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New Estimates for the Shadow Economies all over the World

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ABSTRACT This paper presents estimations of the shadow economies for 162 countries, including developing, Eastern European, Central Asian, and high income OECD countries over 1999 to 2006/2007. According to our estimations, the weighted average size of the shadow economy (as a percentage of ‘official’ GDP) in Sub-Saharan Africa is 37.6%, in Europe and Central Asia (mostly transition countries) 36.4% and in high income OECD countries 13.4%. We find that an increased burden of taxation (direct and indirect ones), combined with (labour market) regulations and the quality of public goods and services as well as the state of the ‘official’ economy are the driving forces of the shadow economy.

KEY WORDS: Shadow economy of 162 countries, tax burden, quality of state institutions, regulation, MIMIC model

JEL CLASSIFICATIONS: O17, O5, D78, H2, H11, H26

1. Introduction

Information about the extent of the shadow economy, who is engaged, the frequency of these activities, and their magnitude is crucial for making effective and efficient decisions regarding the allocations of a country’s resources in this area.

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Unfortunately, it is very difficult to get accurate information about shadow economy activities on the goods and labour market, because all individuals engaged in these activities do not wish to be identified. Hence, doing research in this area can be considered as a scientific passion for knowing the unknown.

Although substantial literature exists on single aspects of the hidden or shadow economy and comprehensive surveys have been written by Schneider and Enste (2000), and Feld and Schneider (2010), the subject is still quite controversial as there are disagreements about the definition of shadow economic activities, the estimation procedures and the use of their estimates in economic analysis and policy aspects.¹ Nevertheless, there are some indications for an increase of the shadow economy around the world, but little is known about the development and the size of the shadow economies in developing, Eastern European and Central Asian (mostly the former transition countries), and high income OECD countries over the period 1999 to 2007. This paper is an attempt to fill this gap by using the same estimation technique and almost the same data sample.

Hence, the goal of this paper is twofold: (i) to undertake the challenging task of estimating the shadow economy for 162 countries all over the world and (ii) to provide some insights into the main causes of the shadow economy and a unique database of the size and trend of the shadow economy for 162 countries between 1999 and 2007. This is an improvement compared with previous work, because we successfully ‘created’ a unique dataset and used the MIMIC estimation method for all countries with the explicit goal of having a comparable shadow economy data set.

2. Some Theoretical Considerations about the Shadow Economy

One commonly used working definition of the shadow economy is all currently unregistered economic activities that contribute to the officially calculated (or observed) Gross National Product.² Smith (1994, p. 18) defines it as ‘market-based production of goods and services, whether legal or illegal, that escapes detection in the official estimates of GDP’. In this paper, the following more narrow definition of the shadow economy is used: the shadow economy includes all market-based legal production of goods and services that are deliberately concealed from public authorities to avoid payment of income, value added or other taxes; to avoid payment of social security contributions; having to meet certain legal labour market standards, such as minimum wages, maximum working hours, safety standards, etc; and complying with certain administrative procedures, such as completing statistical questionnaires or administrative forms. Given this definition, important determinants of the shadow economy are as follows.

¹Compare the different opinions of Tanzi (1999), Thomas (1999), Giles (1999a, 1999b) and Pedersen (2003).

²This definition is used for example, by Feige (1989, 1994), Schneider (2005, 2007), Feld and Schneider (2010) and Frey and Pommerehne (1984). Do-it-yourself activities are not included. For estimates of the shadow economy and the do-it-yourself activities for Germany see Buehn *et al.* (2009).

(a) *Tax and Social Security Contribution Burdens*

It has been ascertained that the overall tax and social security contribution burdens are among the main causes for the existence of the shadow economy.³ The bigger the difference between the total cost of labour in the official economy and the after-tax earnings (from work), the greater is the incentive to avoid this difference and to work in the shadow economy. Since this difference depends broadly on the social security burden/payments and the overall tax burden, the latter are key features of the existence and the increase of the shadow economy.

The concrete measurement of the tax and social security contribution burdens is not easy to define, because the tax and social security systems are vastly different among the countries. In order to have some general comparable proxies, we use the following causal variables: (1) indirect taxes as a proportion of total overall taxation (positive sign expected); (2) share of direct taxes: direct taxes as proportion of overall taxation (positive sign expected); (3) size of government: general government final consumption expenditures (in percentage of GDP, which includes all government current expenditures for purchases of goods and services; positive sign expected); (4) fiscal freedom as subcomponent of the Heritage Foundation's economic freedom index measures the fiscal burden in an economy; i.e. top tax rates on individual and corporate income. The index ranges from 0 to 100, where 0 is least fiscal freedom and 100 maximum degree of fiscal freedom (negative sign expected).

(b) *Intensity of Regulations*

Increased intensity of regulations is another important factor that reduces the freedom (of choice) for individuals engaged in the official economy. One can think of labour market regulations such as minimum wages or dismissal protections, trade barriers such as import quotas, and labour market restrictions for foreigners such as restrictions regarding the free movement of foreign workers. Johnson *et al.* (1998b) find significant overall empirical evidence of the influence of (labour) regulations on the shadow economy; and the impact is clearly described and theoretically derived in other studies, e.g. for Germany (Deregulation Commission, 1991). Regulations lead to a substantial increase in labour costs in the official economy. But since most of these costs can be shifted to the employees, these costs provide another incentive to work in the shadow economy, where they can be avoided. Their empirical evidence supports the model of Johnson *et al.* (1997), which predicts, inter alia, that countries with more general regulation of their economies tend to have a higher share of the unofficial economy in total GDP.

To measure the intensity of regulation or the impact of regulation on the decision of whether to work in the official or unofficial economy is a difficult task, and we try to model this by using the following causal variables: (1) business freedom: it is a subcomponent of the Heritage Foundation's economic freedom index; it measures the time and efforts of business activity. It ranges from 0 to 100, where 0 is least business freedom and 100 maximum business freedom (negative sign

³See Schneider (1986, 2005, 2007); Johnson *et al.* (1998a, 1998b); Tanzi (1999); Giles (1999a); Giles and Tedds (2002); Feld and Schneider (2010).

expected); (2) economic freedom: Heritage Foundation economic freedom index, which ranges from 0 to 100, where 0 is least economic freedom and 100 maximum economic freedom (negative sign expected); (3) regulatory quality: World Bank's regulatory quality index including measures of the incidents of market-unfriendly policies, such as price controls or inadequate bank supervision, as well as perceptions of the burdens imposed by excessive regulation in areas, such as foreign trade and business development. It scores between -2.5 and $+2.5$ with higher scores corresponding to better outcomes (negative sign expected).

(c) *Public Sector Services*

An increase of the shadow economy can lead to reduced state revenues, which in turn reduce the quality and quantity of publicly provided goods and services. Ultimately, this can lead to an increase in the tax rates for firms and individuals in the official sector, quite often combined with a deterioration in the quality of the public goods (such as the public infrastructure) and of the administration, with the consequence of even stronger incentives to participate in the shadow economy. The provision and especially the quality of the public sector services is thus also a crucial causal variable for people's decision to work or not work in the shadow economy. To capture this effect, we have the following variable: Government Effectiveness from the World Bank's Worldwide Governance Indicators. It 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 government's commitment to such policies. The scores of this index lie between -2.5 and $+2.5$ with higher scores corresponding to better outcomes (negative sign expected).

