments.

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I. INTRODUCTION

Informality declined across Europe in recent years but remains significant, especially in Eastern Europe. As a share of formal GDP, shadow economies have shrunk across much of Europe since the global financial crisis, when they reached their peaks in many countries. However, the shadow economy remains, on average, around 15–20 percent of GDP in Advanced Economies and around 30-35 percent of GDP in Emerging Economies and is much larger in some of the Commonwealth of Independent States (CIS) countries[2].

Shadow economies persist for a variety of reasons. Workers and firms may opt for informality to avoid taxes and pension or social security payments, or labor and product market regulations. However, in some cases the shadow economy can serve as a source of employment and income in the absence of opportunities in the formal sector, or as a safety net during cyclical downturns (Loayza and Rigolini 2006, Medina et al. 2017). In this way, the shadow economy, too, can contribute to overall growth (Schneider 2004).

Large shadow economies tend to hold back growth and, for some European countries, convergence with the rest of Europe. While the informal sector can act as a source of supplemental or otherwise unavailable income, its existence is partly a function of inefficiencies in the broader economy. The costs associated with informality include distortions in the labor market, forgone revenue due to underreporting of wages and output, suboptimal provision of public goods, and lower provision of and access to financing. Limited scale of production also tends to impede firms' productivity and innovation.

Given that there are significant costs associated with shadow economies, policy makers seek to understand the drivers and possible solutions. Identifying the causes and reducing the size of the shadow economy entails several challenges. First is selecting from among several methodologies to measure the shadow economy. Second, it can be difficult to assess the drivers of the shadow economy due to endogeneity (Schneider 2013). For instance, tax morale, enforcement, rates, and compliance all interact with each other, as well as the provision of public services and government effectiveness. Finally, once drivers are identified, policies must be calibrated so that economic activity is formalized without stifling entrepreneurship or cutting off incentives to work.

This paper seeks to examine the drivers of shadow economies in Europe, with a focus on the emerging economies, and recommend policies to increase formality. The paper finds that the primary determinants of the shadow economy in Europe relate to regulatory quality and tax administration, along with several macroeconomic factors, including productivity and trade openness. In addition, remittances are found to be significantly negatively associated with informality, suggesting that migration and the shadow economy can be viewed as substitute

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[2] Hassan and Schneider (2016), Medina and Schneider (2018), Schneider (2015)

activities. The determinants for the *Eastern Europe* group[3] are, similarly, regulatory quality, government effectiveness, and human capital. We then re-estimate the size of shadow economies for European countries, including recent years, based on the determinants we identified in our empirical analysis.

The remainder of this paper is organized as follows: Section II provides an overview of how the shadow economy is defined and measured. Section III discusses the size, evolution, and costs of shadow economies in Europe; Section IV describes the underlying causes of the shadow economy; Section V presents an empirical analysis of the determinants of the shadow economy; and Section VI reports updated estimates of the shadow economies for Europe. Section VII discusses the policy implications and recommendations, and Section VIII brings together conclusions.

II. DEFINING AND MEASURING THE SHADOW ECONOMY

Alternative concepts of the shadow economy encompass a wide range of phenomena. Some definitions focus on hidden output (Gerxhani 2004), others on hidden employment (Hussmanns 2004, Perry 2007). While unregistered firms hide all their output, registered firms may choose to hide a fraction of their output to reduce their tax liability. Schneider and his coauthors (Hassan& Schneider 2016, Schneider & Williams 2013, Schneider 2014) define the shadow economy as mostly the legal economic and productive activities that are deliberately hidden from official authorities and that, if recorded, would contribute to GDP (excluding illegal or criminal activities, and do-it-yourself, charitable or household activities). This is the definition adopted in this paper; "informality" is often used interchangeably with "shadow economy".

The hidden nature of informal activity makes it challenging to measure accurately. Several methods have been employed to measure the size of the shadow economy.

•	*Direct approaches* are based on surveys, tax auditing and other compliance methods. Such methods allow detailed information to be gathered about the shadow economy structure. However, the obtained information may not be representative and may not be consistent across countries.

•	*Indirect approaches* include (i) the discrepancy between income and expenditure measures of GDP, (ii) the difference between GDP growth and electricity consumption growth, and (iii) the difference between the estimated money demand and actual amount of currency circulating in the economy. These measures are sensitive to the underlying assumptions (elasticity, velocity of money, base year of the estimation, etc).

•	A *model approach* is based on the Multiple Indicator, Multiple Causes (MIMIC) model, pioneered by Frey and Week-Hannemann (1984) and further expanded by Schneider

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[3] The "*Eastern Europe*" group is a broadly defined set of countries that includes Albania, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Kosovo, Latvia, Lithuania, Macedonia, Moldova, Montenegro, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Turkey, and Ukraine, and also Greece and Cyprus.

and his coauthors (2004, 2012, 2013, 2014, 2015, 2016). In the model, the size of the shadow economy is represented by a latent variable (an index), with both its causes and indicators observed and measured. This latent variable is used in a system of two equations: (i) as the dependent variable with its causes as the explanatory variables and (ii) as the explanatory variable for the indicators of informality. The equations are simultaneously estimated and the fitted values of the latent variable are used to compute an estimate of the size of the shadow economy as a share of GDP. The shortcomings of this method include sensitivity to changes in data and specifications, the sample used, calibration procedures, and starting values (Breusch 2005).

There is no ideal or leading method to measure the shadow economy, each of them have some conceptual or practical strengths and weaknesses.[4] The choice of the methodology can be governed by data availability, or the research objectives. Multiple methods can be employed to improve accuracy of the estimations.

In this paper, we examine the shadow economy in Europe in a two-stage analysis, combining empirical and the MIMIC model approaches. First, we use estimates from Schneider and Hassan (2016), that cover a set of 157 countries for the period of 1999–2013, in the regression analysis to identify factors that are more relevant for Europe. Then, we re-estimate the size of shadow economies for 47 European countries for the period of 1999–2016, using the MIMIC model. Guided by our regression results, we choose *productivity (GDP per worker)*, *government effectiveness*[5], *tax revenues*, *trade volume* and *agriculture value-added* as causal variables, and *GDP growth* and *labor force participation rate* as indicator variables. The input variables in Hassan and Schneider (2016) are *government spending as a percent of GDP, unemployment rate, self-employment rate, Economic and Business Freedom Indices from the Heritage Foundation* as causal variables and *M1/M2 and labor force participation rate* as indicator variables. The MIMIC approach allows us to compare shadow economy estimates across countries and to conduct panel data analysis. While the MIMIC model has its weakness, and has been subject to some criticism, its appeal is in its broad coverage and the internal consistency of the dataset.

III. SIZE, EVOLUTION, AND COSTS OF THE SHADOW ECONOMY

The share of the shadow economy is significant in many European countries, ranging from less than 10 to over 40 percent of GDP. In Advance Economies[6] the shadow economy tends

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[4] While an extensive literature is available regarding the various methods (and associated shortcomings) for measuring the shadow economy, a detailed overview of this body of work (including the MIMIC method) is not provided here. See for example, Schneider and Enste (2002), Feld and Schneider (2010), Schneider, Buehn and Montenegro (2010), Schneider (2015), Schneider and Williams (2013), Williams and Schneider (2016).

[5] Using a World Bank index that measures the perception and quality of public services.

[6] Building on the IMF World Economic Outlook classification, we divide countries into three groups:
(i) *Advanced Economies*: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, United Kingdom, (ii) *Emerging Economies*: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Hungary, Kosovo, FYR Macedonia, Montenegro, Poland, Romania,

to be smaller at around 10–20 percent of GDP on average.[7] Emerging economies have higher shares of the shadow economy, on average around 30–35 percent of GDP. The size of the shadow economy is above 40 percent of GDP in most of the CIS countries and even higher in some cases.[8] The text chart shows the size of shadows economies in Europe based on the updated estimates for 2016.[9]

Size of Shadow Economy in European Countries, 2016
(percent of GDP)

Source: IMF staff calculations

While the average size of the shadow economy in Europe remained broadly similar to the mid-2000s, the dynamics are heterogeneous across countries. In many countries the shadow economy increased since early 2000s (e.g., in Croatia, Cyprus, Greece, Serbia), while in others it declined (Czech Republic, Macedonia). In most countries the shadow economies increased in 2008–2010 and then declined to around pre-crisis levels.

