

IMF Working Paper

Measuring the Informal Economy in the Caucasus and Central Asia

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Abstract

This study estimates the size of the informal economy, and the relative contribution of each underlying factor, for the Caucasus and Central Asia countries in 2008. Using a Multiple Indicator-Multiple Cause model, we find that a burdensome tax system, rigid labor market, low institutional quality, and excessive regulation in financial and products markets are determinant factors in explaining the size of the informal economy, which ranges from 26 percent of GDP in Kyrgyz Republic to around 35 percent of GDP in Armenia. Furthermore, the results show that higher levels of informality increase the levels of self employment and the percentage of currency held outside the banking system.

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I. INTRODUCTION

The characterization of the informal economy has been debated both in policy and academic circles. There is no unique definition of the informal economy in the literature, and terms such as shadow economy, black economy and unreported economy have been used to define it.

According to Feige (2005), the informal economy “has been used so frequently, and inconsistently;” he argued that the informal economy comprises those economic activities that circumvent the costs and are excluded from the benefits and rights incorporated in the laws and administrative rules covering property relationships, commercial licensing, labor contracts, torts, financial credit, and social systems.

Measuring informality is important given that workers in informal conditions have little or no social protection or employment benefits; and these conditions undermine inclusiveness in the labor market. According to the most recent World Bank *World Development Indicators* (World Bank, 2011), 65 percent of the labor force in Kazakhstan and 64 percent in Azerbaijan do not contribute to a retirement pension scheme. In Armenia and the Kyrgyz Republic, more than 58 percent of the labor force lacks pension coverage. Economic activity largely goes underground to avoid the burden of administrative regulation and taxation.²

Different methods have been proposed to estimate the size of the informal economy. Direct approaches, mostly based on surveys and samples, rely on voluntary replies, or tax auditing and other compliance methods to measure the informal economy; the results are sensitive to how the questionnaire is formulated and therefore unlikely to capture all informal activities.

Indirect approaches, also called indicator approaches, use indirect information to estimate the size of the informal economy. For example, the discrepancy between the official and actual labor force approach states that a decline in labor force participation in the official economy can be seen as an indication of an increase in the size of the informal economy, if total labor force participation is assumed to be constant.³ Most direct and indirect methods consider just one indicator of all effects of the informal economy.

This study estimates the size of the informal economy for the Caucasus and Central Asia (CCA) countries in 2008. Using a Multiple Indicator-Multiple Cause (MIMIC) model, we find that a burdensome tax system, rigid labor market, low institutional quality, and excessive regulation in financial and products markets are the key determinants of the size of the informal economy that ranges from 26 percent of GDP in Kyrgyz Republic to around 35 percent of GDP in Armenia. Furthermore, results show that higher levels of informality increase the levels of self employment and the percentage of money held outside the banking system.

² In Kazakhstan, people that move from rural areas to the cities often choose not to work in the formal sector due to the strict internal migration regulations.

³ For a comprehensive review, see Schneider and Enste (2000).

The paper is organized as follows: The next section reviews the empirical methodology. Section III presents the variables of interest used in this analysis. Section IV presents the econometric estimation results and the calculation of the size of the informal economy. It also includes a policy discussion. Section V concludes.

II. EMPIRICAL METHODOLOGY

Most methods exploited in the literature—and surveyed in Schneider and Enste (2000) and Vuletin (2009)—consider only one indicator of the informal economy, such as electricity consumption, or money demand. However, there may exist more than one manifestation or symptom of the informal economy showing up simultaneously. The MIMIC approach used in this paper explicitly considers various causes, as well as several effects of the informal economy. The model exploits the associations between observable causes and observable effects of the unobserved informal economy to estimate the size of the informal economy itself.⁴ The model can be described as:

$$y = \lambda IE + \varepsilon \quad (1)$$

$$IE = \gamma' x + \nu \quad (2)$$

Where IE is the unobservable latent variable, $y' = (y_1, \dots, y_p)$ is a vector of indicators for IE , $x' = (x_1, \dots, x_q)$ is a vector of causes of IE , λ and γ are the $(p \times 1)$ and $(q \times 1)$ vectors of the parameters, and ε and ν are the $(p \times 1)$ 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 $\text{var}(\nu) = \sigma_\nu^2$ and $\text{cov}(\varepsilon) = \Theta_\varepsilon$, the model can be solved for the reduced form as a function of observable variables by combining equations (1) and (2):

$$y = \pi x + \mu \quad (3)$$

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

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_ν^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.