(d) *Official Economy*

As has been shown in a number of studies (Enste & Schneider, 2006; Feld & Schneider, 2010), the situation of the official economy also plays a crucial role in people's decision to work or not to work in the shadow economy. In a booming official economy, people have many opportunities to earn a good salary and 'extra money' in the official economy. This is not the case in an economy facing a recession, and more people try to compensate their losses of income from the official economy through additional shadow economy activities. In order to capture this, we will use the following variables: (1) GPD per capita based on Purchasing Power Parity (PPP), measured in constant 2005 US\$ (negative sign expected); (2) unemployment rate defined as total unemployment in percentage of total labour force (positive sign expected); (3) inflation rate: GDP deflator (annual rate in percent); inflation is measured by the annual growth rate of the GDP implicit deflator, it shows the rate of price changes in the economy as a whole (positive sign expected); (4) openness: openness corresponds to trade (in percentage of GDP). Trade is the sum of exports and imports of goods and services, measured as a share of gross domestic product (negative sign expected).

Because the shadow economy cannot be directly measured, we have to use indicators in which shadow economy activities are reflected. Here, we use the following indicators.

(e) *Monetary Indicators*

Given that people who engage in shadow economy transactions do not want to leave traces, they conduct these activities in cash. Hence, most shadow economy activities are reflected in an additional use of cash (or currency). To take this into account, we use the following two indicators: (1) M0/M1:M0 corresponds to the currency outside the banks; the usual definition for M1 is M0 plus deposits; (2) currency/M2: this corresponds to the currency outside the banks as a proportion of M2.

(f) *Labour Market Indicators*

Shadow economy activities are also reflected in labour market indicators. We use the following two: (1) labour force participation rate: this is a proportion of the population that is economically active, supplying labour for the production of goods and services during a specified period; (2) growth rate of the total labour force: total labour force comprises people aging 15 and older who meet the International Labor Organization's (ILO) definition of the economically active population: all people who supply labour for the production of goods and services during a specified period.

(g) *State of the Official Economy*

In addition, shadow economy activities are reflected in the state of the official economy. For this reason, we include the following two indicators: (1) GDP per capita: GDP per capita is gross domestic product converted to international dollars using Purchasing Power Parity rates, divided by the population; (2) growth rate of GDP per capita, as (1), but the annual growth rate of the GDP per capita.

3. The Size of the Shadow Economy for 162 Countries

3.1 *Econometric Methodology*

Estimating the size and trend of a shadow economy is a difficult and challenging task. Methods – designed to estimate the size and trend of the shadow economy – such as the currency demand approach or the electricity approach consider just one indicator that ‘must’ capture all effects of the shadow economy. However, it is obvious that shadow economy effects show up simultaneously in the production, labour, and money markets. The empirical method used in this paper is based on the statistical theory of unobserved variables, which considers multiple causes and multiple indicators of the phenomenon to be measured, i.e. it explicitly considers multiple causes leading to the existence and growth of the shadow economy, as well as the multiple effects of the shadow economy over time.⁴ In particular, we use a Multiple Indicators Multiple Causes (MIMIC) model – a Structural Equation Model (SEM) with one latent variable – for the empirical analysis.

⁴The pioneers of this approach are Frey and Weck-Hannemann (1984) who applied this approach to cross-section data from the 24 OECD countries for various years.

The main idea behind a SEM is to examine the relationships among unobserved variables in terms of the relationships among a set of observed variables by using the covariance information of the latter. In particular, a SEM compares a sample covariance matrix, i.e. the covariance matrix of the observed variables, with the parametric structure imposed on it by a hypothesized model.⁵ The relationships among the observed variables are described in terms of their covariances and it is assumed that they are generated by (a usually smaller number of) unobserved variables. In the MIMIC model presented in this paper, the shadow economy is the unobserved variable and is analysed with respect to its relationship to the observed variables using the covariance matrix of the latter. For this purpose, the unobserved variable is, in a first step, linked to the observed indicator variables in a factor analytical model, also called a measurement model. Second, the relationships between the unobserved variable and the observed explanatory (causal) variables are specified through a structural model. Thus, a MIMIC model is the simultaneous specification of a factor model and a structural model. In this sense, the MIMIC model tests the consistency of a ‘structural’ theory through data and has two goals: (i) estimating the parameters (coefficients, variances, etc) and (ii) assessing the fit of the model. Applying this to the shadow economy research, these two goals mean (i) measuring the relationships of a set of observed causes and indicators to the shadow economy (latent variable), and (ii) testing if the researcher’s theory or the derived hypotheses, as a whole, fit the data used.

3.2 *Econometric Results*

Table 1 presents seven different specifications because we think it is interesting to see which variables turn out to be significant, especially if one uses subsamples of countries, where more and different causal variables are available. We believe that it is interesting to see which variables have an influence on the size and trend of the shadow economy, if we have more and better data available. The ideal situation of course would be, if a large data set were to be available for all countries over the total period 1996 up to 2007, but this is unfortunately not the case.

For the total sample, two estimations are shown, one for the 151 countries over 1996 to 2007 and, with more causal variables, one sample for 120 countries over 1996 to 2006. In addition to the total sample estimations, econometric estimations using the MIMIC approach are presented for 98 (88) developing countries, 21 Eastern European and Central Asian (mostly former transition) countries; and 25 high income OECD-countries. For the developing countries, two estimations with and without the direct tax burden rate as causal variable are presented; without the direct tax burden rate the number of development countries increase from 88 to 98. For the high income OECD countries again two estimations are shown, one over the period 1996 to 2006 and one over the period 1996 to 2007. For the 98 (88) developing countries and the 21 Eastern European and Central Asian countries, the estimation was done over the period

⁵A general overview about the SEM approach is given in, for example, Bollen (1989).

