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Household Tax Compliance and the Shadow Economy in Central and Southeastern Europe

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About

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Global Development Network Southeast Europe

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Abstract

This paper presents and applies a new indicator of the size of the shadow economy based on the estimation of tax compliance in the household sector. These estimates are performed for the countries of Central, Eastern and Southeastern Europe using 2001 data. Estimates of income declaration rates and of corresponding undeclared household income are computed using household consumption data as well as detailed data on household taxation. Specific aspects such as remittances, the role of agriculture and the impact of tourism are explicitly taken into account and discussed.

Introduction

According to the terminology of Schneider and Enste (2000), one can distinguish the three following types of methods for measuring the size and development of the shadow economy: the direct approaches, the indirect approaches and the model approach. What follows is a short description of the traditional methods.

Direct approaches to the measurement of the unofficial economy are generally microeconomic approaches using either survey or tax auditing methods. However, these methods rely heavily on the honesty of the surveyed persons and on the investigative skills of the auditors respectively. They may lack representativeness and can be very costly if done on a big scale.

The indirect or indicator approaches to the estimation of the development of the hidden economy are in general macroeconomic approaches. These include, *inter alia*: the national accounts discrepancy method, using the gap between the income measure of GDP and the expenditure measure of GDP for the estimation of the shadow economy; the official and actual labour force discrepancy method, where a change in the official participation rate can be a crude estimate for a change in the informal sector activities; the transactions approach by Feige (1979, 1989, 1996), where, starting from the quantity equation, assumptions on the velocity of money and the relationship between total transactions and the total nominal GDP (= official + unofficial economy) are made; the currency demand approach by Tanzi (1980, 1983), assuming that the unofficial economy's transactions are made in cash, an increase of the shadow economy would therefore result in an increase of currency demand; and the physical input method, e.g. by Kaufmann and Kaliberda (1996) or Lackó (1996, 1998, 1999), using data on electricity consumption for estimating the size of the shadow economy. Several of the indirect approaches need either the assumption of a base year without a shadow economy or an external estimate of the unofficial economy

of a base country (e.g. Feige's transaction approach, Tanzi's currency demand approach and Lackó's household electricity approach). The use of base years or base countries is at the same time one of the weaknesses of these approaches and provides, among other things, points of critique.

Finally, the model approach, which goes back to Weck (1983) and Frey and Weck-Hannemann (1984), deals with multiple causes (e.g. tax burden, burden of regulations, citizens' attitudes towards the state) leading to the existence, growth and multiple effects (e.g. monetary indicators, labour market indicators, indicators of the development of the product market) of the black economy.

Table 1

Comparison of unofficial economy shares in % of official GDP

according to the methods of Lackó (1999), Kaufmann and Kaliberda (1996), and Madzarevic-Sujster and Mikulic (2002)

Country	Method	1992	1993	1994	1995
Bulgaria	L	34.1	34.0	35.9	34.0
Bulgaria	KK	33.3	42.7	41.0	56.7
Croatia	L	38.6	39.3	40.4	36.0
Croatia	MM	29.4	36.9	25.5	17.7

Source: Lackó (1999), pp. 52, 47; Madzarevic-Sujster and Mikulic (2002), p. 41.

Unfortunately full and uniform data coverage, which would be needed for applying the above-mentioned traditional methods for all countries and territories of the Balkans, is still lacking. This is the main reason why the literature on the shadow economy fails to provide results for the whole of Southeast Europe derived from using a single method. As can be seen from Table 1, it does not help to use results from different methods. Table 1 compares the results (unofficial economy shares in per cent of official GDP) of the indirect methods by Lackó (1999), indicated as method L, by Kaufmann and Kaliberda (1996), indicated as KK, and by Madzarevic-Sujster and Mikulic (2002), indicated as MM, for Bulgaria and Croatia in the period 1992 to 1995. The first two are physical input methods, the third one is a national accounts discrepancy method. Some of the results differ quite substantially with respect to the method used, in terms of shares for single years as well as growth rates between years.