Shadow Economy Estimates, 2000-2016
(Percent of GDP)

Source: IMF Staff calculations.

The size of the shadow economy is smaller in more developed countries, both as the share of GDP and share of employment. The share of shadow economy is strongly negatively correlated with income per capita across different country samples and time periods. In more advanced economies, the shadow economy is dominated by tax evasion and undeclared labor in registered firms (Schneider and Buehn 2012). In contrast, developing economies tend to have a relatively higher share of informal workers, to

Shadow Economy and GDP per capita, 2016

Source: IMF Staff calculations and the World Bank.
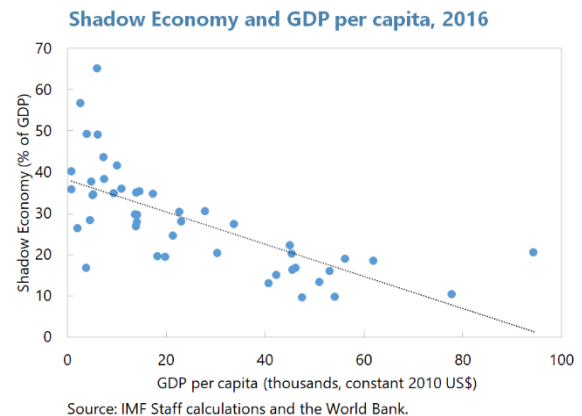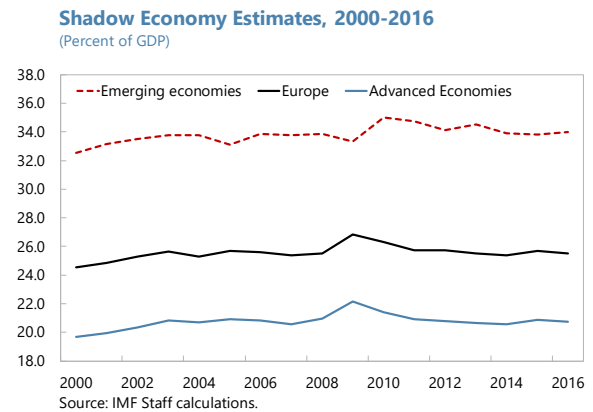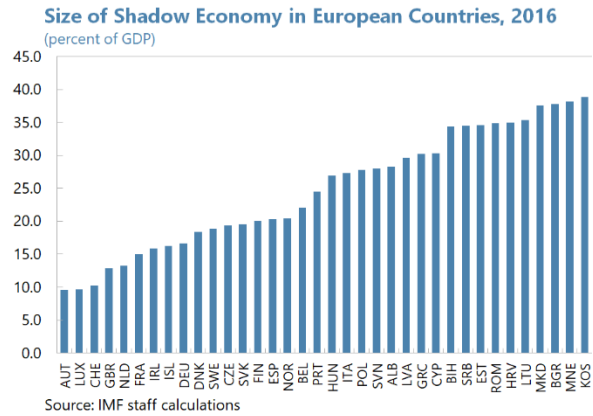
Serbia, Turkey, and (iii) *CIS*: Armenia, Azerbaijan, Belarus, Georgia, Kazakhstan, Kyrgyz Republic, Moldova, Russia, Tajikistan, Ukraine.

[7] Hassan and Schneider (2016) estimate the average size for Advanced Economies at 20.5 percent in 2013, the average in our updated estimates are 20.7 percent for 2013 and for 2016. Schneider (2015) has a lower average for advanced economies in Europe of 15.8 percent for 2013, however, their sample is missing Cyprus, Czech Republic, Iceland and Slovak Republic; their average estimate for 31 European countries is 18.2 percent. The estimate of Medina and Schneider (2018) for advanced economies is also 15.8 percent for 2013.

[8] Hassan and Schneider (2016) and Medina and Schneider (2018).

[9] The updated estimates and dynamics are very similar to Hassan & Schneider (2016), however their estimation period ends in 2013. We compare the two sets of estimates in more detail in Section VI.

a large extent reflecting a lack of opportunity in the formal sector (Oviedo 2009). As the economy develops, informal firms are more likely to be replaced by new or existing registered firms rather than transition into the formal sector (Porta and Shleifer 2008).
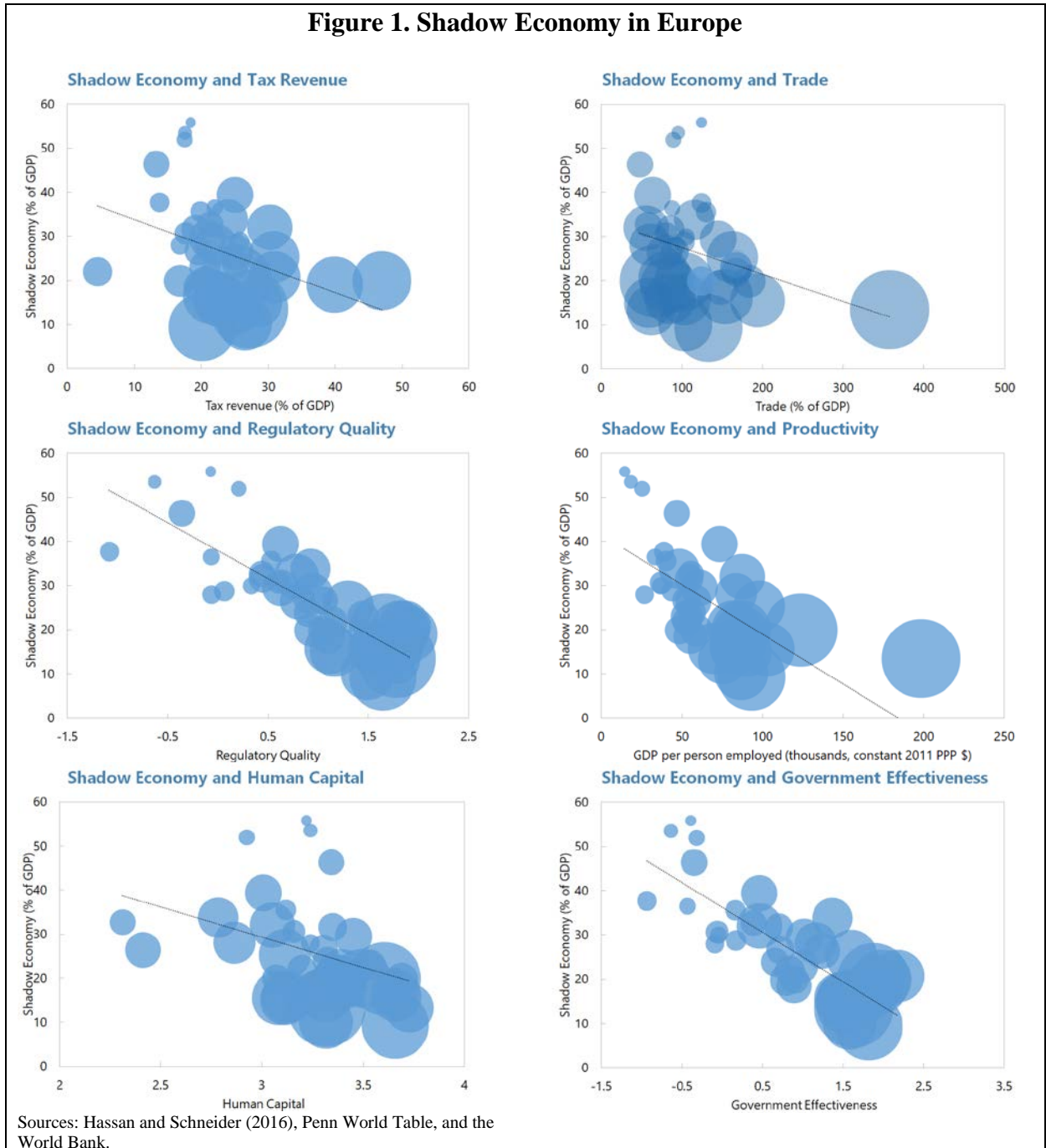
Shadow economies can have significant economic and social implications, and tend to create inefficiencies and hold back growth and development across a number of dimensions:

- *Public revenue and services:* Shadow economy activity often goes untaxed and so weakens public revenues. This, in turn, leads to fewer and/or weaker public goods and services. Weaker public services—such as education, social support, or training programs— can on their own weaken growth prospects and efforts to reduce poverty. But it can also have a dynamic effect, as weaker public services negatively influence public perceptions of government effectiveness, thus increasing citizens' incentive, or willingness, to avoid taxes, increasing informality and further weakening public revenues and services (see, for instance, Schneider 2004). Lower incomes could also therefore necessitate higher taxation across the economy.