Table 1. MIMIC model estimation results

Independent variables	Specification 1 98 Developing Countries (1994–2006)	Specification 2 88 Developing Countries (1994–2006)	Specification 3 21 Transition Countries (1994–2006)	Specification 4 25 High Income OECD Countries (1996–2006)	Specification 5 25 High Income OECD Countries (1996–2007)	Specification 6 151 Countries (1996–2007)	Specification 7 120 Countries (1996–2006)
Causal variables							
Size of government	0.14 (5.97)***	0.15 (5.57)***	0.18 (3.49)***			0.05 (2.64)***	0.10 (3.77)***
Share of direct taxation		0.06 (2.57)**					0.05 (2.39)**
Total tax burden				0.05 (2.05)**	0.06 (1.78)*		
Fiscal freedom	−0.06 (2.90)***	−0.03 (1.69)*	−0.08 (1.68)*	−0.07 (2.84)***			−0.04 (2.08)**
Business freedom	−0.05 (2.18)**	−0.05 (2.33)**		−0.23 (5.93)***			−0.04 (1.84)*
Economic freedom			−0.09 (1.91)*				
Unemployment rate	0.01 (0.67)	−0.00 (0.06)	0.08 (1.84)*	0.05 (1.89)*	0.11 (3.16)***	0.04 (2.08)**	0.02 (0.89)
GDP per capita	−0.27 (8.79)***	−0.26 (6.87)***				−0.38 (15.89)***	−0.33 (9.15)***
Regulatory quality				−0.21 (5.45)***	−0.31 (6.50)***		
Government effectiveness						−0.05 (2.64)***	−0.04 (2.11)**
Openness			−0.15 (2.47)**				
Inflation rate			0.22 (2.83)***				
Indicator variables							
Growth rate of GDP per capita	−1.01 (7.88)***	−1.39 (6.70)***	−0.76 (4.41)***			−0.79 (10.93)***	−0.99 (8.42)***
GDP per capita				−1.52 (6.71)***	−1.25 (8.36)***		
Labour force participation rate	0.05 (0.59)	0.02 (0.14)		−1.11 (5.45)***	−1.03 (7.70)***	−0.19 (3.15)***	
Growth rate of labour force			−0.83 (3.90)***				−0.16 (1.76)*
Currency	1	1	1	1	1	1	1
Statistical tests							
RMSEA (<i>p</i> -value)	0.03 (0.99)	0.03 (0.99)	0.00 (1.00)	0.00 (0.88)	0.00 (0.99)	0.03 (1.00)	0.02 (1.00)
Chi-square (<i>p</i> -value)	38.70 (0.00)	44.43 (0.02)	17.75 (0.91)	17.74 (0.60)	3.55 (0.94)	29.95 (0.00)	51.82 (0.03)
AGFI	0.98	0.98	0.97	0.95	0.99	0.99	0.98
Degrees of freedom	20	27	27	20	9	13	35
Number of observations	1045	741	213	145	243	1563	942

Note: Absolute *z*-statistics in parentheses. ***, **, * denote significance at the 1, 5, and 10% significance level. All variables are used as their standardized deviations from mean. According to the MIMIC models identification rule (see also section 3.1), one indicator has to be fixed to an a priori value. We have consistently chosen the currency variable. The degrees of freedom are determined by $0.5(p + q)(p + q + 1) - t$; with *p* = number of indicators; *q* = number of causes; *t* = the number for free parameters.

1994 to 2006 and for the 25 OECD countries over the period 1996 to 2007. For the total sample of 151(120) countries we use data for the period from 1996 up to 2007(2006).

For the developing countries we use as cause variables the following six: share of direct taxation (direct taxes in percentage of overall taxation), size of government (general government final consumption expenditure, in percentage of GDP) as a proxy for indirect taxation and a variable, fiscal freedom (an index consisting of top individual income tax rate, top individual corporal tax rate, and total tax revenues as a percentage of GDP) as three tax burden variables in a wide sense; regulatory intensity for state regulation, and the business freedom index (which is composed of the following components: time to open a business, financial costs to start a business, minimum capital stock to start a business, and costs for obtaining a licence), the state of economy with the two variables: the unemployment rate and GDP per capita. As indicator variables we use growth rate of GDP per capita, the labour force participation rate (people over 15 economically active as a percentage of total population), and as currency we use M0 divided by M1. For the Eastern European and Central Asian (mostly former transition) countries, we use as cause variables the size of government, the fiscal freedom index, for state regulation the business freedom index, and for the state of the economy the unemployment rate, inflation rate and openness (sum of export and imports of goods and services, in percentage of GDP). As indicators, we use the growth rate of GDP per capita, the growth rate of total labour force, and the ratio M0 over M1. For the 25 OECD countries, we use the total tax burden (total tax revenues in percent of GDP), the fiscal and business freedom indices, a regulatory quality index, and the unemployment rate. As indicator variables, we use GDP per capita, the labour force participation rate and a measure for currency (M0 over M2). For the total sample of 151 countries we use as cause variables the size of the government, the unemployment rate, government effectiveness, and the GDP per capita. As indicators we use currency (M0 over M1), the growth rate of GDP per capita, and the labour force participation rate. For the 120 countries, we have additional causal variables. Here we include the size of the government, the fiscal freedom index, the share of direct taxation, the business freedom index, the unemployment rate, government effectiveness, and the GDP per capita. As indicator variables we use currency (M0 over M1), the growth rate of GDP per capita, and the growth rate of total labour force.

The estimations results for the 98 developing countries over the period 1994 to 2006 are shown in specification 1, and the estimation results for the 88 developing countries (including direct taxation) over the same period are shown in specification 2. In both estimations, all estimated coefficients of the cause variables have the theoretically expected signs. Except for the unemployment rate, all other cause variables are statistically significant, at least at the 90% confidence level. The share of direct taxation and the size of government are highly statistically significant, as well as the fiscal freedom and the business freedom variable. In addition, the GDP per capita is in both equations highly statistically significant with the expected negative sign. If we turn to the indicator variables, the labour force participation rate and the growth rate of GDP per capita are in both equations highly statistically significant. The test statistics are also quite satisfactory.

In specification 3, the MIMIC estimation result for the 21 Eastern European and Central Asian (mostly former transition) countries over the period 1994 to 2006 is shown. The size of government and the fiscal freedom variable (both capturing the overall state burden), are highly statistically significant causes and have the expected signs. Turning to regulation, the economic freedom variable has the expected negative significant sign. As these countries experienced periods of high inflation, we include the inflation rate which has the expected positive, highly significant sign. The variable openness, modelling in a certain way the transition process, is also statistically significant. Considering the indicator variables, the growth rate of the total labour force is statistically significant, as well as the growth rate of GDP per capita. Also, here the test statistics are quite satisfactory.

In specifications 4 and 5, the estimation results for the 25 high income OECD countries are shown over the period 1996 to 2006 and 1996 to 2007.⁶ In specification 4, the two variables capturing government burden (total tax burden and fiscal freedom) are highly statistically significant and have the expected sign. The unemployment rate has the expected sign and is at 95% confidence level statistically significant. The two variables capturing the regulatory burden, i.e. business freedom and regulatory quality, have the expected signs and are highly statistically significant. Turning to the indicator variables, the labour force participation rate and currency (ratio of M0 over M2) are both highly statistically significant. In addition, the test statistics for this equation are quite satisfactory. Specification 5 excludes fiscal and business freedom, which allows us to estimate the model up to the year 2007. All causal variables are highly statistically significant and have the expected signs, and the same is true for the indicators.

Specifications 6 and 7 present two estimations of 151 and 120 countries. In specification 6, we present the results of 151 countries estimated over the period 1996 to 2007. Turning first to the causal variables, we see that the size of government has the expected positive sign and is highly statistically significant. The same holds for the two variables that describe the state of the economy, the unemployment variable, which is statistically significant with a positive sign, and GDP per capita, which is highly statistically significant with the expected negative sign. Turning to the indicator variables, the growth rate of GDP per capita and the labour force participation rate have the expected signs and are highly statistically significant. If we reduce this sample to 120 countries, we can include more causal variables and the results are presented in specification 7. Here, we see that as we have three variables capturing the burden of taxation (in a wide sense): the size of government, fiscal freedom and share of direct taxation. All three have the expected signs and are statistically significant. As regulatory variables we have business freedom and government effectiveness which, again, have the expected negative signs and are statistically significant. For the state of the economy, we have the unemployment rate, which is not statistically significant, and GDP per capita, which is statistically significant with the expected negative sign. For the indicators, we have currency (M0 over M1), the labour force participation rate and GDP per capita, being statistically significant and showing the expected sign.