Additional inputs that are of interest from the existing literature include a simple 'rule of thumb' approach to estimating the size of the shadow economy in Albania (IMF, 2003). In this report, the authors present a way of arriving at a 'very rough and preliminary' estimate of the size of the shadow economy using tax revenue and overall tax burden data. They use Bulgaria as an 'anchor country' for which a separate estimate of the shadow economy is known. They assume that the tax burden in Albania is the same as in Bulgaria, and

arrive at their estimate for Albania by comparing the tax revenues between the two countries. This simple approach inspired us to see whether we could formulate a similar but more realistic approach, notably by estimating the tax burden of each country ourselves and avoiding the use of an anchor country. The outcome of this work is the household income taxation method (HITM) as presented in this paper.

Tax evasion, tax avoidance and the shadow economy

Our chosen base definition of the shadow economy, which we take from Mirus and Smith (1997), is the following: 'economic activity which would generally be taxable were it reported to the tax authorities'. Hence, this would include all unreported income and barter activities related to legal goods and services. Activities related to illegal goods and services, i.e. criminal activities, are not part of this concept. Furthermore we must add that the expression 'economic activity' should be understood as productive economic activity, in other words, that generates value added.

This definition of the shadow economy can be expressed according to the OECD terminology[1]: the shadow economy as defined here includes all of what is called 'underground activity' (legal activities that are deliberately hidden in order to avoid taxation and/or compliance with regulations), and the undeclared parts (from a fiscal point of view) of 'informal activity' (activities conducted by unincorporated enterprises in the household sector) and 'production of households for own final use' (self-explanatory) to the extent that these should be subject to taxation.

One important clarification must be made at this point: we are not attempting to measure 'missing GDP' (often referred to as 'non-observed GDP'). The issue of missing GDP, meaning value added that is somehow not captured by the official measure of GDP and which, when found, should be added to officially recorded GDP to obtain 'actual GDP', is a separate issue and a separate, different quantity. The issue of missing GDP is the issue of the exhaustiveness of the national accounts, which national statistical agencies try to tackle using a variety of direct and indirect methods. These efforts are supported by several international institutions, and joint efforts to specify methods designed to achieve exhaustiveness can be found notably in OECD (2002a). Attempting to achieve an exhaustive estimate of GDP and its components is a complementary exercise to the estimate of the shadow economy which would make estimates of the size of the shadow economy more precise and more reliable, but they are distinct quantities. The shadow economy as defined in this paper may in principle be completely captured by the official measure of GDP. This would happen if the official measure of GDP were fully exhaustive. In practice full exhaustiveness is generally not reached, and so there is always some non-

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[1]   As detailed in OECD (2002a).

observed GDP, but the shadow economy as defined in our current framework will typically be a larger figure.

The second necessary clarification concerns the way in which activities escape taxation. In this report we consider tax evasion and tax avoidance as a single activity, namely the activity of not declaring incomes that should generally be taxed. Whether this is done by underreporting income (e.g. by forging or fabricating documents) or by legally exploiting taxation law loopholes is not relevant in our context.

In this report we purposely choose to limit ourselves to tax evasion and avoidance by households as a contributing factor to the shadow economy. In a more comprehensive framework one should add the contribution from the corporate sector (from non-declaration of profits) as well. Having said that we feel that our approach is quite comprehensive because our starting point is final household consumption as reported in the countries' national accounts. This final consumption can be thought to have at its origin all kinds of recycled or grey incomes, along with declared, formal ones, although admittedly we do not deal with the extra complication of (hidden) capital flight.

In order to motivate our methodology and clarify our basic assumptions, we start off by re-writing the 'factor remuneration' equation for GDP taking explicit account of undeclared incomes. We consider 'actual GDP', implying that there could be some value added spread between informal wages and informal profits (gross operating surpluses in this case) which is not captured by official GDP at market prices.

$$GDP_{MP} = GVA_{BP} + TLSP = W_M + \Pi_M + TLSP$$
$$= W_F + W_I + \Pi_F + \Pi_I + TLSP - NCVA$$

GDP_{MP} =   Official Gross Domestic Product at Market Prices

GVA_{BP} =   Official Gross Value Added at Basic Prices

W_M, W_F, W_I =   Measured, Formal and Informal Gross Wages

Π_M, Π_F, Π_I =   Measured, Formal and Informal 'Profits' (Gross Operating Surpluses and Mixed Incomes)