⁴ See Loayza (1997).

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 $\hat{\lambda}^s = \hat{\lambda} \left(\frac{\hat{\sigma}_{IE}}{\hat{\sigma}_y} \right)$ and

$$\hat{\gamma}^s = \hat{\gamma} \left(\frac{\hat{\sigma}_x}{\hat{\sigma}_{IE}} \right).$$

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 ν to its mean value of zero, the predicted values for the informal economy can be estimated using equation (2). Then, by using information for one country 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.

III. DATA

Even though this study focuses on the CCA countries, the panel estimation takes into account data from a sample of 26 countries. The sample is restricted to the year 2008, a year where most of the data were available for all countries. The countries included in this study are: Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyz Republic, Latvia, Lithuania, Macedonia, Moldova, Mongolia, Montenegro, Poland, Romania, Serbia, Slovak Republic, Slovenia, Tajikistan, Turkey, and Ukraine.

Different causal variables affect the size of the informal economy. Four main dimensions are considered in this study: tax burden, labor rigidity, institutional quality, and regulatory burden in financial and product markets.

Tax burden: Tax and social security burdens are among the main causes of the informal economy. The larger the difference between the total cost of labor in the official economy and after-tax earnings, the greater the incentive to avoid this difference by joining the informal economy.⁵ To measure this effect, this study exploits the World Bank's *Doing Business* Paying Taxes ranking. The *Doing Business* records the taxes and mandatory contributions that a medium-size company must pay in a given year, as well as measures of the administrative burden of paying taxes and contributions.⁶ It exploits three indicators:

⁵ For more details, see Schneider et al. (2010).

⁶ The taxes and contributions measure includes: the profit or corporate income tax, social contributions and labor taxes paid by the employer, property taxes, property transfer taxes, dividend tax, capital gains tax, financial transactions tax, waste collection taxes, vehicle and road taxes, and any other small taxes or fees.

payments, time and the total tax rate borne by a case study firm in a given year. The number of payments indicates the frequency with which the company has to file and pay different types of taxes and contributions, adjusted for the manner in which those payments are made. The time indicator captures the number of hours it takes to prepare, file and pay 3 major types of taxes: profit taxes, consumption taxes, and labor taxes and mandatory contributions. The total tax rate measures the tax cost borne by the standard firm.

Labor rigidity: The intensity of labor market regulations is another important factor that reduces the freedom of choice for actors engaged in the official economy. Furthermore, tight labor regulations help increase unemployment.⁷ These regulations, which decrease the freedom of both the employer and the employee, reduce the likelihood of formal economy employment, thus generating opportunities in the informal sector. The labor rigidities are captured in this study by the Fraser Index that includes different sub components which are described as follows:

(i) Hiring regulations and minimum wage. The index measures (i) whether fixed-term contracts are prohibited for permanent tasks; (ii) the maximum cumulative duration of fixed-term contracts; and (iii) the ratio of the minimum wage for a trainee or first-time employee to the average value added per worker.

(ii) Hiring and firing regulations. This sub-component is based on the World Economic Forum's *Global Competitiveness Report* question: "The hiring and firing of workers is impeded by regulations or flexibly determined by employers."

(iii) Centralized collective bargaining. This sub-component is based on the World Economic Forum's *Global Competitiveness Report* question: "Wages in your country are set by a centralized bargaining process or up to each individual company."

(iv) Hours regulations. The rigidity of hours index has five components: (a) whether there are restrictions on night work; (b) whether there are restrictions on weekly holiday work; (c) whether the work week can consist of 5.5 days; (d) whether the work week can extend to 50 hours or more (including overtime) for 2 months a year to respond to a seasonal increase in production; and (e) whether paid annual vacation is 21 working days or fewer.

(v) Mandated cost of worker dismissal. This sub-component is based on the World Bank's *Doing Business* data on the cost of advance notice requirements, severance payments, and penalties due when dismissing a redundant worker.

(vi) Conscription. Data on the use and duration of military conscription were used to construct rating intervals. Countries with longer conscription periods received lower ratings. Source— International Institute for Strategic Studies, *The Military Balance* (various issues); War Resisters International, *World Survey of Conscription and Conscientious Objection to Military Service*.