⁶A number of variables is not available for 2007, hence we have two different sets of cause variables.

Summarizing the results, we can say that for all groups of countries, the theoretical considerations of the causes of the shadow economy in section 2 behave according to our expectations. However, the estimated coefficients in Table 1 are quite different in magnitude from one specification to the next. Because it is rather difficult to come up with an explanation for the exact differences in the magnitude of the coefficients, we only present a general interpretation for this observation. With respect to the indices measuring regulation in one way or the other, i.e. the fiscal freedom and business/economic freedom indices, our results suggest that regulation is a much more important determinant in developed and transition countries than in developing ones. It seems that – for the reason that the burden of regulation is, on average, higher in developed and transition countries as more rules, regulations, and administrative procedures are in place – the importance of regulation being a determinant of the shadow economy increases with the level of development. On the contrary, in developing countries, in which regulation is often less burdensome, the coefficients of the fiscal and business freedom indices are much smaller, and hence regulation is a less important determinant of the shadow economy. Regarding the unemployment rate, the results are comparable. It does not influence the shadow economies in developing countries but in transition and the OECD countries. It seems that higher unemployment rates due to, on average, more regulated and hence less flexible labour markets significantly contribute to the size and trend of the shadow economies in OECD countries. In developing countries, however, unemployment is not a significant determinant of the shadow economy. In these countries, the income earned in the shadow economy guarantees subsistence of families. Comparing specifications 3 and 5, the unemployment rate seems to be a more important determinant in OECD than in transition countries.

The estimation results further show a slightly different impact of ‘policy’ causal variables compared with non-policy ‘economic’ causal variables across the different groups of countries. In general, economic variables, i.e. the level of development and the state of the economy measured by the GDP per capital and the unemployment rate, are very important determinants of the shadow economy. The estimated coefficient indicates that an improvement of economic conditions would reduce the size of the shadow economy. Of course, for the unemployment rate this is only true for transition and highly developed OECD countries. Comparing the impact of the policy variables such as the different measures of the tax burden and regulation on the shadow economy across the estimated specifications also reveals interesting results. A reduction of the regulatory burden and improvement of business/economic freedom in transition and OECD countries leads to a much higher reduction of the shadow economy than it would in developing countries, which is clearly indicated by the (much) larger coefficients of these variables. Fiscal freedom, however, is similarly important across all groups of countries.

3.3 *The Size of the Shadow Economies for 162 Countries from 1999 to 2007*

The estimated MIMIC coefficients allow us to determine only relatively estimated sizes of the shadow economy, which describe the pattern of the shadow economy

in a particular country over time. In order to calculate the size and trend of the shadow economy, we must convert the MIMIC index into ‘real world’ figures measured in percentage of official GDP. This final step requires an additional procedure: so-called benchmarking or calibration. Unfortunately, no consensus exists in the literature of which benchmarking procedure to use. The methodology we use was promoted by Dell’Anno (2007) and Dell’Anno and Solomon (2008). In the first step, the MIMIC model index of the shadow economies is calculated using the structural equation (1), i.e. by multiplying the coefficients of the significant causal variables with the respective time series. For the numerical example of specification 1 the structural equation is given as:⁷

$$\tilde{\eta}_t = 0.14x_{1t} - 0.06x_{2t} - 0.05x_{3t} - 0.27x_{4t} \quad (1)$$

Secondly, this index is converted into absolute values of the shadow economies, taking a base values in a particular base year. The base values necessary for this final step of the calibration procedure are from the year 2000 and are taken from Schneider (2007) who estimated the shadow economies in 145 countries around the world using the MIMIC and the currency demand approach. Thus, the size of the shadow economy $\hat{\eta}_t$ at time t is given as:

$$\hat{\eta}_t = \frac{\tilde{\eta}_t}{\tilde{\eta}_{2000}} \eta_{2000}^* \quad (2)$$

where $\tilde{\eta}_t$ denotes the value of the MIMIC index at t according to equation (1), $\tilde{\eta}_{2000}$ is the value of this index in the base year 2000, and η_{2000}^* is the exogenous estimate (base value) of the shadow economies in 2000. Applying this benchmarking procedure, the final estimates of the shadow economies can be calculated.⁸

Of course, when showing the size of the shadow economies for countries that are quite different in location and developing stage, one should be aware that such country comparisons give only a rough picture of the ranking of the size of the shadow economy in these countries and over time, because the MIMIC and the currency demand methods have shortcomings (see for example Breusch, 2005 and Ahumada *et al.*, 2007). Table 2 shows (in alphabetical order) the development of the shadow economy in 162 countries between 1999 and 2007.

We turn now to analyse the measurement estimates by regions, using the regions as defined by the World Bank. The World Bank distinguishes eight world regions. The mean, median, minimum, maximum, standard deviation and number of observations (countries) in each region are presented in Table 3. The medians by region are plotted in Figure 1 (ordered from the highest at the top, to the lowest at the bottom). The regional results are very clear: Sub-Saharan Africa has the highest estimates of the shadow economy (with a media of 40.6) closely followed by Europe and Central Asia (39.0) and Latin America and the Caribbean (38.8).

⁷ x_{1t} is size of government, x_{2t} and x_{3t} are the fiscal and business freedom index, and x_{4t} represents GDP per capita. All series are taken as standardized deviations from the country-specific mean.

⁸ The base values originate from the year 2000 except for some developing countries, for which we sometimes used base values from the year 2005 because of data availability. The MIMIC index has been adjusted to the positive range by adding a positive constant.