- *Innovation and productivity*: Operating informally tends to limit the growth of firms below the efficient scale of production. Tax and regulatory pressures that spur firms to stay informal mean that firms also tend to stay smaller, engage in less research and development and innovation, and hire fewer workers (Bobbio 2016). This skews resource allocation away from efficiency, reduces human and physical capital accumulation and technological innovation, and weakens productivity and potential output.

- *Labor markets*: A large shadow economy can also mean high and persistent unemployment rates and low labor force participation (Schneider 2013). While this is partly a reflection of a smaller labor force due to high informal employment, informal labor can also be lower-paying, less secure, and offer weaker working conditions, including no formal apprenticeships and less training in general (Williams 2015). A large number of workers in the informal sector also makes it more difficult to target effective labor policies.

- *Financial access*: Banks tend to avoid lending or lend less to unregistered firms and borrowers without formal jobs or declared income. This can stymie financial deepening (Gobbi and Zizza 2012) and the funding needed for capital investment, private sector expansion, and innovation.

- *Data and surveillance*: Large shadow economies can also distort economic indicators and lead to inaccurate measurement of national accounts, employment, income, labor force, consumption and other key data. This makes it more difficult to analyze a country's overall macroeconomy and could lead to misdiagnoses and flawed policy choices.

IV. DETERMINANTS OF THE SHADOW ECONOMY

Correlations between the shadow economy and economic indicators are broadly consistent with expectations (see Figure 1). The relationship between the shadow economy and

unemployment, corruption, and agriculture is positive in the data. The relationship between the shadow economy and GDP per capita, credit to the private sector, the revenue burden, human development, and regulation is negative. These relationships are relatively stable over time.

Figure 1. Shadow Economy in Europe

Sources: Hassan and Schneider (2016), Penn World Table, and the World Bank.

In seeking to understand the dynamics around the shadow economy, we find it useful to group determinants into two broad categories: (i) "exit" factors and (ii) "exclusion" factors (Perry 2007, Oviedo 2009). "Exit" factors from the formal economy tend to lead to voluntary

informal employment, with shadow workers typically earning similar or higher incomes relative to comparable formal workers and enjoying greater employment flexibility. In contrast, "exclusion" factors from the formal economy tend to result in forced informal employment when workers are unable to find formal work. The difference mostly depends on whether, as a result, workers are better off with a formal, compared to an informal job. In most countries, both sets of factors are present to a varying degree.

i. *Exit* factors include:

- Burdensome and costly regulation, including high entry costs, trade barriers
- Complex and excessive taxation and poor tax administration,
- Administrative barriers, including excessive paperwork, corruption
- Low monitoring and enforcement
- Low benefits of being formally employed or formally registered,
- Low quality of public goods and services (infrastructure, social protection)
- Individual preference for self-employment

ii. *Exclusion* factors include:

- Burdensome and costly regulation, including high entry costs, trade barriers
- Lack of opportunities in the formal sector, especially for certain demographic (e.g., young or old workers) or ethnic groups
- Low productivity
- Low skills and low human capital

There is a broad literature related to the drivers of the shadow economy. The literature suggests a wide range of factors can drive the evolution of the shadow economy, including:

a. *Weak institutional quality* is found to be a key determinant across the literature. Excessive regulatory burden, inefficiency of government institutions, weak rule of law, widespread corruption can prevent formal firms from hiring workers and encourage informal activities.

o *Regulatory burden* is the most robust cause of informality, it suppresses entrepreneurial freedom, imposes higher entry costs, results in more bureaucracy (Dabla-Norris, Gradstein, and Inchauste 2008).

o *Weak governance*, including corruption and weak judicial systems also play an important role in determining the size of shadow economy, especially in interaction with regulation and other variables. The impact of regulation and financial constraints on informality is stronger with better rule of law (Dabla-Norris, Gradstein, and Inchauste 2008) and when governance levels exceed certain thresholds (Oviedo 2009).

b. *Tax burden and tax administration* are also crucial factors that explain the size of the shadow economy. The higher overall tax burden and/or lower monitoring and enforcement, the stronger incentive for tax evasion and underreporting of wages (Schneider and Williams 2013, Hassan and Schneider 2016).

c. *Trade openness* is also found to be negatively associated with the size of shadow economy (Torgler and Schneider 2007). Trade is relatively transparent and easier to tax and, therefore, more difficult to conceal for tax and other purposes.

Where informal activity is driven more by "exclusion" factors, workers tend to rely on their jobs to provide their income subsistence. Those workers typically have fewer skills, less education, and are less productive.

a. Countries with higher *productivity* (GDP per worker) typically have a better allocation of resources within the economy and so smaller informal sectors (Porta and Shleifer 2008). Productivity could also act as a proxy for a country's level of development, which is generally correlated with taxation capacity and demand for public goods and services. As with the income level, the relationship between productivity and the size of shadow economy is endogenous, with causation going both ways.

b. Shadow economies are associated with lower *human capital*, with informal workers having fewer skills and a lower education level (Porta and Shleifer 2008, Dabla-Norris, Gradstein, and Inchauste 2008). Human capital accumulation and entrepreneurial talent are held back by lower levels of innovation and productivity that occur in countries with larger shadow economies.

c. The "exclusion" factors tend to explain the prevalence of informal work in *agriculture* and related sectors (along with lower enforcement), with the size of agricultural sector positively contributing to the shadow economy (Vuletin 2008, Schneider 2014).

Migration and remittances play a dual role with respect to the shadow economy. Migrant workers, similarly to informal workers, tend to reside in rural areas, have less education, and are employed more in labor-intensive (less productive) activities compared to workers in the formal sector. The shadow economy and migration also play a similar poverty reducing role, providing a safety net for the poor. As a result, the two phenomena can be viewed as substitute activities, and are therefore negatively related. On the other hand, remittances can encourage informality by providing the capital, or by providing a safety net, to encourage remittance recipients to choose less secure informal work (Ivlevs 2016). For example, in Moldova some women and young people in families with household member(s) working abroad choose informal employment over a formal job (Ganta 2012). In this case, remittances positively contribute to the size of the shadow economy. The ultimate sign of the relationship between the two phenomena depend on which of these two effects is stronger

V. EMPIRICAL RESULTS

Our analysis seeks to identify the determinants of the shadow economy in Europe. To determine the shadow economy drivers specific to Europe, we use estimates for European shadow economies derived by Schneider and Hassan (2016)[10] as the dependent variable in a Europe-focused model. For independent variables, we use macroeconomic indicators and institutional indices that are consistent with the literature and relevant to our smaller country set. We begin with a panel of 40 European countries over 2000–2013 and then examine the sub-sample of "*Eastern European*" countries[11] over a shorter time period. Narrowing the country focus allows us to examine European countries with larger shadow economies and so to better refine our policy recommendations. Overall results are presented in Table 1 below.