⁷ See Feldmann (2009).

Institutional quality: Institutional quality has a strong bearing on competitiveness and growth. A weak judiciary system, excessive bureaucracy, lack of transparency, and directed credit to connected borrowers and strategic enterprises exacerbate the incentives to informality. Furthermore, the stronger the enforcement capability and quality of government, the lower the expected size of the informal economy. To measure the quality of institutions causal variable, the World Bank's *Governance Indicators* are used. Particularly, the average of four sub-components:

(i) Control of Corruption. This sub-component captures perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.

(ii) Rule of Law. Captures perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.

(iii) Regulatory Quality. Captures perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.

(iv) Government Effectiveness. This sub-component 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.

Regulatory burden in financial and product markets: Burdensome regulations in product markets, in the form of procedures for starting a business, registering property, and dealing with construction permits, as well as difficulties in the credit market (such as availability and affordability of financial services), increase the size of the informal economy. On the other hand, any legislation aimed at increasing local competition, and reducing monopolies and the extent of market dominance would contribute to reducing the size of the informal economy.

To account for this casual variable, this study exploits an indicator that takes into account both financial and product market restrictions. The financial market sub-component includes the World Economic Forum *Global Competitiveness Report's* financial market development indicators; particularly, availability of financial services, affordability of financial services, and the ease of access to loans. The product market sub-component takes into account the World Economic Forum *Global Competitiveness Report's* goods market efficiency indicators; in particular, the intensity of local competition, extent of market dominance, and effectiveness of anti-monopoly policy.

Since the informal economy cannot be directly measured, indicators that capture and reflect its characteristics must be used. The indicator variables used in this study are: self employment as percent of total employment from the International Labor Organization, and currency held outside depository corporations (in percent of broad money).

The intuition is that the informal economy typically avoids any formal transactions in the financial system, and hence needs cash in order to function. Therefore, a large amount of money held outside depository corporations (as a percent of broad money) would signal a large informal economy. In the same vein, a large proportion of self employment in total employment would also signal a large informal economy.

IV. MAIN RESULTS AND DISCUSSION

In this section we present the model estimation results, the calculation of the size of the informal economy, and the relative contribution of each causal variable to the size of the informal economy. We also discuss the policy implications of our results.

A. MIMIC Model Estimation

The MIMIC model is represented in Figure 1. The tax burden, labor rigidity, institutional quality, and regulatory burden in financial and product markets are the cause variables of the informal economy, while self employment (in percent of total employment) and currency held outside depository corporations (in percent of broad money) are the indicator variables.

The coefficients on the causal and indicators variables have the expected signs, and are statistically significant. In particular, a one standard deviation increase in the tax burden, labor rigidity, institutional quality, and regulatory burden in financial and product markets increases the size of the informal economy by 0.22, 0.25, 0.37, and 0.49 standard deviations respectively. Furthermore, the joint influence of the casual variables explains over 75 percent of the informal economy variance.

In addition, increases in the informal economy raises self employment (as percent of total employment) and currency held outside depository corporations (in percent of broad money), and explains 52 and 80 percent of their respective variances.

Different goodness-of-fit statistics are constructed to evaluate the MIMIC model. These measures are based on fitting the model to sample moments, which involves comparing the observed covariance matrix to the one estimated under the assumption that the model being tested is true. The Discrepancy function (CMIN) is one of the most common fit tests, and is the minimum value of discrepancy function between the sample covariance matrix and the estimated covariance matrix. The chi-square value should not be significant if there is a good model fit, while a significant chi-square indicates lack of a satisfactory model. The root mean square error of approximation (RMSEA) is another test known to be less sensitive to the sample size. By convention, there is good model fit if the RMSEA is less than 0.05. The CMIN and RMSEA values are 0.852 and 0, respectively (Figure 1).