Table 2. Ranking of 162 countries in alphabetical order

No.	Country	Years										Country Average
		1999	2000	2001	2002	2003	2004	2005	2006	2007		
1	Albania	35.7	35.3	34.9	34.7	34.4	33.9	33.7	33.3	32.9	34.3	
2	Algeria	34.2	34.1	33.8	33.3	32.5	31.7	31.1	31.0	31.2	32.5	
3	Angola	48.8	48.8	48.4	47.4	47.3	47.1	45.0	44.0	42.1	46.5	
4	Argentina	25.2	25.4	26.1	27.6	26.4	25.5	24.7	23.8	23.0	25.3	
5	Armenia	46.6	46.3	45.4	44.5	43.9	43.6	42.7	42.1	41.1	44.0	
6	Australia	14.4	14.3	14.3	14.1	13.9	13.7	13.7	13.7	13.5	14.0	
7	Austria	10.0	9.8	9.7	9.8	9.8	9.8	9.8	9.6	9.5	9.8	
8	Azerbaijan	61.0	60.6	60.3	60.0	59.1	58.6	56.7	54.0	52.0	58.0	
9	Bahamas, The	26.3	26.2	26.4	26.5	27.0	27.4	26.7	26.2	26.2	26.5	
10	Bahrain	18.6	18.4	18.2	18.0	17.8	17.4	17.1	—	—	17.9	
11	Bangladesh	36.0	35.6	35.5	35.7	35.6	35.5	35.1	34.5	34.1	35.3	
12	Belarus	48.3	48.1	47.9	47.6	47.0	46.1	45.2	44.2	43.3	46.4	
13	Belgium	22.7	22.2	22.1	22.0	22.0	21.8	21.8	21.4	21.3	21.9	
14	Belize	45.2	43.8	43.3	43.4	42.3	42.0	42.1	41.7	42.0	42.9	
15	Benin	51.2	50.2	49.8	49.6	49.3	49.5	49.8	49.6	49.1	49.8	
16	Bhutan	29.6	29.4	29.2	29.1	28.7	28.7	28.3	28.2	27.7	28.8	
17	Bolivia	67.0	67.1	67.6	67.7	67.7	66.9	64.3	62.8	63.5	66.1	
18	Bosnia & Herzegovina	34.3	34.1	34.0	33.9	33.5	33.6	33.2	32.9	32.8	33.6	
19	Botswana	33.9	33.4	33.2	33.3	33.0	32.8	32.7	32.3	31.9	32.9	
20	Brazil	40.8	39.8	39.9	39.9	39.6	38.6	38.4	37.8	36.6	39.0	
21	Brunei Darussalam	31.3	31.1	31.0	30.2	29.9	31.2	31.8	30.8	31.2	30.9	
22	Bulgaria	37.3	36.9	36.6	36.1	35.6	34.9	34.1	33.5	32.7	35.3	
23	Burkina Faso	41.3	41.4	41.3	41.4	40.3	40.1	39.7	39.7	39.6	40.5	
24	Burundi	39.1	39.5	39.6	39.4	39.6	39.6	39.7	39.6	39.6	39.5	
25	Cambodia	50.4	50.1	49.6	50.0	49.2	48.8	47.8	46.8	46.0	48.7	
26	Cameroon	33.3	32.8	32.4	32.1	31.7	31.6	31.6	31.4	31.4	32.0	
27	Canada	16.3	16.0	15.9	15.8	15.7	15.6	15.5	15.3	15.3	15.7	
28	Cape Verde	36.5	36.1	35.9	35.9	35.7	35.8	35.4	34.1	33.4	35.4	
29	Central African Republic	42.8	42.6	43.1	44.0	46.9	47.3	46.9	45.9	45.1	45.0	
30	Chad	45.8	46.2	45.5	45.1	44.2	41.5	41.1	41.7	42.2	43.7	
31	Chile	19.9	19.8	19.6	19.6	19.4	19.1	18.9	18.7	18.5	19.3	
32	China	13.2	13.1	13.0	12.9	12.8	12.6	12.5	12.2	11.9	12.7	
33	Colombia	39.4	39.1	38.9	38.9	37.9	37.1	36.1	35.1	33.5	37.3	
34	Comoros	39.3	39.6	39.0	37.7	37.6	39.0	38.0	38.4	39.4	38.7	
35	Congo, Dem. Rep.	47.2	48.0	48.2	48.1	47.1	46.9	46.8	46.8	46.7	47.3	
36	Congo, Rep.	49.5	48.2	47.2	46.8	46.8	46.2	44.7	43.3	44.6	46.4	
37	Costa Rica	26.1	26.2	26.4	26.4	26.1	25.9	25.6	25.0	24.0	25.7	
38	Côte d'Ivoire	41.4	43.2	44.3	45.5	46.0	46.1	46.3	46.8	47.0	45.2	
39	Croatia	33.8	33.4	33.2	32.6	32.1	31.7	31.3	30.8	30.4	32.1	
40	Cyprus	29.2	28.7	28.2	27.8	28.2	28.1	27.7	27.3	26.5	28.0	
41	Czech Republic	19.3	19.1	18.9	18.8	18.7	18.4	17.8	17.3	17.0	18.4	
42	Denmark	18.4	18.0	18.0	18.0	18.0	17.8	17.6	17.0	16.9	17.7	
43	Dominican Republic	32.4	32.1	32.4	32.1	32.1	32.4	31.7	31.0	30.5	31.9	
44	Ecuador	34.2	34.4	33.7	33.3	32.8	31.6	30.8	30.4	30.4	32.4	
45	Egypt, Arab Rep.	35.5	35.1	35.2	35.7	35.4	35.0	34.8	34.1	33.1	34.9	
46	El Salvador	46.5	46.3	46.2	45.6	45.2	44.9	44.5	43.8	43.0	45.1	
47	Equatorial Guinea	32.7	32.8	32.0	31.5	31.2	30.8	30.5	30.6	30.1	31.4	
48	Eritrea	38.1	40.3	39.4	39.4	40.3	40.6	40.5	41.2	41.4	40.1	
49	Estonia	—	32.7	32.4	32.0	31.4	31.1	30.5	29.8	29.5	31.2	
50	Ethiopia	40.6	40.3	39.5	39.6	40.1	38.6	37.7	36.3	35.1	38.6	
51	Fiji	32.9	33.6	33.3	32.6	32.5	31.9	31.4	31.0	32.6	32.4	
52	Finland	18.4	18.1	17.9	17.8	17.7	17.6	17.4	17.1	17.0	17.7	
53	France	15.7	15.2	15.0	15.1	15.0	14.9	14.8	14.8	14.7	15.0	

(Continued)