TLSP = Taxes Less Subsidies on Products

NCVA = Non-Captured Value Added ('missing GDP')

Here we define the size of the shadow economy ('informal sector') as the sum of informal wages and informal profits. One must distinguish at this stage between measured quantities and formal quantities. Formal wages are wages declared to the tax authorities. Measured wages are those found in the national accounts. These will typically be larger, as statistical offices use a variety of techniques to get closer to the actual figure, but of course

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they will not capture all informal wages. Of course we do not know the sizes of informal wages and informal profits and we also do not know the value of non-captured value added. In other words we have, at this stage, one equation and three unknowns.

What we do know is that households, regardless of how they obtained their incomes, will consume a substantial share of it, while using the rest either for savings or for paying taxes. So if we cannot find out about informal wages made in the domestic economy directly, we can on the other hand make an estimate of total household income starting from household final consumption as recorded in the national accounts. To the extent that some estimations of initially non-observed economic activities are made by the statistical agencies[2], so that the published figure for household final consumption can be considered to be (almost) exhaustive, this way of estimating total household income may be considered to be a good estimate[3]. Once we have total household income, we will have gained additional information that will help us to estimate informal incomes.

Total household income includes both formal and informal wages, as well as all other kinds of incomes, notably received social benefits (pensions, unemployment, maternity etc.), remittances from abroad, other transfers from government, transfers from foreign or domestic aid agencies, transfers from domestic individuals, incomes in kind, consumption of household-produced goods (e.g. own production of food and beverages) and so on. Again, some of this total household income may be recorded in official GDP while some of it may not. This is not our prime issue of concern in this research.

Using the concept of total household income, and noting the sum of non-wage incomes as OHI (Other Household Incomes) we can re-write the GDP equation as follows:

$$GDP_{MP} = W_F + W_I + OHI + \Pi_F + \Pi_I + TLSP - NCVA - OHI$$

$$THI = W_F + W_I + OHI$$

$$GDP_{MP} = THI + \Pi_F + \Pi_I + TLSP - NCVA - OHI$$

Finally we re-group the last three terms and rename the corporate sector as the 'other sector', obtaining:

$$GDP = THI + TOI - \Delta \qquad \text{where } \Delta = -TLSP + NCVA + OHI .$$

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[2] See OECD (2002a) for guidelines and methods as to how this is done, and UNECE (2003) for an international survey of currently implemented and planned practices.

[3] There are, in fact, no clear alternatives. Aggregated data from household budget surveys are already used by statistical agencies to refine the estimate of household final consumption and one would not make any gains by aggregating these data oneself.

Coming back to the issue of formal versus informal incomes, which we will refer to as declared and undeclared incomes, we may write:

$$GDP = THI + TOI - \Delta = DHI + UHI + DOI + UOI - \Delta$$

where:

THI, TOI = Total Household (resp. Other Sector) Income;

DHI, DOI = Declared (Formal) (resp. Other Sector) Household Income;

UHI, UOI = Undeclared (Informal) (resp. Other Sector) Household Income.

With this notation, we define the size of the shadow economy income (SEI) as:

$$SEI = UHI + UOI$$

We furthermore define the following ratios:

$$\boldsymbol{b}_H = \frac{THI}{GDP} \; ; \boldsymbol{b}_O = \frac{TOI}{GDP} \; ; \boldsymbol{l}_H = \frac{DHI}{THI} \; ; \boldsymbol{l}_O = \frac{DOI}{TOI}$$

λ_H, λ_O = Household (resp. Other) Income Declaration Rate;

β_H, β_O = Total Household (resp. Other) Income divided by GDP.

Now that we have laid down our working framework, we turn to the issue of tax evasion and avoidance. We have at our disposal official revenues from personal taxes, taxes on consumption (VAT and excise taxes) and social contribution schemes. We define statutory tax rates which apply to total household income. At this stage the weighting is important. THI includes income sources which are exempt from certain taxes such as personal income tax and social security contributions, and so our overall statutory tax rates must be computed accordingly.