B. The Size of the Informal Economy

The standardized values of the informal economy are obtained from the estimated benchmark model (Figure 1). To transform these values into absolute informal economy sizes (measured in percent of GDP), we first normalize the ordinal values by the estimated value for Armenia. This gives the size of the informal economy for all countries relative to Armenia. Then, we multiply the latter by the size of the informal economy in Armenia (measured in percent of GDP) as estimated by detailed independent studies, to recover the size of the informal economy for all other countries measured in percent of GDP.⁸ Table 1 and Figure 2 show the ordinal values relative to Armenia, as well as the absolute values of the size of the informal economy, for the sample countries. Associated with low levels of informality is Kyrgyz Republic, and with higher levels of informality are Armenia and Kazakhstan, with an informal economy size of around 35 and 33 percent of GDP respectively, with other CCA countries located in between.⁹ These estimates are consistent with those reported in Schneider et al. (2010)—a study that covers a sample of 162 countries for the years from 1999 to 2007.

The relative contributions of the alternative causes of the informal economy are depicted in Figure 3. On average, the tax burden, labor rigidity, institutional quality, and regulatory burden in financial and product markets contribute around 10 percent, 12, 31, and 46 percent respectively, to the size of the informal economy. However, the contributions by country are heterogeneous (see also Table 2)¹⁰.

⁸ See Tunyan (2005); Davoodi and Grigorian (2007).

⁹ It is worth noting that Armenia has a sizable share of self-employed in the agriculture sector, mainly poor subsistence farmers. This fact could play an important role in the results, assuming that the self employment ratio differs in its composition by country. This study takes into the account the aggregate measure.

¹⁰ Our results regarding the impact of labor market institutions on the size of the informal economy are consistent with prior research, and do not derive from the specific labor measure used in this paper. First, using the same empirical methodology as used here, as well as a labor measure that is different from the measure used in this paper and one that does not derive from any of the sources used to construct our measure, Vuletin (2009) finds that a one standard deviation increase in his index of labor market rigidity increases the size of the informal economy by about 0.29 standard deviations, which is virtually identical to our estimate of 0.25. Second, the estimates reported in this paper are consistent with those reported in Schneider et al. (2010)—for the 18 common countries in both studies, there is a positive correlation of 0.53 between the absolute sizes of the informal economy, and the Spearman rank correlation test has a value of 0.68, which rejects at the 1 percent significance level the null hypothesis that the rankings have zero correlation. This, together with the fact that Schneider et al. (2010) does not use labor market regulations as an explanatory variable in their study, provide evidence that our results are not driven by the specific labor measure used. Indeed, the results of our paper suggest that the contribution of labor rigidities to the size of the informal economy is small relative to other determinants, such as institution quality and the regulatory burden in financial and product markets. Finally, our labor measure is highly correlated with well-known and widely-used alternative measures of labor market institutions: the correlation coefficient between our measure and the Heritage Foundation Index of Labor Freedom is about 0.8, and the correlation with the Labor Flexibility Index of the World Economic Forum's Global Competitiveness Indicators is about 0.6.

C. Policy Implications

To reduce the barriers to business and labor formality, which are also barriers to more inclusive growth, policymakers should tackle the main causes of informality.

Policymakers should:

- *Improve the regulatory framework for business.* They should simplify entry regulations and reduce compliance costs, and at the same time create an environment that fosters a fairer enforcement of regulation. Furthermore, measures to promote the availability and affordability of financial services, as well as measures that would aim at increasing local competition, easing trade barriers, and reducing monopolies and the extent of market dominance would contribute to reducing the size of the informal economy. This approach is conducive to investment and growth, and is inclusive as it allows all firms and workers to compete on a level playing field.
- *Reform labor market institutions.* Overly restrictive labor market regulations can impede job creation in the formal sector, contribute to driving firms and workers into the informal economy, and reinforce segmentation in the labor market. As a result, workers in the formal sector enjoy protection while informal workers have little or no protection at all. Policy should aim to relax such rigid regulations to achieve more compliance and improved employment outcomes, while preserving the right to collective bargaining and developing effective social protection systems.
- *Reduce the tax burden.* Lowering corporate tax rates (where these are excessive) and simplifying tax regulations would increase formality, and could raise tax revenues, as evidence from Brazil and Egypt suggests (Gatti and others, 2011).¹¹ Such reforms will provide incentives for existing informal firms to formalize and, hence, pay taxes; existing formal firms will have greater incentive to invest; and new firms will have greater incentive to operate in the formal economy.