Table 2. Continued

No.	Country	Years									Country Average
		1999	2000	2001	2002	2003	2004	2005	2006	2007	
54	Gabon	46.2	48.0	47.4	47.6	47.5	48.0	47.7	48.0	47.3	47.5
55	Gambia, The	46.1	45.1	44.7	47.1	45.4	43.8	43.6	42.4	40.9	44.3
56	Georgia	68.3	67.3	67.2	67.2	65.9	65.5	65.1	63.6	62.1	65.8
57	Germany	16.4	16.0	15.9	16.1	16.3	16.1	16.0	15.6	15.3	16.0
58	Ghana	42.0	41.9	41.8	41.6	41.3	40.9	39.5	38.6	38.3	40.7
59	Greece	28.5	28.7	28.2	28.0	27.4	27.1	26.9	26.4	26.5	27.5
60	Guatemala	51.6	51.5	51.6	51.2	50.7	50.5	50.2	49.0	47.9	50.5
61	Guinea	39.7	39.6	39.3	38.7	38.8	38.5	38.4	38.9	39.2	39.0
62	Guinea-Bissau	40.4	39.6	39.6	40.7	41.5	41.9	41.7	41.5	41.6	40.9
63	Guyana	33.4	33.6	33.3	33.7	33.9	33.4	34.3	33.8	34.0	33.7
64	Haiti	54.8	55.4	56.1	56.5	56.4	57.4	57.1	57.0	57.1	56.4
65	Honduras	50.3	49.6	49.7	49.6	48.9	48.3	47.3	46.1	45.1	48.3
66	Hong Kong, China	17.0	16.6	16.6	16.6	16.4	15.9	15.5	15.0	14.7	16.0
67	Hungary	25.4	25.1	24.8	24.5	24.4	24.1	24.0	23.7	23.7	24.4
68	Iceland	16.0	15.9	15.8	16.0	15.9	15.5	15.1	15.0	15.0	15.6
69	India	23.2	23.1	22.8	22.6	22.3	22.0	21.7	21.2	20.7	22.2
70	Indonesia	19.7	19.4	19.4	19.3	19.1	18.8	18.6	18.3	17.9	18.9
71	Iran, Islamic Rep.	19.1	18.9	19.0	18.7	18.2	17.9	18.1	17.7	17.3	18.3
72	Ireland	16.1	15.9	15.9	15.9	16.0	15.8	15.6	15.5	15.4	15.8
73	Israel	22.7	21.9	22.3	22.7	22.7	22.1	21.8	21.2	20.7	22.0
74	Italy	27.8	27.1	26.7	26.8	27.0	27.0	27.1	26.9	26.8	27.0
75	Jamaica	36.4	36.4	36.2	36.2	34.4	33.9	34.0	32.9	32.5	34.8
76	Japan	11.4	11.2	11.2	11.3	11.2	10.9	10.7	10.4	10.3	11.0
77	Jordan	19.4	19.4	19.2	18.9	18.7	18.3	18.0	17.5	17.2	18.5
78	Kazakhstan	43.8	43.2	42.5	42.0	41.1	40.6	39.8	38.9	38.4	41.1
79	Kenya	33.7	34.3	34.0	34.8	34.6	33.7	32.7	31.1	29.5	33.2
80	Korea, Rep.	28.3	27.5	27.3	26.9	26.8	26.5	26.3	25.9	25.6	26.8
81	Kuwait	20.1	20.1	20.2	20.3	19.3	18.8	18.1	17.9	—	19.4
82	Kyrgyz Republic	41.4	41.2	40.8	41.4	40.5	39.8	40.1	39.8	38.8	40.4
83	Lao PDR	30.9	30.6	30.2	30.0	29.8	29.4	28.9	28.4	28.0	29.6
84	Latvia	30.8	30.5	30.1	29.8	29.4	29.0	28.4	27.7	27.2	29.2
85	Lebanon	34.1	34.1	33.7	33.5	33.2	32.4	32.4	32.8	32.0	33.1
86	Lesotho	31.7	31.3	31.1	31.0	30.7	30.1	30.2	29.3	28.8	30.5
87	Liberia	44.2	43.2	43.2	43.1	45.0	45.4	44.9	44.5	44.2	44.2
88	Libya	34.7	35.1	34.5	33.8	34.9	33.9	33.1	32.0	30.9	33.7
89	Lithuania	33.8	33.7	33.3	32.8	32.0	31.7	31.0	30.4	29.7	32.0
90	Luxembourg	10.0	9.8	9.8	9.8	9.8	9.8	9.7	9.6	9.4	9.7
91	Macao, China	13.3	13.1	13.0	12.9	12.5	12.1	11.9	11.7	11.1	12.4
92	Macedonia	39.0	38.2	39.1	38.9	38.4	37.4	36.9	36.0	34.9	37.6
93	Madagascar	40.1	39.6	38.7	44.8	43.4	41.6	40.8	39.8	38.5	40.8
94	Malawi	39.9	40.3	42.5	44.4	43.4	42.5	42.6	41.3	39.4	41.8
95	Malaysia	32.2	31.1	31.6	31.5	31.2	30.7	30.4	30.0	29.6	30.9
96	Maldives	30.3	30.3	30.0	29.4	29.2	28.9	29.6	29.3	28.6	29.5
97	Mali	42.5	42.3	40.8	40.2	39.9	40.6	40.1	39.9	39.9	40.7
98	Malta	27.4	27.1	27.3	27.3	27.5	27.6	27.3	27.0	26.5	27.2
99	Mauritania	35.5	36.1	36.0	35.8	35.8	35.1	34.4	31.7	—	35.1
100	Mauritius	23.3	23.1	22.9	23.0	22.7	22.4	22.4	22.2	21.9	22.7
101	Mexico	30.8	30.1	30.3	30.4	30.5	30.1	29.9	29.2	28.8	30.0
102	Moldova	45.6	45.1	44.1	44.5	44.6	44.0	43.4	44.3	—	44.5
103	Mongolia	18.4	18.4	18.3	18.0	17.7	17.4	17.1	16.7	16.4	17.6
104	Morocco	36.5	36.4	35.7	35.5	35.0	34.2	34.9	33.1	33.1	34.9
105	Mozambique	41.1	40.3	40.4	39.8	39.8	39.7	38.9	38.6	—	39.8
106	Myanmar	51.6	52.6	51.5	50.7	49.0	49.1	47.8	—	—	50.3
107	Namibia	31.4	31.4	31.2	31.3	30.7	29.7	29.6	28.8	28.5	30.3

(Continued)