A combination of macroeconomic, microeconomic, and institutional factors drive shadow economies in Europe. For our full sample, we use a fixed effects panel regression to control for heterogeneity across this broad set of countries. The benchmark specification used is:

$$ShadowEconomy_{i,t} = \alpha_i + \beta X_{it} + \delta_t Time_t + u_{i,t}$$

where *Shadow Economy*$_{i,t}$ represents the size of the shadow economy as a share of GDP; α_i are country fixed effects; $X_{i,t}$ is a vector of macroeconomic variables and institutional indicators; *Time*$_t$ is time fixed effects, which we include to control for unexpected year-related variation and special events; and $u_{i,t}$ is the error term. We start with a group of macroeconomic variables and institutional indicators found in the literature to influence the shadow economy. We find the following to be statistically significant and negatively associated with the size of the shadow economy as a share of GDP (see Table 1, regressions 1 and 2), broadly in line with the literature.

We use several indices (World Bank's Regulatory Quality, Heritage Foundation's Fiscal Freedom, World Bank's Government Effectiveness) in our estimations, the selection of indicators follows the literature. The results are broadly robust to the choice of indicator.[12]

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[10] Schneider and Hassan (2016) estimates are based on a common set of causal variables for the entire global country set. We chose their estimates as baseline estimates because of their broad coverage of European, including emerging European, countries. Schneider (2015) covers only 31 countries, mostly advanced economies. The country sample in Medina and Schneider (2018) misses some of the European emerging countries (Montenegro, Macedonia, Serbia), which for us are relevant for estimating the size of the shadow economy in Kosovo (see Section VI).

[11] The country set includes: Albania, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Macedonia, Moldova, Montenegro, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Turkey, and Ukraine, and also Greece and Cyprus.

[12] The alternative indicators include Global Competitiveness Index (Global Competitiveness report), Ease of Paying Taxes (WB Doing Business), Rule of Law (Worldwide Governance Indicators), Corruption Perception Index (Transparency International).

- *Regulatory quality*: Using the World Bank's regulatory quality index[13], we find a negative relationship between regulatory quality and the size of a shadow economy.

- *Tax burden*: Using the Heritage Foundation's Fiscal Freedom index[14], which encompasses marginal personal and corporate tax rates and the total tax burden as a share of GDP, we find a negative (if weak) relationship between fiscal freedom and the shadow economy.

- *Productivity (GDP per worker)*: We find a negative relationship between productivity and the size of the shadow economy, as expected.

- *Trade openness (trade volume/GDP)*: Similar to the literature, we find a negative relationship in Europe.

- *Remittances (share of GDP)*: We find a negative relationship between remittances received and the size of the shadow economy. This suggests that migration and informality can be viewed as substitutes, even though the two phenomena likely have common determinants: weak institutional factors, low human capital, and low productivity. Imposing country fixed effects, as we do, significantly reduces the explanatory power of these variables since most of them do not exhibit strong time variation (Table 1, regressions 1, 2, and 5). Thus, when we control for institutional factors, countries that are more dependent on remittances (and, correspondingly, have higher levels of migration) have smaller shadow economies.

- *Agriculture value-added per GDP*: We find a negative relationship between agriculture's share of GDP and the shadow economy in Europe, contrary to some literature findings. However, the literature focuses predominantly on developing countries. Since about half of this sample is comprised of advanced economies with more developed institutions, including taxation systems, this result could be a function of more efficient—and formalized —agriculture sectors in advanced Europe dominating the sample. In this case, larger agricultural sector offers more employment opportunities, and we would expect a negative relationship with the size of the shadow economy.

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[13] Regulatory Quality Index captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5. The score indicates better regulatory quality.

[14] "Fiscal Freedom Index is a (reverse) measure of the tax burden imposed by government. It includes direct taxes, in terms of the top marginal tax rates on individual and corporate incomes, and overall taxes, including all forms of direct and indirect taxation at all levels of government, as a percentage of GDP. Thus, the fiscal freedom component is composed of three quantitative factors: (i) the top marginal tax rate on individual income; (ii) the top marginal tax rate on corporate income, and (iii) the total tax burden as a percentage of GDP. The higher index indicates less tax burden.

The full country set is quite heterogeneous, encompassing high-income advanced countries with relatively small shadow economies and low-to-middle income transition countries with some of the largest shadow economies in the world. As such, we split the sample to focus more closely on those countries with larger shadow economies.

The *Eastern European* countries see their shadow economies more clearly driven by institutional factors. For the smaller, more homogenous sets of countries we use a random effects model. The benchmark specification is:

$$ShadowEconomy_{i,t} = \alpha_i + \beta X_{it} + \delta_t Time_t + v_i + \epsilon_{i,t}$$

which is similar to the fixed effects specification above, but where v_i is the unit-specific error term and $\epsilon_{i,t}$ is the within-entity error term. This country set includes 23 countries over 2005-2013. We find that the shadow economy is again negatively associated with productivity, remittances, and regulatory quality (see Table 1, regressions 3 and 4). However, our results also show two other important drivers of the shadow economy in those countries:

- *Government effectiveness*: Using a World Bank index[15] that measures the perception and quality of public services—as discussed, an important influence on tax morale – we find a negative relationship between government effectiveness and the size of the shadow economy, as expected.

- *Human capital*: Using an index from the Penn World tables that measures human capital based on years of schooling and returns to education, we find a negative relationship with the size of the shadow economy.

Including non-European CIS countries with our overall sample appears to confirm these results. Adding CIS countries from the Caucasus and Central Asia[16] to our original set of European countries (which includes European CIS countries), we again see that the shadow economy is negatively associated with productivity and remittances. Moreover, these results show an even stronger importance of institutional factors—specifically, *government effectiveness*, *human capital*, *rule of law*, and, to a lesser extent, *corruption and ease of paying taxes* (see Appendix 1). We would expect this given the addition of more countries with large shadow economies and institutional challenges, and in fact this is in line with the literature that has focused on these regions (Yasser and Medina 2013).

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[15] Government Effectiveness Index captures perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. Estimate gives the country's score on the aggregate indicator, in units of a standard normal distribution, i.e. ranging from approximately -2.5 to 2.5. The higher score indicates better quality.

[16] Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyz Republic, and Tajikistan.

Table 1. Summary of Empirical Results

	Europe		Eastern Europe	
	1	2	3	4
Productivity (GDP/worker)		-.221**	-.266***	-.271***
Trade Openness	-.276***	-.286***		
Remittances	-.038***		-.056**	-.022***
Agriculture VA/GDP	-.125***	-.150***		
Minimum Wage		-.011		
Regulatory Quality	-.149***			-.148**
Fiscal Freedom		-.001**		
Government Effectiveness			-.162**	
Human Capital			-.805***	-.782***
Estimation	FE	FE	RE	RE
R-square	0.317	0.334	0.710	0.776
Chi-square				
Observations	509	289	205	205
Countries	40	28	23	23
Years	2000-13	2004-13	2005-13	2005-13

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

Overall, these results point to the importance of macroeconomic and institutional factors in determining the size of the shadow economy in Europe. For the largest set of countries, macroeconomic factors appear to be more important than institutional factors. We would expect this given the more highly-developed institutions in Western European countries. For *Eastern European* countries, however, institutional factors play a relatively stronger role, although productivity is also still important. We would also expect this, given that institutions in much of the Eastern Europe are less developed. This is in line with the literature, which suggests that institutional elements such as regulatory quality and government effectiveness—which, as discussed above, can have dynamic effects on tax morale, incentives to work formally or informally, and development strategies for small firms—are important drivers of informality.

VI. RE-ESTIMATING THE SIZE OF SHADOW ECONOMIES FOR EUROPEAN COUNTRIES

This section uses the multiple indicator-multiple cause (MIMIC) approach to re-estimate the size of shadow economy for European countries. As mentioned in Section II, the MIMIC approach uses indirect measures of the entire economy to derive the size of the shadow economy that is "unobserved" in the surveys that form the basis of the national accounts. It estimates the unobserved shadow sector by explicitly considering the multiple causes for the existence and growth of the informal economy, as well as its multiple effects. Please see

Appendix II for the details. We acknowledge that the MIMIC estimates can be subject to limitations (see Section II) and address some of the concerns via various robustness checks.