We have the following variables:

THTR/GDP = Total Household Tax Revenue as a share of GDP;
SHTR = Statutory Household Tax Rate;

where THTR/GDP = (ITR + SSR + VAR + ETR) / GDP. This corresponds to: personal income tax revenue (ITR), employee social security contribution revenue (SSR), value added or the respective sales tax revenue (VAR) and excise tax revenue (ETR). The statutory household tax rate (SHTR) is the average statutory tax rate that includes these four types of taxes. We explain how to estimate SHTR in the next section.

Turning to the relationship between tax revenue and the statutory rate, we have:

$$THTR = DHI \cdot SHTR = \lambda_H \cdot THI \cdot SHTR$$

Dividing by GDP and by SHTR on both sides, we obtain the following ratio:

$$\frac{THTR/GDP}{SHTR} = \beta_H \lambda_H = \frac{THI}{GDP} \cdot \frac{DHI}{THI} = \frac{DHI}{GDP}$$

At this stage we know neither β_H nor λ_H , only their product. We will overcome this issue by making a direct estimate of THI based on final household consumption. This in turn will yield β_H, which in turn will enable us to estimate λ_H. Thanks to this we will be able to compute an estimate of the shadow economy share generated by households.

$$SEIH = \frac{UHI}{GDP} = \frac{THI}{GDP} - \frac{DHI}{GDP} = \beta_H - \beta_H \lambda_H = \beta_H (1 - \lambda_H)$$

SEIH = Shadow Economy Income due to Households / GDP
    = Undeclared Household Income / GDP

This quantity is what the HITM method estimates. In this perspective, we may now define in words what we mean by SEIH, namely: 'the share in GDP of household income which should be subject to taxation, but is not'.

In order to make such a figure comparable with other estimations found in the literature on the shadow economy or with those made by statistical agencies, one would need to convert this variable so that it expresses a quantity of value added, rather than a quantity of income. In this paper we stick to estimates based on income, although we plan to make the needed adjustments in future versions of our research. The estimates we present in this paper should therefore not be directly compared to other estimates in the literature, although they provide useful information by giving the volume of undeclared income, as well as a corresponding estimate of the household income declaration rate, which may itself be used as an indicator for the shadow economy, as well as its traditional use for discussing tax compliance.

Determining total household income (THI)

The first necessary step to enable us to produce estimates of the size of the shadow economy is to quantify total household income. Obviously households use their income either for consumption or for savings (which may include cash hoardings) or for paying taxes. Now we know what households pay in taxes in total because we know total tax incomes at the national level for all countries by adding incomes from income tax collection, excise taxes, VAT, as well as the appropriate share of social security contributions that are paid in. We also have an estimate of how much households consume in total thanks to the expenditure breakdown of GDP found in the national accounts which gives us household final consumption. The only remaining issue is household savings. To estimate the household savings rate for those countries (especially Balkan countries) where it is not readily available, we decided to use averages across households from household budget surveys. Although the amounts for total income and total expenditure computed from household survey data are always too low[4], we make the assumption that the ratios between the various expenditure categories and total household income are consistent with reality. In order to compute estimates of net savings rates, we add all types of savings, notably unspent income (the difference between average household income and average household expenditure), increases in deposits, investments in housing[5] and livestock, and debt reduction and we subtract all types of dissavings, namely the sum of all newly incurred loans and debts as well as decreases in savings (e.g. decreases in deposits). Noting the savings rate (with regard to total household income) as σ, we now write down THI as:

$$THI = THC + SAVINGS + PaidTaxes = THC + s \cdot THI + PaidTaxes$$

And so we are able to compute total household income as follows:

$$THI = \frac{1}{1-s} \cdot (THC + PaidTaxes)$$

Determining the Statutory Household Tax Rate (SHTR)

SHTR = Statutory Household Tax Rate =

AIT + ESS + (1 – AIT – ESS) * (1 - SVR) * (VAT + ECR * AET)

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[4] Estimates of household final consumption using household survey averages (and then multiplying by the number of households) yield totals that are generally too low. One item which is problematic is the imputed rents for home-owners that are calculated for household final consumption.