Table 2. Continued

No.	Country	Years									Country Average
		1999	2000	2001	2002	2003	2004	2005	2006	2007	
108	Nepal	37.2	36.8	36.7	37.1	36.9	36.8	36.7	36.3	36.0	36.7
109	Netherlands	13.3	13.1	13.1	13.2	13.3	13.2	13.2	13.2	13.0	13.2
110	New Zealand	13.0	12.8	12.6	12.4	12.2	12.0	12.1	12.1	12.0	12.4
111	Nicaragua	45.7	45.2	45.3	45.5	45.0	44.2	43.8	43.5	43.1	44.6
112	Niger	41.7	41.9	40.9	40.3	39.7	40.7	39.7	38.6	–	40.4
113	Nigeria	58.0	57.9	57.8	57.6	56.3	55.1	53.8	53.0	–	56.2
114	Norway	19.2	19.1	19.0	19.0	19.0	18.5	18.5	18.2	18.0	18.7
115	Oman	19.1	18.9	18.5	18.5	18.4	18.3	18.0	17.6	–	18.4
116	Pakistan	37.0	36.8	37.0	36.8	36.2	35.3	34.9	33.8	33.6	35.7
117	Panama	64.8	64.1	64.7	65.1	64.4	63.5	61.7	60.0	–	63.5
118	Papua New Guinea	35.5	36.1	36.8	37.1	37.1	37.0	37.2	37.1	36.5	36.7
119	Paraguay	38.0	39.8	39.7	40.1	39.1	38.3	38.2	37.4	–	38.8
120	Peru	60.1	59.9	60.2	59.1	58.6	57.9	57.2	55.7	53.7	58.0
121	Philippines	43.8	43.3	43.0	42.5	42.0	41.6	40.1	39.5	38.3	41.6
122	Poland	27.7	27.6	27.7	27.7	27.5	27.3	26.9	26.4	26.0	27.2
123	Portugal	23.0	22.7	22.6	22.7	23.0	23.1	23.3	23.2	23.0	23.0
124	Qatar	–	19.0	19.3	19.0	19.6	17.4	18.4	–	–	14.1
125	Romania	34.3	34.4	33.7	33.5	32.8	32.0	31.7	30.7	30.2	32.6
126	Russian Federation	47.0	46.1	45.3	44.5	43.6	43.0	42.4	41.7	40.6	43.8
127	Rwanda	40.5	40.3	40.6	39.9	40.7	40.2	39.3	39.1	–	40.1
128	Saudi Arabia	18.7	18.4	18.7	19.2	18.3	17.7	17.4	17.4	16.8	18.1
129	Senegal	45.0	45.1	44.5	45.1	44.4	43.2	42.3	42.4	41.7	43.7
130	Sierra Leone	48.6	48.6	47.6	45.4	44.8	44.4	44.3	43.6	42.9	45.6
131	Singapore	13.3	13.1	13.3	13.3	13.1	12.8	12.7	12.4	12.2	12.9
132	Slovak Republic	18.9	18.9	18.8	18.6	18.3	18.1	17.6	17.2	16.8	18.1
133	Slovenia	27.3	27.1	26.7	26.6	26.4	26.2	25.8	25.3	24.7	26.2
134	Solomon Islands	31.7	33.4	34.5	34.8	34.7	33.8	33.4	33.2	32.7	33.6
135	South Africa	28.4	28.4	28.4	28.0	27.8	27.1	26.5	26.0	25.2	27.3
136	Spain	23.0	22.7	22.4	22.4	22.4	22.5	22.4	22.4	22.2	22.5
137	Sri Lanka	45.2	44.6	44.6	44.1	43.8	43.9	43.4	42.9	42.2	43.9
138	Sudan	34.1	–	–	–	–	–	–	–	–	34.1
139	Suriname	39.7	39.8	39.3	38.9	38.1	36.9	36.5	35.9	35.1	37.8
140	Swaziland	43.5	41.4	41.3	40.9	40.2	40.1	39.3	38.9	–	40.7
141	Sweden	19.6	19.2	19.1	19.0	18.7	18.5	18.6	18.2	17.9	18.8
142	Switzerland	8.8	8.6	8.6	8.6	8.8	8.6	8.5	8.3	8.1	8.5
143	Syrian Arab Republic	19.3	19.3	19.2	19.1	19.3	19.1	19.0	18.7	18.5	19.1
144	Taiwan	25.7	25.4	25.7	25.4	25.2	24.7	24.5	24.2	23.9	25.0
145	Tajikistan	43.5	43.2	42.9	42.7	42.1	41.7	41.5	41.2	41.0	42.2
146	Tanzania	58.6	58.3	57.7	56.9	56.6	56.0	55.4	54.7	53.7	56.4
147	Thailand	53.4	52.6	52.4	51.5	50.2	49.6	49.0	48.5	48.2	50.6
148	Togo	34.4	35.1	35.4	34.5	34.9	35.0	35.0	34.6	–	34.9
149	Trinidad and Tobago	34.7	34.4	34.3	34.4	33.4	33.1	32.9	31.9	31.5	33.4
150	Tunisia	38.7	38.4	37.8	37.8	37.4	36.9	36.7	35.9	35.4	37.2
151	Turkey	32.7	32.1	32.8	32.4	31.8	31.0	30.0	29.5	29.1	31.3
152	Uganda	43.5	43.1	42.9	42.9	42.5	42.4	42.2	41.0	40.3	42.3
153	Ukraine	52.7	52.2	51.4	50.8	49.7	48.8	47.8	47.3	46.8	49.7
154	United Arab Emirates	26.3	26.4	27.0	27.4	26.3	25.4	24.8	23.5	–	25.9
155	United Kingdom	12.8	12.7	12.6	12.6	12.5	12.4	12.4	12.3	12.2	12.5
156	United States	8.8	8.7	8.8	8.8	8.7	8.6	8.5	8.4	8.4	8.6
157	Uruguay	50.5	51.1	51.7	54.0	53.6	51.1	49.2	48.5	46.1	50.6
158	Venezuela, RB	33.8	33.6	33.5	35.5	36.9	34.9	33.5	32.0	30.9	33.8
159	Vietnam	15.8	15.6	15.5	15.3	15.2	15.1	14.7	14.6	14.4	15.1
160	Yemen, Rep.	27.7	27.4	27.3	27.2	27.0	27.0	26.6	26.8	26.8	27.1
161	Zambia	49.3	48.9	48.3	48.1	47.5	46.8	46.3	45.0	43.9	47.1
162	Zimbabwe	59.6	59.4	61.5	62.8	63.7	62.3	62.0	62.3	62.7	61.8
	Time Average	34.0	33.7	33.6	33.6	33.3	32.9	32.5	32.1	31.2	

Table 3. Average informality (unweighted) by World Bank's regions

Region		mean	median	min	max	sd
EAP	East Asia and Pacific	32.3	32.4	12.7	50.6	13.3
ECA	Europe and Central Asia	38.9	39.0	18.1	65.8	10.9
LAC	Latin America and the Caribbean	41.1	38.8	19.3	66.1	12.3
MENA	Middle East and North Africa	28.0	32.5	18.3	37.2	7.8
OECD	High Income OECD	17.1	15.8	8.5	28.0	6.1
OHIE	Other High Income	23.0	25.0	12.4	33.4	7.0
SAS	South Asia	33.2	35.3	22.2	43.9	7.0
SSA	Sub-Saharan Africa	40.2	40.6	18.4	61.8	8.3
World		33.0	33.5	8.5	66.1	12.8

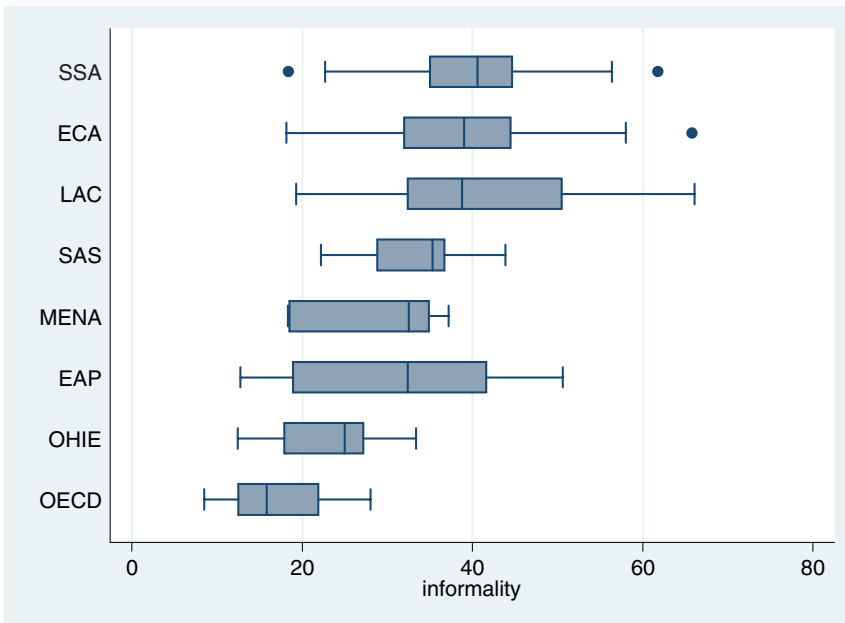


Figure 1. Average shadow economy measure by region.