We apply the MIMIC model to a sample of 47 countries[17] over the period of 1999–2016. Building on the empirical results from Section IV, the MIMIC estimation uses the following shadow economy drivers: *productivity (GDP per worker)*, *government effectiveness*, *tax revenues*, *trade volume as a percent of GDP* and *agriculture value-added as a percent of GDP* as causal variables, and *GDP growth, investment* and *labor force participation rate* as indicator variables. Figure 2 illustrates the estimation results for the two specifications we used. Both specifications produce very similar results, with Model B results slightly higher for most countries and an average difference of around one percent. The summary of the estimation results are reported in Table 2.

Size of Shadow Economy in European Countries, 2016
(Percent of GDP)
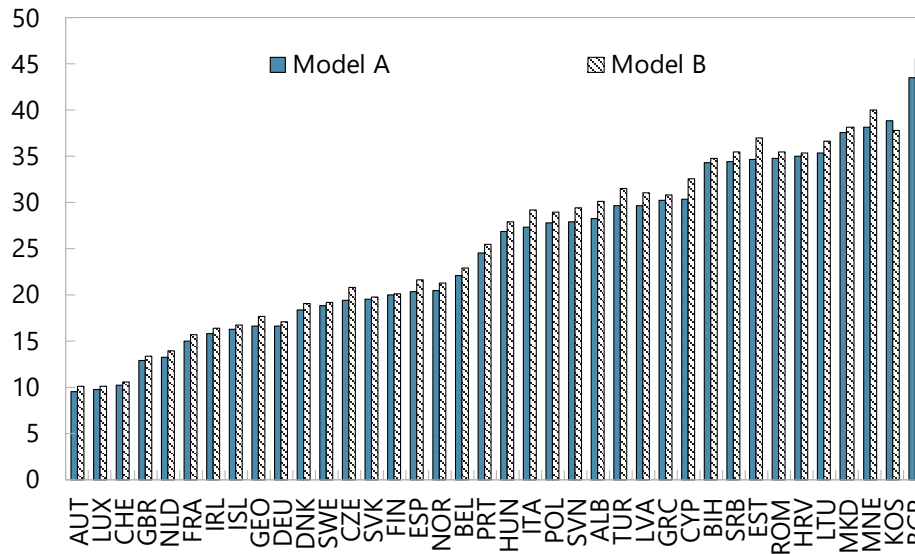
Source: IMF staff calculations.

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[17] Albania, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Kazakhstan, Kosovo, Kyrgyz Republic, Latvia, Lithuania, Luxembourg, Macedonia, Moldova, Montenegro, Netherlands, Norway, Poland, Portugal, Romania, Russian Federation, Serbia, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Tajikistan, Turkey, Ukraine, United Kingdom.

Figure 2. Shadow Economy Estimation: The MIMIC Model

Model A

Causes   Indicators

Agriculture share in VA
-0.135***
Labor productivity
-0.048**
Tax revenue
-0.047***
Trade Openness
-0.045***

Informal Economy

Labor Force Participation
1
Investment
-1.52***
GDP growth
-3.83***
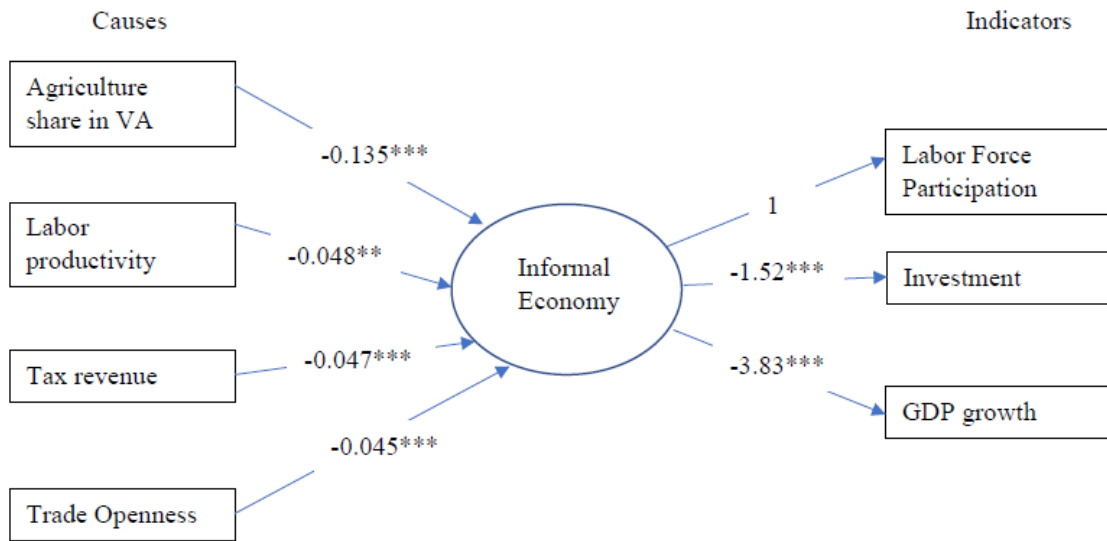
RMSEA: 0.175
Chi-Square: 461.328
Observations: 720
***p<0.01, **p<0.05, *p<0.1

Model B

Causes   Indicators

Agriculture share in VA
-0.19***
GDP per capita
-0.03
Government Effectiveness
-0.001
Trade Openness
-0.05***

Informal Economy

Labor Force Participation
1
Investment
-1.19***
GDP growth
-3.18***
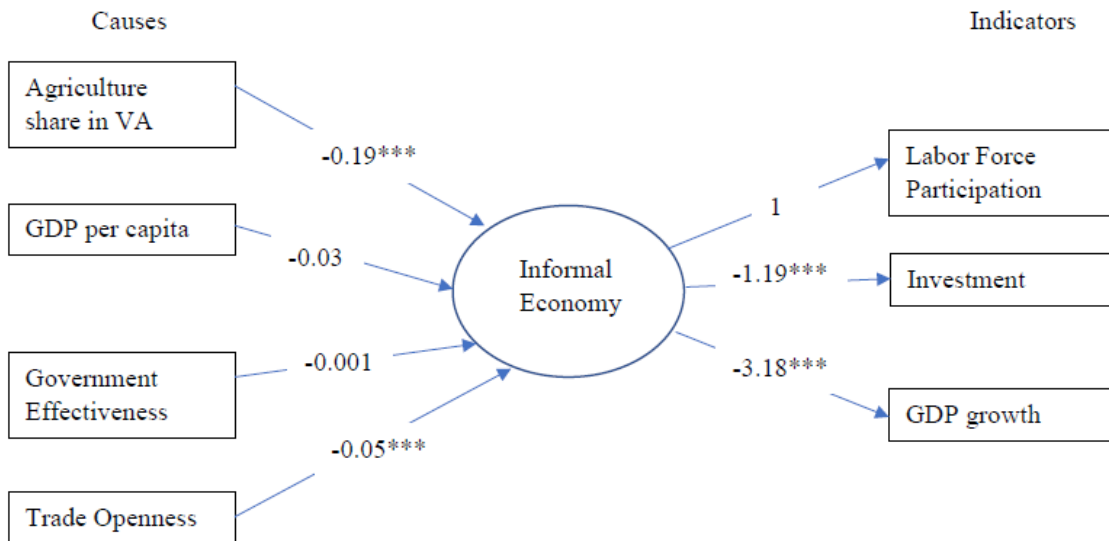
RMSEA: 0.154
Chi-Square: 333.031
Observations: 637
***p<0.01, **p<0.05, *p<0.1

The new estimates of the shadow economy are broadly in line with Hassan and Schneider (2016), they are less volatile reflecting a greater contribution from the institutional factors and structure of the economy (e.g. trade openness and a share of agriculture), which tend to change slowly over time. The average estimate for advanced economies is 20.7 percent in 2013 compared to 20.5 percent in Hassan and Schneider (2016). The estimates for emerging economies are slightly further apart, with the 2013 average of 34.1 percent in the updated set and 33.2 percent in Schneider and Hassan (2016).