[5] This does not include regular maintenance work on one's own property such as replacing old furniture or re-painting existing walls. It refers to new investment, for example paying into a mortgage scheme or acquiring extra land or building an extension or acquiring additional livestock.

Quantifying the statutory household tax rate (SHTR) includes the estimation of an average income tax rate (AIT) and an employee social security rate (ESS). This is an easier task in the second case, as it is in most cases a flat rate. It is more difficult in the first case, with most countries having a progressive income taxation. AIT has to be estimated by calculating a simple average of the tax brackets' tax rates, including the first tax bracket of 0%. Additionally, figures of AIT and ESS have to be corrected *inter alia* by the shares of remittances and state current transfers to the households, as this type of income is often not being taxed by direct taxes and social security contributions. Then, the value added tax (VAT) or the respective sales tax has to be applied to the share of the remaining household income, after being reduced by the AIT and the ESS, reduced by the savings rate (SVR). On top of that, an average excise tax rate (AET) is being applied to the share of consumption, determined by the excised goods consumption rate (ECR). The AET can be estimated by using an average of all available excise tax rates for e.g. tobacco, beer, soft drinks, coffee, perfume and various types of gasoline and oil. In many cases, the actual rates are not available. Instead we have tax rates based on physical quantities rather than *ad valorem*. Therefore one can estimate the relevant excise rates using the prices of the most common types of local cigarettes and gasoline. This is what we have done for all the countries analysed.

The information on the tax structure of the particular countries and territories was taken from various publications as for example IMF country reports[6] and the Stability Pact's tax policy assessment (see Stability Pact, 2003). With the help of information from the finance ministries and secondary literature (e.g. Ivanov et al., 2002, 2003, Jarass and Obermair, 2000, Deloitte & Touche, 2002, KPMG, 2003), it was tried in all cases to correct the data to fit especially for the year 2001.

Estimating the average income tax rate is probably the most difficult task. Some countries and territories have introduced a flat rate (i.e. the Federation of Bosnia and Herzegovina, Serbia[7] and Montenegro, Kosovo[8], Estonia, Latvia and Lithuania) while all the others have progressive income taxation[9]. In this current version of our work the following simplifying assumption was made: AIT was estimated by calculating a simple average of the tax brackets' tax rates, including the first tax bracket of 0%. As the average of the countries with progressive taxation has about 5 tax brackets, this leads to approximately 20% of the income being considered as untaxed. Personal allowances are assumed for now to be

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[6] Albania: IMF CR 03 64; Bosnia and Herzegovina: IMF CR 00 77; Bulgaria: IMF WP 01 11, Stability Pact (2003); Croatia: IMF CR 00 22, Stability Pact (2003); Macedonia: IMF CR 02 48; Romania: IMF CR 01 16; Serbia and Montenegro: IMF CR 02 103, Stability Pact (2003); Kosovo: IMF (2002).

[7] Though the system here is more complex as on top of the flat 14% withholding rate an additional surtax is imposed on income in excess of a certain threshold – therefore the same 19% flat rate as in Montenegro was also assumed to be valid for Serbia.

[8] In 2001, Kosovo had neither a personal income tax nor social security contributions.

[9] Interestingly, in Republika Srpska, the tax structure is regressive.

included in this figure. The complicating issue is that it is difficult to know the *ad valorem* equivalent value of the allowances (e.g. child allowances, personal allowances), as they are in most cases described in money values, unless one has more information on the income distribution for an average household. This issue is one which we are currently addressing. At this stage we can say, however, that our estimates for the statutory income and social security rates for the four OECD countries of our sample (Czech Republic, Slovakia, Hungary and Poland) are in line with OECD (2002b) in which average statutory income tax and social security contribution rates are computed for the average manufacturing employee, depending on whether he/she is married or not, and/or has no child or two children. Our goal for the final version of this paper will be to use our estimate of total household income alongside data on the income distribution in order to construct an appropriately-weighted statutory personal income tax rate which takes all deductions and allowances into account in the correct way. At the moment we applied only allowances and deductions in the cases where they were provided as percentage shares of the income (i.e. in the Federation of Bosnia and Herzegovina, Republika Srpska and Slovenia). In the cases of flat income tax countries where the information on allowances and deductions were not given in percentage shares of the income, allowances and deductions were estimated to be 20%.[10]