Table 4. Average informality weighted by total GDP in 2005

Region		mean	median	min	max	sd
EAP	East Asia and Pacific	17.5	12.7	12.7	50.6	10.6
ECA	Europe and Central Asia	36.4	32.6	18.1	65.8	8.4
LAC	Latin America and the Caribbean	34.7	33.8	19.3	66.1	7.9
MENA	Middle East and North Africa	27.3	32.5	18.3	37.2	7.7
OECD	High Income OECD	13.4	11.0	8.5	28.0	5.7
OHIE	Other High Income	20.8	19.4	12.4	33.4	4.9
SAS	South Asia	25.1	22.2	22.2	43.9	5.9
SSA	Sub-Saharan Africa	37.6	33.2	18.4	61.8	11.7
World		17.1	13.2	8.5	66.1	9.9

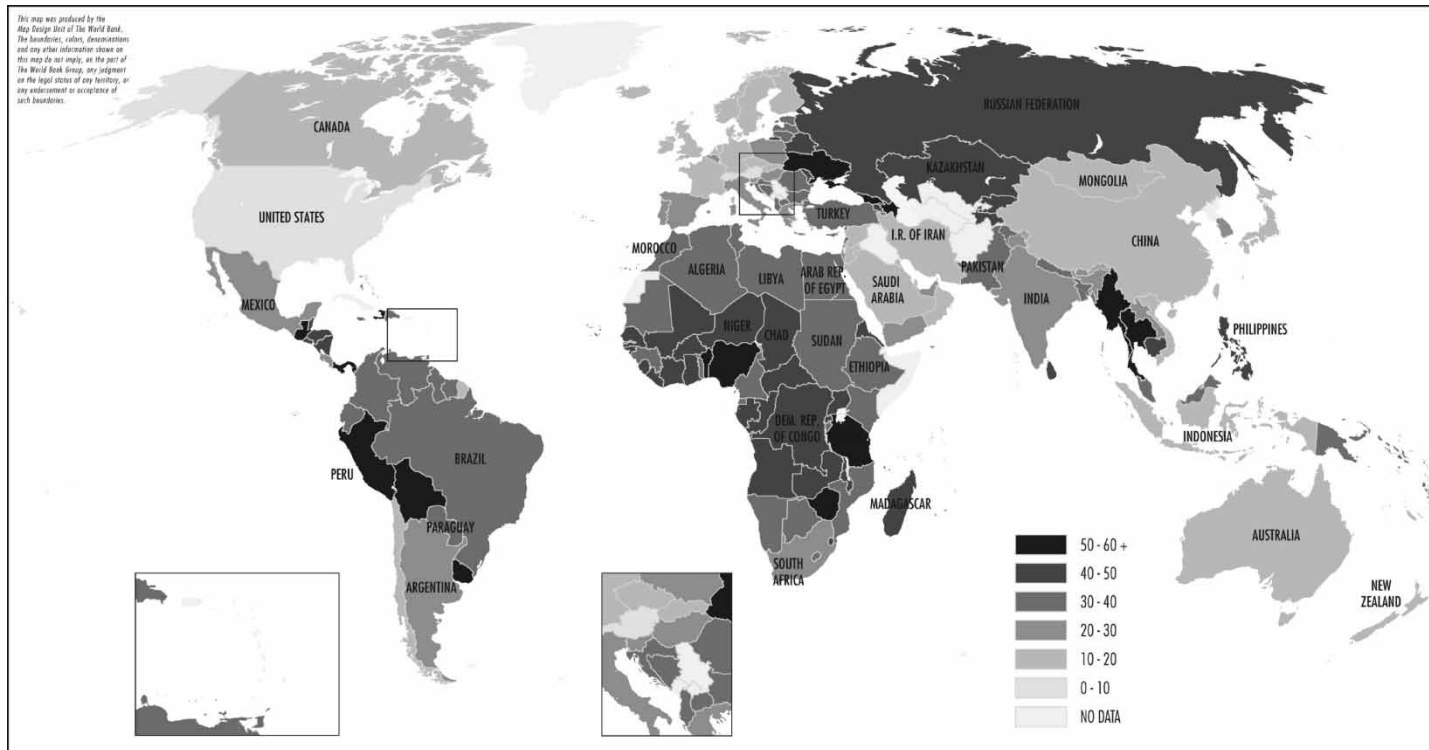


Figure 2. World view of informality.

At the bottom of the distribution we find the OECD countries with a median of 15.8. This figure also shows that there are big disparities among the same region.

While Table 3 presents at its bottom line the simple unweighted yearly average which is not the average informality for the World but the average World's informality when one weights every country equally. In order to measure how much of the GDP in the world is really informal, we weighted by total country GDP. In particular, for every country/year we weighted the rate of informality by the total GDP. This gives us the GDP in current Billion US dollars that is informal for each country/year. Then we added up this amount and divided it by the total GDP of the sample. The same had also been done for the sub-samples of the eight world regions the World Bank distinguishes. According to these calculations Table 4 shows much lower rates of informal GDP for the world as a whole, with an average of 17.1%. The results with respect to the countries' development stage are very impressive too: the averages of the weighted yearly informality estimates demonstrate that Sub-Saharan Africa has the largest shadow economies (with an average of 37.6%) followed by Europe and Central Asia (with an average of 36.4%). At the bottom of the distribution we find the OECD countries with an average of 13.4%, which is consistent with the fact that richer economies have lower informality rates.

Lastly, we present the informality measurement country by country in a world map view. Countries shown with darker tones in Figure 2 indicate countries with higher levels of informality. Among them: Azerbaijan, Bolivia, Peru, Panama, Tanzania, and Zimbabwe. Countries shown with lighter tones indicate countries with lower levels of informality. Among them: Austria, Japan, Luxembourg, Switzerland, the United States, and the United Kingdom.

4. Summary and Conclusions

There are many obstacles to overcome when measuring the size of the shadow economy and when analysing its consequences on the official economy. However, as this paper shows, some progress can be made. We provide estimates of the size of the shadow economies for 162 countries over the period 1999 to 2007 using the MIMIC procedure for the econometric estimation; and a benchmarking procedure for calibrating the estimated MIMIC into absolute values of the size of the shadow economy. The new knowledge/insights gained with respect to the size and trend of the shadow economy of 162 countries lead to three conclusions.

The first conclusion from these results is that for all countries investigated, the shadow economy has reached a large size of a weighted (unweighted) average of 17.1% (33.0%) of official GDP over 162 countries over 1999 to 2007. However, equally important is the clear negative trend of the size of the shadow economy over time. The unweighted average size of the shadow economies of all of these 162 countries (developing, Eastern European and Central Asian and high income OECD countries) decreased from 34.0% of official GDP in 1999 to 31.2% of official GDP in 2007. The second conclusion is that shadow economies are a complex phenomenon that is present, to an important extent, in all types of economies (developing, transition and highly developed). People engage in shadow economic activities for a variety of reasons. Among the most important are government

actions, most notably, taxation and regulation. The third conclusion is that there are regional disparities in the level of informality, but obvious regional clusters. At the top level of informality we find Sub-Saharan Africa, and at the lowest level of informality we find the OECD countries.

Considering these three conclusions, it is obvious that one of the big challenges for every government is to undertake efficient incentive-orientated policy measures in order to make work less attractive in the shadow economy and, hence, to make the work in the official economy more attractive. Successful implementation of such policies may lead to a stabilization, or even reduction, of the size of the shadow economy. Of course, even after 20 years of intensive research, the size, causes, and consequences of the shadow economy is still controversially debated in the literature and further research is necessary to improve our understanding about the shadow economy.

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