Shadow Economy estimates for Advanced and Emerging Economies, 2000-2016 (percent of GDP)

Source: Hassan and Schneider (20016) and IMF Staff calculations

Shadow Economy estimates for CIS, 2000-2016 (percent of GDP)

Source: IMF Staff calculations
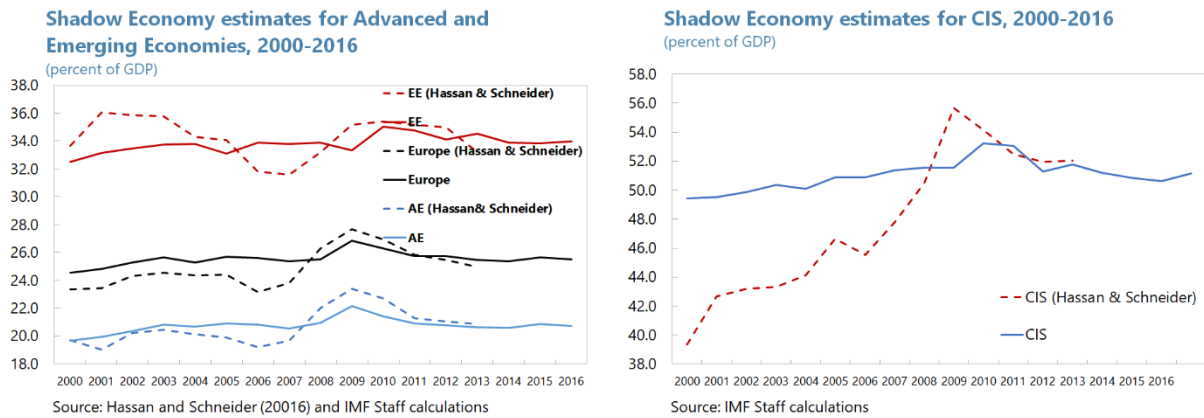
The estimates for the CIS group appear to be more sensitive to estimation specifications, with the divergence especially pronounced in early 2000s; however, the recent dynamics are broadly similar. The difference in the estimates for the CIS economy could be affected by some data limitations as well as changes in data collection methodology and data processing techniques from late 1990s–early 2000s.[18] Also, while the absolute values of the MIMIC estimations can be sensitive to the sample and variables used in the estimations, the relative ranking is more robust.

Table 2. Summary of MIMIC Estimations

	2013		
	Hassan & Schneider 2016	Model A	Model B
Sample average	30.1	28.5	30.1
Europe (excl CIS)	25.2	24.8	25.8
Advanced	20.5	20.7	21.5
Emerging	33.2	34.1	35.6
EU	23.2	23.4	24.4
CIS	51.6	40.9	44.2

There is also a trade-off between sample homogeneity and sample size. Focusing on European economies allows us to capture more relevant factors in our estimations. However, it comes at the expense of the country sample: less than 50 countries compared to over 150 countries in the papers by Schneider et al. Possibly due this reason, for some countries

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[18] For those reasons, we chose not to report the estimates for the CIS countries in Appendix III.

(Bulgaria, Croatia, Germany, Norway, and Baltic countries) the updated estimates appear to be higher than estimated previously in the literature, and for some (Albania, Greece, Spain) lower.

Box 1: Estimating Kosovo's Shadow Economy

Kosovo's informal sector is generally acknowledged as large, but measuring its size precisely has, until now, been difficult. Recent cross-country studies estimating the size of shadow economies have not included Kosovo. A 2013 study that suggested Kosovo's shadow economy is about 34 percent of GDP was limited by its reliance on survey data (Riinvest 2013). A 2017 EU study estimated Kosovo's shadow economy at 32 percent of GDP by comparing national accounts and household income data. However, this assumes that all income components of national accounts expenditure data are measured without error.[19]

We estimate that Kosovo's shadow economy was 38.8 percent of GDP in 2016. The absence of any existing estimates of the size of Kosovo's shadow economy in the MIMIC estimation's base year (2000) presented a challenge. As a proxy, we used an average of the other five Western Balkan countries (Albania, Bosnia and Herzegovina, Macedonia, Montenegro, and Serbia) in 2000, as estimated by Schneider and Hassan (2016). This allowed us to estimate a full-time series of Kosovo's shadow economy —to our knowledge, the first such estimate for Kosovo.

Shadow Economy estimates for Kosovo, 2000-2016
(Percent of GDP)

Source: IMF Staff calculations.
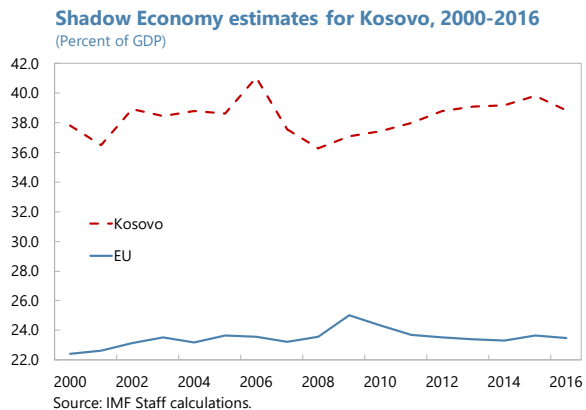
VII. POLICY OPTIONS

A combination of policies should be employed, targeting the determinants most pertinent in any particular country. The size of the shadow economy (using any of the estimation approaches) is strongly and inversely related to per capita income, and more effective institutions play a key role in achieving development goals. Furthermore, improving tax administration, reducing regulatory burdens and enhancing transparency would reduce incentives for informal activities driven by "exit" factors, while improving the operation of the labor market and promoting human capital help to address informality caused by "exclusion" factors.

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[19] European Union, 2017, "Assessment on the Extent of Informal Economy in Kosovo".

Improving regulation and institutional quality

It is well-recognized that better institutions foster more equitable and sustainable growth in the long-run. More effective governance serves the well-being of broader parts of society, mitigating both "exit" and "exclusion" factors. Regulatory and institutional reforms are critical to tackling bottlenecks in the business climate, strengthening the rule of law, improving government effectiveness, and combating corruption.

a.	*Reducing regulatory and administrative barriers* will lower the cost incentive for participating in the shadow economy. Examples of successful reforms include simplifying registration and licensing process (e.g., automatic licensing in Georgia), creating "one-stop-shop" registration (Estonia), reducing registration fees and statutory requirements (USAID Report 2005).

b.	*Increasing transparency and engagement.* Adopting measures to promote transparency (e.g. though mandatory public electronic auctions for public procurement) and public administration (e.g. by improving court system efficiency) can improve the perception of government effectiveness, and the link between revenues and expenditure, increasing voluntary compliance. Possible measures include the public identification of tax evaders and targeted public relations campaigns. Adopting industry-based strategies can also be helpful, by utilizing continued engagement with industry bodies, advisory programs, clear communications on areas of noncompliance, follow-up audit programs and prosecution of the worst offenders.

c.	*Improving governance.* Many emerging economies still lag behind advanced EU countries in terms of the quality of their judicial systems and property rights, and the institutional quality improvement has been uneven across countries (IMF REI Report, Nov 2017). While initial conditions (such as resource allocation) and external factors (e.g., EU accession) play an important role, reforms focused on improving the quality of public administration, transparency and accountability help to form positive feedback.[20] The longer-term reform agenda can include:

•	strong enforcement of competition rules that reduce monopolistic behavior;

•	sound regulatory frameworks for infrastructure industries (telecom, transports) and finance;

•	redistributive fiscal policies, fiscal transparency, accountability of the use of public resources;

•	policies and practices that ensure transparency of ownership structures of financial institutions.

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[20] See IMF REI Europe November 2017, Chapter 2 "Reforming the Judiciary: Learning from the Experience of Central, Eastern and Southeastern Europe" for country examples of institution building paths.

- measures to establish clear rules and procedures for recruiting and training civil servants.

- strengthened property rights through improving cadastres and the ability to register property. Reducing court case backlogs and improving case management systems, (see for example Kosovo and Latvia), would improve the ability to settle cases and recover debts and incentivize the private sector to more fully participate in the formal sector.