In the case of Albania and Romania, where agricultural income is exempted from income taxation, the tax base of AIT was reduced by the share of agricultural income in total household income.[11] For Albania this share is 49.1% in 2001 and for Romania the share is 13.4%. It is worth mentioning that in Albania 71.6% of employment is engaged in the private agricultural sector and that in Romania agriculture and forestry account for 40.9% of employment. In the Czech Republic, Slovakia, Poland and Hungary, where agriculture represents less than 5% of GDP, agricultural income is deductible too.[12] A similar procedure had to be applied for calculating ESS all over Central and Southeastern Europe, as only employees and/or employers have to make social security contributions. Additionally, figures of AIT and ESS had to be corrected by the shares of remittances and state current transfers to the households[13], as this type of income is not being taxed by direct taxes and social security contributions. For Croatia, Macedonia, Romania, Estonia, Latvia, Poland and Slovenia, state current transfers had to be reduced by the share of pensions as the latter are taxed in these countries. In the region, Kosovo has the highest ratio of remittances to GDP (30%) but in this case no correction had to be made due to the missing income taxation in 2001. In Serbia and Montenegro and in Albania private

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[10] Only in Serbia and Montenegro, 10% were used, as it is said that there are no general deductions beside the social security contributions and allowances.

[11] The data on agriculture in per cent of GDP and total employment are taken from the wiiw Database.

[12] 50% of agricultural income can be deducted in the Czech Republic, while the information for Hungary is somewhat unclear. Nevertheless full deductibility was assumed. The case of Slovakia was treated similarly as sole income from agriculture is taxed at a negligible rate. In Poland, income from non-specialized agricultural activities is exempted.

[13] The sources for the data on remittances and the current transfers can be found in various IMF country reports.

remittances accounted for over 13% of GDP in 2001. State current transfers to households range in this sample from only 3% in Kosovo to almost 20% in Poland. Finally, for most of the countries AIT had to be corrected for the ESS rate, as in most of the cases, social security contributions are deductible.[14]

In the second stage of estimations required for SHTR, the value added tax (VAT) or the respective sales tax was applied to the remaining household income, after being reduced by the AIT, the ESS and the savings rate (SVR).[15] VAT or sales taxes in the region range between 15% (in Kosovo) and 25% (in Hungary). In most other countries it is 20%. On top of that an average excise tax rate (AET) is applied to the share of the remaining income as determined by the excised goods consumption rate (ECR)[16]. The AET was estimated by using an average of all available excise tax rates for tobacco, alcohol and gasoline. In most cases, the actual rates were not available. Instead we had tax rates based on physical quantities rather than *ad valorem*. In those cases we estimated the relevant excise rates using the prices of the most common types of local cigarettes and gasoline. Again at this stage there is room for improvement provided sufficiently detailed data can be found.

In order to estimate the SHTR on the state level of Bosnia and Herzegovina and of Serbia and Montenegro, statutory tax rates of the entities and the republics, respectively, were combined with the help of a GDP-based key. Thus, for the Federation of Bosnia and Herzegovina and Republika Srpska a relationship of 3 to 2 was assumed and for Serbia and Montenegro 12 to 1.

Determining tax revenues from households

The next task is to compute the total household tax revenues (THTR) in 2001[17]. For this purpose, data on the consolidated general government fiscal operations from various IMF country reports were used. THTR includes personal income tax revenue (ITR), employee social security contribution revenue (SSR), value added or the respective sales tax revenue (VAR) and excise tax revenue (ETR).