V. CONCLUSION

This study estimates the size of the informal economy, and the relative contribution of each underlying factor, for CCA countries in 2008. Using a Multiple Indicator-Multiple Cause model, we find that a burdensome tax system, rigid labor markets, low institutional quality, and excessive regulation in financial and products markets are key factors in explaining the size of the informal economy. Furthermore, results show that higher levels of informality

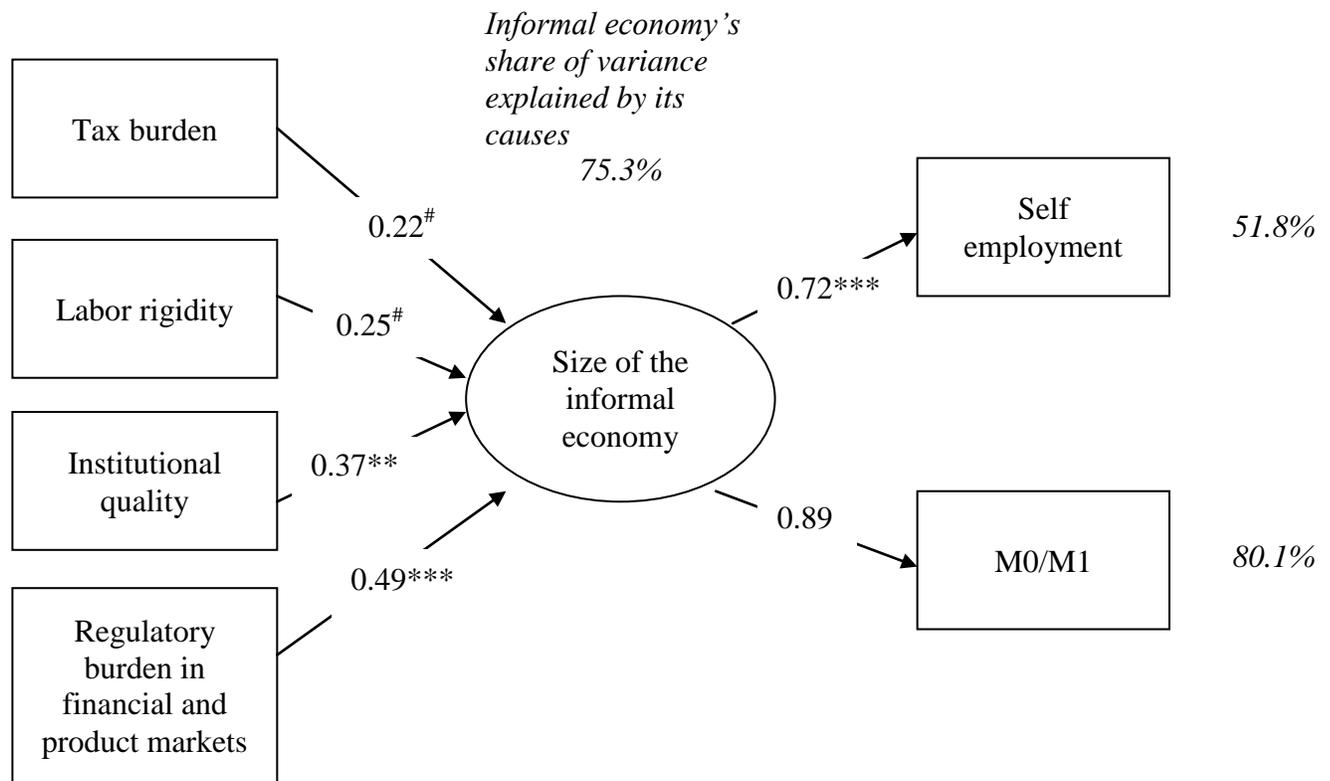
¹¹ In the successful country cases, the lowering of tax rates was usually accompanied by important reductions in loopholes, to avoid eroding the tax base.

increase the levels of self employment and the percentage of money held outside the banking system.

Our study also finds that the relative contribution of each cause variable to the informal economy size varies significantly across countries. To reduce informality and foster inclusive growth, policymakers should improve the business environment, relax labor market rigidities, reduce the tax burden, provide informal workers with access to skill upgrading, and create an environment that fosters a level playing field for all workers and firms.