Taxation-related policies

Actions aimed at boosting revenues can also be helpful in reducing the shadow economy. The scope for improvement in tax administration varies across Europe, however, most countries facing challenges with low automation of processes, organizational structure and operational performance.[21] Successful policy actions can include:

a. *Increasing tax compliance* by improving registration, audit, and collection. Registration can be strengthened by facilitating the information exchange between government agencies, e.g., in most EU countries firms and workers have single common business ID for social security, unemployment, and tax agencies (Oviedo 2009). The tax base can be broadened by gradually eliminating existing distortionary exemptions.

b. *Automating and computerizing procedures.* Efforts to minimize contact between tax officials and tax payers tend to reduce bureaucracy and corruption (USAID report 2005). Simplifying tax and social benefits systems, if not necessarily tax rates, will reduce tax compliance costs.

c. *Promoting electronic payments.* This can help increase collections and reduce VAT fraud. In recent years several countries have obliged businesses to record payments and money transfers through fiscal devices. According to Schneider and Kearney 2013, increasing electronic payments by an average of 10 percent annually for at least four consecutive years can reduce the size of the shadow economy by up to 5 percent. Promoting electronic payments and limiting the use of cash would likely help with shadow activities in which one side of the transaction (typically a consumer) does not benefit from not reporting the transaction (and may not even be aware that he/she is contributing to the expansion of the shadow economy through the cash payment). The promotion of electronic payments may have a more limited impact where both sides of the transaction benefit from not reporting[22].

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[21] See IMF REI "Effective Government for Stronger Growth" November 2016 for how to improve tax administration efficiency and for country experiences in improving tax administration.

[22] See, EY Report on Reducing the Shadow Economy through Electronic Payments, 2017. In the latter cases, shadow activities can be conducted even in a non-cash economy setting, e.g., via barter or cryptocurrencies. It would require additional measures to correct incentives and /or strengthen enforcement.

Labor market reforms and human capital development

In countries with high levels of migration, and where the shadow economy can act as a social safety net, policy actions should focus on improving incentives for informal workers to move into the formal sector. When informal activities are driven primarily by the so-called "exclusion" factors, solely focusing on enforcement and compliance may result in informal workers seeking employment abroad and driving shadow firms out of business. In such circumstances, encouraging private-sector job creation and fostering skill formation would help to bring firms and workers out of the shadows and promote more inclusive growth.

Policy actions aimed at improving human capital will improve job-search capacity and the earnings potential of informal workers. The relevant labor market and education policies include:

- Increasing hiring and firing flexibility (e.g., labor market reforms in Slovakia) in case of overly restrictive labor laws, while enforcing such laws elsewhere to maintain a level playing field across enterprises and encourage lawful behavior.

- Strengthening enforcement and monitoring (e.g., enforced obligation to register all new workers in Bulgaria)

- Making the labor market more inclusive by developing and implementing customized employment and training measures for target groups which are mostly in danger of social exclusion (e.g., young people).

- Creating a favorable employment environment to returning migrants, providing special training and recognition of the practical skills gained abroad.

- Making professional and vocational education and training more relevant and fostering internal cross-sector mobility.

- Improving efficiency of funds allocated for education, through better prioritization, screening and monitoring of education projects.

VIII. CONCLUSION

A comprehensive package of reforms is needed to successfully combat the shadow economy, carefully designed based on the determinants most relevant in that specific case. Measures can range from regulatory and institutional reforms, to tax policies and administration. The menu of policies most relevant for emerging economies would include: reducing regulatory and administrative burdens, promoting transparency and improving government effectiveness as well as improving tax compliance, automating procedures, promoting electronic payments. In addition, a well-designed policy set should address incentives for informal workers to transition to the formal sector, especially in countries reliant on remittances and where the shadow economy provides a social safety net. Furthermore, policy actions focused on encouraging private-sector job creation and fostering human capital development would help to bring firms and workers out of the shadows and promote more inclusive growth.

Appendix I: Empirical Results with Non-European CIS Countries

	Europe + Central Asia and Caucasus			
Table. Summary of Empirical Results				
	1	2	3	4
Productivity (GDP/worker)	-.324***	-.334***	-.230***	-.498***
Trade Openness				
Remittances	-.050***	-.051***	-.057***	-.057**
Government Effectiveness	-.142***	-.146***		
Rule of Law			-.184***	
Human Capital	-.856***	-.805***	-.872***	-1.11***
Corruption		-.002***	-.001**	
Tax Ease				-.009**
Estimation	MLE	MLE	MLE	MLE
R-square				
Chi-square	480.9	485.69	470.01	226.12
Observations	358	357	357	160
Countries	40	40	40	40
Years	2006-13	2006-13	2006-13	2011-13
***$p<0.01$, **$p<0.05$, *$p<0.1$				
Sources: IMF staff calculations.				

Appendix II. MIMIC Model

The model exploits the associations between observable causes and effects of the unobserved informal economy to estimate the size of the informal economy itself.[23] The model can be described as:

$$y = \lambda\, IE + \varepsilon \qquad\qquad (1)$$

$$IE = \gamma'\, x + \upsilon \qquad\qquad (2)$$

where *IE is* the unobservable latent variable, $y' = (y_1,..., y_p)$ is a vector of indicators for *IE*, $x' = (x_1,..., x_q)$ is a vector of causes of *IE*, λ and γ are the (px1) and (qx1) vectors of the parameters, and ε and υ are the (px1) and scalar errors. Equation (1) relates the informal economy to its indicators, while equation (2) associates the informal economy with a set of observable causes. Assuming that the errors are normally distributed and mutually uncorrelated with $\mathrm{var}(\upsilon) = \sigma_\upsilon^2$ and $\mathrm{cov}(\varepsilon) = \Theta_\varepsilon$, the model can be solved for the reduced form as a function of observable variables by combining equations (1) and (2):

$$y = \pi\, x + \mu \qquad\qquad (3)$$

where $\pi = \lambda\gamma'$, $\mu = \lambda\upsilon + \varepsilon$ and $\mathrm{cov}(\mu) = \lambda\lambda'\sigma_\upsilon^2 + \Theta_\varepsilon$.

As *y* and *x* are data vectors, equation (3) can be estimated by maximum likelihood using the restrictions implied in both the coefficient matrix π and the covariance matrix of the errors μ. Since the reduced form parameters of equation (3) remain unaltered when λ is multiplied by a scalar and γ and σ_υ^2 are divided by the same scalar, the estimation of equations (1) and (2) requires a normalization of the parameters in equation (1), and a convenient way to achieve this is to constrain one element of λ to some pre-assigned value. Since the estimation of λ and γ is obtained by constraining one element of λ to an arbitrary value, it is useful to

standardize the regression coefficients $\hat{\lambda}$ and $\hat{\gamma}$ as $\hat{\lambda}^s = \hat{\lambda}\left(\dfrac{\hat{\sigma}_{IE}}{\hat{\sigma}_y}\right)$ and $\hat{\gamma}^s = \hat{\gamma}\left(\dfrac{\hat{\sigma}_x}{\hat{\sigma}_{IE}}\right)$.

The standardized coefficient measures the expected change (in standard-deviation units) of the dependent variable due to a one standard-deviation change of a given explanatory variable, when all other explanatory variables are held constant. Using the estimates of the γ^s vector and setting the error term υ to its mean value of zero, the predicted values for the informal economy can be estimated using equation (2). Then, by using information from various independent studies regarding the specific size of the informal economy measured in percent of GDP, the ordinal within-sample predictions for the informal economy can be converted into percentages of GDP.[24]

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[23] See Loayza (1999).