As, in most cases, revenues from social security contributions are generally not indicated separately for the employees and the employers, it had to be corrected for the share of nominal employer social security rates in the total nominal social security rate. Similarly, in the case of Bosnia and Herzegovina and Macedonia, the original data on the revenue from direct taxes was not split into a personal income and enterprise profit tax revenue for the

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[14]   However, in the case of Albania, no information on the deductibility of social security contributions was available.

[15]   One remaining improvement that we wish to bring to our method is to take into account the taxation of savings.

[16]   This was estimated with the help of household surveys and includes the consumption shares of tobacco, alcohol and fuel.

[17]   For Poland consolidated general government revenue data were found only for 2000.

general budget. For Bosnia and Herzegovina and its entities, the revenue data were corrected with the help of the share of income tax revenue in direct tax revenues of the Federation of Bosnia and Herzegovina. For Macedonia, information from the central government was employed.

For all countries VAT and excise tax revenue figures were corrected by the share of net tourism income in GDP. The justification for this adjustment is that VAT and excise tax incomes due to goods and services consumed domestically by tourists from abroad are not part of domestic household taxation revenue. Indeed we do not include estimates of the funds brought in by foreign tourists in our definition of total household income. Our concept of household taxation is purely domestic and so this correction is necessary. For countries with large revenues from tourism this correction makes a substantial difference to the final estimates, for example for Croatia (net tourism income is 13% of GDP) which has unusually high revenues from VAT and excise taxes.

Empirical results

In this section we present the results of our (preliminary) estimation results for seven countries (and five territories) of Southeast Europe (SEE) and for the eight Central and East European Accession Countries (AC). All the results are point estimates. The issue of precision is discussed in the next section.

Overall the estimation results are in the range of what one would expect for most countries. The average for Southeast Europe is higher than the average for the accession countries. Albania and Kosovo have the highest estimates, followed by Romania, Macedonia and Bulgaria. Perhaps more surprisingly, the estimates for Serbia and Montenegro (excluding Kosovo) and for Bosnia and Herzegovina (and the territories therein) are relatively low and more comparable to the levels found in the accession countries. These results are in contrast with recent literature on the region, notably Gligorov (2003) and Gligorov, Landesmann and Holzner (2003) which had led us to expect higher estimates. These two countries warrant further investigations. The efficiency of tax collection may indeed be relatively good in both countries, but we suspect that household final consumption as well as GDP may be incorrectly measured in Serbia and Montenegro. Regarding Bosnia and Herzegovina, we copied the beta (THI/GDP) from Serbia and Montenegro as the former does not have national accounts in the usual sense. This may also have influenced the result. As for the accession countries, Poland has the highest estimate (perhaps not surprisingly, given its large agricultural sector) while the lowest estimates are for Estonia and Slovenia. Latvia and Lithuania have higher estimates than Estonia. Though we may

Table 2

Estimates of shadow economy contribution from households, 2001

	ß	SHTR	THTR/GDP	ß*Lambda	Lambda	SEIH
	Total household income as share of GDP	Statutory household tax rate	Total household tax revenue as share of GDP	Declared household income as share of GDP	Household income declaration rate	Undeclared household income as share of GDP
SEE average	**85%**	**38%**	**21%**	**55%**	**64%**	**30%**
Albania	88%	30%	11%	35%	40%	52%
Bosnia & Herzegovina	85%	40%	26%	64%	76%	21%
FBiH	85%	41%	27%	66%	78%	19%
RS	85%	37%	22%	59%	69%	26%
Bulgaria	78%	38%	17%	44%	56%	34%
Croatia	75%	49%	28%	57%	76%	18%
Macedonia	88%	54%	26%	49%	55%	39%
Romania	81%	41%	14%	35%	43%	46%
Serbia & Montenegro	85%	36%	24%	66%	77%	19%
Serbia	85%	36%	24%	66%	78%	19%
Montenegro	85%	36%	21%	58%	69%	27%
Kosovo	104%	18%	10%	58%	56%	45%
AC average	**72%**	**44%**	**22%**	**50%**	**69%**	**22%**
Czech Republic	67%	39%	19%	48%	72%	18%
Estonia	77%	53%	32%	60%	78%	17%
Hungary	70%	45%	22%	49%	70%	21%
Latvia	74%	40%	19%	49%	66%	26%
Lithuania	75%	37%	19%	50%	67%	25%
Poland	78%	48%	22%	47%	60%	31%
Slovakia	65%	41%	18%	44%	67%	21%
Slovenia	72%	50%	27%	55%	76%	17%