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Figure 1: MIMIC Estimation Results

Overall model fit:

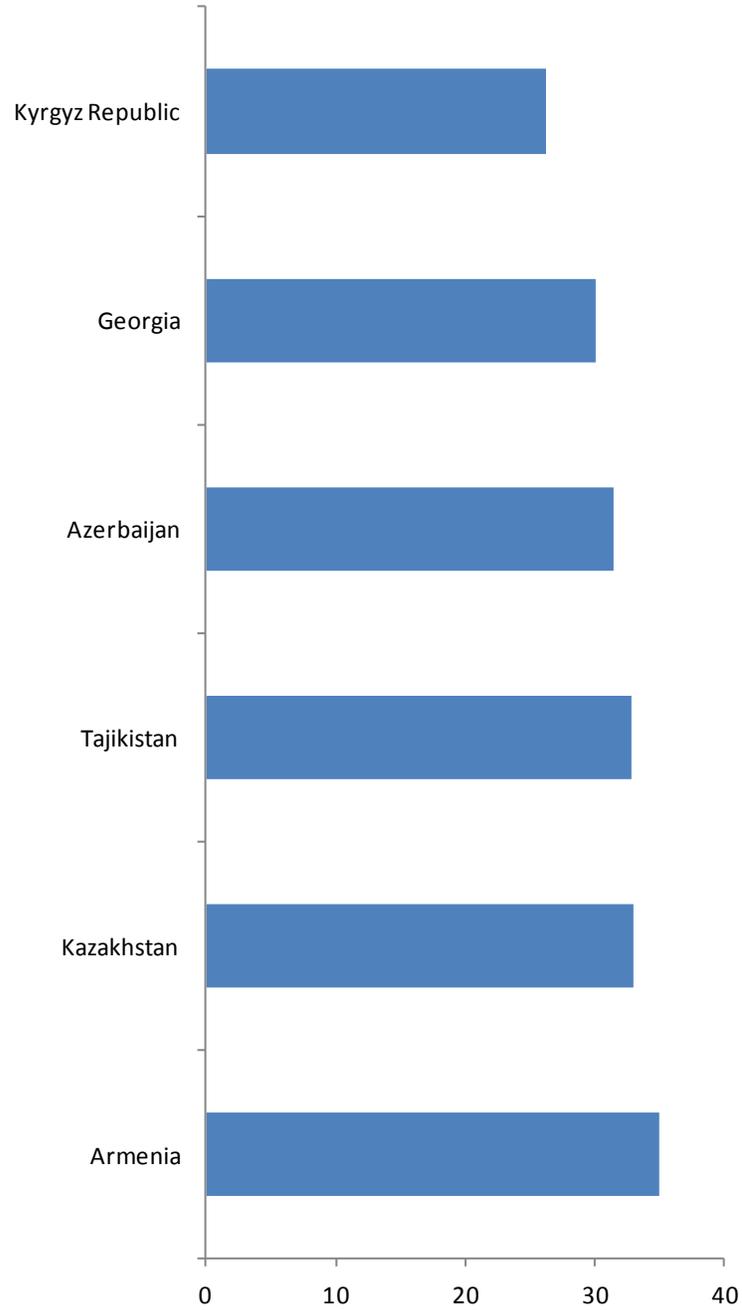
Discrepancy function (CMIN)(p -value): 0.852

Root mean square error of approximation (RMSEA): 0

Note: The panel estimation takes into account data from a sample of 26 countries for the year 2008. The countries included in this estimation are: Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyz Republic, Latvia, Lithuania, Macedonia, Moldova, Mongolia, Montenegro, Poland, Romania, Serbia, Slovak Republic, Slovenia, Tajikistan, Turkey, and Ukraine. The standardized regression coefficients and their respective significance levels are displayed by the arrow pointing in the direction of influence.
Significant at 15% level; * at the 10% level; ** at the 5% level; *** at the 1% level.