[24] The benchmarking procedure used to derive "real world" figures of shadow economic activities has been criticized (Breusch, 2005a, 2005b). As the latent variable and its unit of measurement are not observed, SEMs only provide a set of estimated coefficients from which one can calculate an index that shows the dynamics of

Appendix III. MIMIC Estimation Results

Country	Code	2000	2001	2002	2003	2004	2005	2006	2007	2008
Albania	ALB	27.8	28.9	28.5	28.2	28.6	29.2	29.3	29.0	28.7
Austria	AUT	9.3	8.8	9.2	9.5	9.4	10.0	9.9	9.4	9.4
Belgium	BEL	20.8	21.4	21.8	22.1	21.6	22.2	21.7	21.7	22.4
Bosnia and Herzegovina	BIH	34.1	34.2	35.3	35.3	34.2	33.9	32.5	33.8	34.7
Bulgaria	BGR	36.9	37.3	38.3	37.7	37.1	37.2	36.9	37.2	36.0
Croatia	HRV	33.4	33.4	32.9	35.1	34.5	35.4	34.7	35.1	34.7
Cyprus	CYP	28.6	28.2	28.5	29.5	29.7	29.9	30.4	29.7	29.8
Czech Republic	CZE	18.9	19.0	19.8	19.7	19.2	19.3	19.6	19.4	20.1
Denmark	DNK	17.7	17.4	18.5	18.8	18.4	18.5	18.2	18.1	19.1
Estonia	EST	33.1	33.6	34.4	34.6	34.7	35.2	35.7	34.4	36.8
Finland	FIN	18.1	19.6	19.8	20.4	20.8	20.7	21.2	19.8	20.4
France	FRA	14.3	14.4	14.8	15.4	15.2	15.3	15.4	15.1	15.3
Germany	DEU	15.7	15.7	17.0	17.4	16.6	17.8	17.1	16.4	15.9
Greece	GRC	28.1	28.9	29.4	29.7	30.5	30.0	31.1	30.7	31.0
Hungary	HUN	25.1	25.7	27.4	27.7	26.5	27.9	27.7	26.6	26.6
Iceland	ISL	15.9	15.8	15.9	16.6	16.8	16.7	16.5	16.8	17.0
Ireland	IRL	14.3	15.2	15.6	16.0	15.7	16.2	16.1	16.0	16.6
Italy	ITA	25.6	25.8	26.7	26.9	27.0	28.2	27.3	27.0	27.6
Kosovo	KOS	37.8	36.5	38.9	38.4	38.8	38.6	41.0	37.6	36.3
Latvia	LVA	28.5	28.5	28.6	29.5	28.6	28.7	29.3	29.4	30.9
Lithuania	LTU	33.7	34.7	34.7	35.2	35.3	34.6	34.8	35.2	35.1
Luxembourg	LUX	9.4	9.3	9.1	9.7	9.7	9.7	10.0	9.5	9.7
Macedonia, FYR	MKD	38.2	39.7	38.2	36.5	35.9	38.4	39.9	38.5	33.4
Montenegro	MNE	36.8	37.1	37.8	38.8	38.9	39.0	37.8	38.1	37.2
Netherlands	NLD	12.6	12.6	13.1	13.5	13.8	13.4	12.9	12.9	13.4
Norway	NOR	19.1	20.1	20.7	21.9	20.8	20.2	19.7	20.2	20.6
Poland	POL	27.6	27.4	29.2	29.4	26.3	27.4	27.7	25.4	27.3
Portugal	PRT	23.3	23.7	24.3	24.8	24.8	25.2	24.5	24.5	24.6
Romania	ROM	34.4	33.9	34.4	33.6	32.7	34.8	34.6	35.9	36.0
Serbia	SRB	33.0	32.4	34.2	34.5	33.8	34.4	34.7	35.0	34.8
Slovak Republic	SVK	19.2	18.5	18.4	19.1	19.5	19.9	19.9	19.1	19.0
Slovenia	SVN	27.1	27.9	27.3	29.0	28.3	27.7	27.7	27.8	27.9
Spain	ESP	18.9	19.1	19.5	19.7	19.7	19.9	20.0	19.5	20.8
Sweden	SWE	17.9	18.2	18.6	18.7	18.4	19.9	18.9	18.1	18.1
Switzerland	CHE	9.2	10.2	10.0	10.5	10.2	10.3	10.3	10.2	9.8
Turkey	TUR	29.5	30.5	28.7	28.7	28.8	28.9	29.7	30.7	30.6
United Kingdom	GBR	12.3	12.5	12.9	12.7	12.5	13.4	13.1	13.2	12.3

the unobservable variable. Application of the so-called calibration or benchmarking procedure, regardless which one is used, requires experimentation, and a comparison of the calibrated values in a wide academic debate. Unfortunately, at this stage of research it is not clear which benchmarking method is the best or most reliable. See Dell'Anno and Schneider (2009) for a detailed discussion on different benchmarking procedures. Compare also the latest discussion and critique of the MIMIC procedure by Breusch (2016), Feige (2016a,b), Schneider (2016) and Hashimzade and Heady (2016).

Country	2009	2010	2011	2012	2013	2014	2015	2016
Albania	29.0	28.3	27.8	27.8	27.5	27.1	27.5	28.3
Austria	10.4	9.8	9.2	9.3	9.4	9.6	9.7	9.6
Belgium	24.2	22.7	22.8	21.6	21.8	22.0	22.3	22.1
Bosnia and Herzegovina	36.5	35.8	35.4	36.0	35.7	36.3	35.3	34.4
Bulgaria	39.3	39.7	39.0	38.5	38.1	38.0	38.2	37.8
Croatia	36.4	36.6	36.7	36.5	36.7	36.3	36.4	35.0
Cyprus	31.7	31.3	31.3	32.1	32.1	31.9	31.8	30.4
Czech Republic	21.0	21.0	19.1	18.4	18.0	18.0	18.5	19.4
Denmark	20.1	19.2	18.7	17.8	18.4	17.6	19.1	18.4
Estonia	37.2	35.4	33.2	33.1	33.4	32.7	32.9	34.6
Finland	21.7	20.8	20.2	20.2	19.3	20.0	20.8	20.0
France	16.9	15.6	14.9	14.7	14.9	14.5	14.7	15.0
Germany	17.3	17.3	16.3	16.2	15.3	16.1	16.9	16.7
Greece	32.2	31.8	31.3	30.6	30.4	29.8	30.4	30.2
Hungary	27.7	27.8	26.8	25.9	26.0	25.3	26.1	26.9
Iceland	16.6	16.1	15.7	15.6	15.9	16.1	16.3	16.2
Ireland	17.1	16.4	16.1	16.2	16.0	15.4	15.8	15.8
Italy	29.6	28.8	27.9	27.1	26.9	27.6	27.9	27.3
Kosovo	37.1	37.4	38.0	38.8	39.1	39.2	39.8	38.8
Latvia	31.5	29.2	29.6	29.3	29.7	29.8	30.4	29.6
Lithuania	37.9	36.9	35.7	34.6	35.0	35.6	35.7	35.3
Luxembourg	10.0	10.0	10.0	9.6	9.7	9.6	10.1	9.7
Macedonia, FYR	37.4	37.5	38.2	39.2	36.9	36.3	37.2	37.6
Montenegro	38.6	40.2	39.1	40.1	38.7	37.9	37.5	38.2
Netherlands	14.2	13.3	13.9	13.9	13.5	13.2	13.2	13.3
Norway	21.5	20.2	20.7	21.7	21.5	21.1	20.4	20.4
Poland	29.0	28.1	26.6	27.5	26.7	27.6	29.1	27.8
Portugal	26.6	25.7	25.4	25.7	24.6	24.3	24.5	24.5
Romania	37.9	36.6	34.5	35.2	34.9	34.7	34.4	34.8
Serbia	35.9	35.5	35.0	35.7	35.0	34.7	35.2	34.5
Slovak Republic	20.7	21.3	20.1	19.9	19.0	18.2	19.3	19.5
Slovenia	29.8	29.6	28.1	28.4	29.1	27.9	28.1	28.0
Spain	22.5	21.5	21.3	21.1	20.5	20.6	20.7	20.3
Sweden	19.3	18.6	18.5	19.1	19.6	19.6	19.4	18.8
Switzerland	10.1	10.4	10.1	10.4	10.2	10.2	10.5	10.2
Turkey	30.4	29.4	28.8	28.9	29.0	29.3	29.0	29.6
United Kingdom	13.9	12.6	12.6	12.9	12.6	12.9	12.9	12.9

* Shadow economy estimates are based on Model A, excluding CIS countries.
Sources: IMF staff calculations.

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