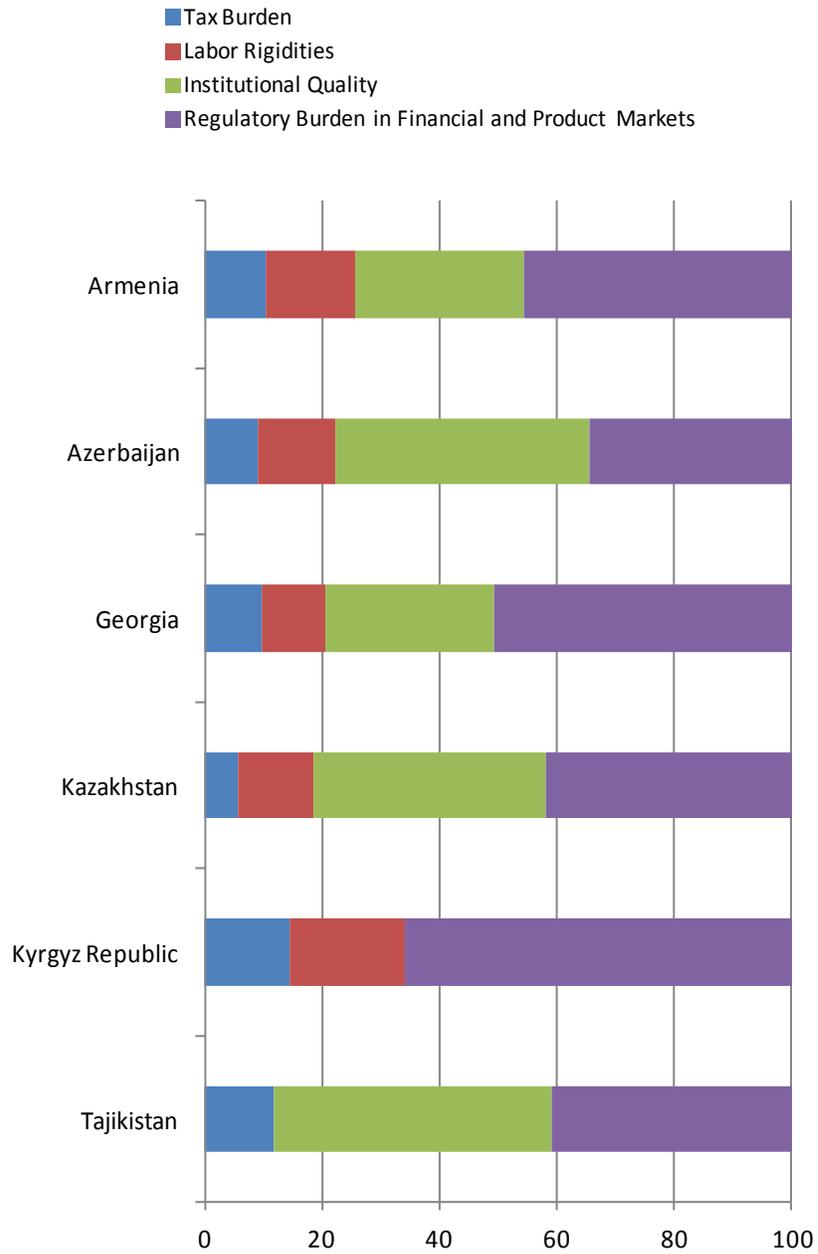
In order to remove the structural indeterminacy of the coefficients, the non-standardized coefficients associated with M0/M1 was set to 1. For this reason the t -test cannot be performed on this coefficient.

Source: Authors' calculations.

Figure 2: Estimated Size of the Informal Economy (in percent of GDP), 2008

Source: Authors' calculations.

Figure 3: Contribution of Each Cause Variable to the Size of the Informal Economy (in percent), 2008



Source: Authors' calculations.

Table 1. Size of the Informal Economy, 2008

Country	Relative value	Absolute value (% of GDP)
Kyrgyz Republic	0.750	26.3
Georgia	0.859	30.1
Azerbaijan	0.899	31.5
Tajikistan	0.938	32.8
Kazakhstan	0.944	33.0
Armenia	1.000	35.0
Mean	0.898	27.4
Standard Deviation	0.087	3.0

Source: Authors' calculations.

Table 2. Relative Contribution of Cause Variables to the Size of the Informal Economy, 2008

Country	Tax Burden	Labor Rigidities	Institutional Quality	Regulatory Burden in Financial and Product Markets
Armenia	10.6	15.0	28.8	45.7
Azerbaijan	9.1	13.4	43.0	34.5
Georgia	9.9	10.6	29.0	50.6
Kazakhstan	5.8	12.8	39.7	41.7
Kyrgyz Republic	14.5	19.6	0.0	65.9
Tajikistan	11.7	0.0	47.6	40.7
Mean Percentage	10.3	11.9	31.3	46.5

Source: Authors' calculations.