Source: Own estimates.

not directly compare our estimates with those made by Schneider and Klinglmair (2004) for the period 1999-2000[18], we briefly compare the positions of the estimates within each estimation set distribution resulting from each approach. The main differences concern the estimates for Slovenia and Croatia on the one hand (where our estimates place them at the low end of the distribution, while Schneider and Klinglmair (2004) attribute relatively

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[18] We use this set of Schneider estimates as it covers the Balkan countries as well, except Macedonia.

larger estimates to them) and those for Albania and Romania on the other hand, which HITM places at the top end of the distribution while they are estimated to have only average-sized shadow economies by Schneider and Klinglmair (2004). The results for Latvia in particular are very different. It has the largest estimate among those of Schneider and Klinglmair, but is close to the average according to HITM. On the other hand both sets of estimates place Bulgaria, Lithuania, the Czech Republic and Hungary in similar positions with respect to each distribution.

The main reason for these differences seems to be linked to the specific focus of HITM on household taxation, whereas the DYMIMIC model takes multiple causes and indicators into account[19]. In particular, Romania has low tax revenues compared to its statutory tax rate, while Croatia, Slovenia and Estonia have rather high tax revenues compared to their respective statutory tax rates.

Further methodological discussion – data issues and points of improvement

Coverage

At this stage the issue of the coverage of our estimates, which focus strictly on the household contribution to the shadow economy, naturally comes to mind. Without loss of generality, we can say that a share of informal corporate income (informal gross operating surplus and mixed income) does end up as informal wages. So it may be said that SEIH captures some of the informal income generated by the corporate sector as well, but not all of it. Furthermore, the share of informal gross operating surplus which contributes to informal wages escapes not just household taxation but corporate tax as well. Taken together, these comments imply that the statutory tax rate, if based purely on those taxes that apply to the household sector, will be lower than it should be, so that the correct size of shadow economy income will certainly be higher than the HITM estimates. As for the corporate sector itself, again without loss of generality, one can say that some share of its informal incomes are not used to pay informal wages, but are either re-invested in the firm's assets or somehow hoarded or deposited abroad. One notes here that informal incomes that are split between business associates and then spent on consumption goods and services on the domestic market are equivalent to informal wages. We are therefore left with two missing items which HITM cannot account for: re-invested informal profits and hoarded or exported (informal) capital. These two items would require a separate estimation procedure. We also recall here that HITM does not enable us to account for cash hoardings by households either. In the case of households however cash hoardings interact with savings. Whether or not households prefer hoarding cash (e.g. in foreign

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[19] It is difficult to be more specific in interpreting the output of DYMIMIC as Schneider's publications tend to only explain the general principle of his method. One can only assume that the other factors considered by DYMIMIC somehow compensate the effect from tax compliance for the countries where estimates differ substantially.

currency) to classical savings accounts at domestic banks, the issue relevant to the accuracy of HITM is whether or not the savings rate estimated from household budget surveys is correct. Here again, a complementary estimation exercise would be helpful, the aim of which would be to describe the true dynamic of household savings. Finally, as previously stated, a complementary framework needs to be designed if one wishes to obtain value added estimates rather than income estimates. All of these improvements will be attempted for future or complementary versions of our research on this topic.

Data issues

As pointed out in previous sections, data availability is a major constraint. In order to produce a more reliable estimate of the statutory household tax rate (SHTR), it is necessary to gather extensive information not only on the tax structure, but also on the income distribution. This income distribution must itself be corrected since it will generally be an under-estimation / under-declaration of the true income distribution. At this stage some distributional assumptions concerning the share of underground or informal incomes across different income quantiles would become necessary.

Sensitivity analysis

Because we have not defined a classical model with error terms and relevant distributional assumptions, it is not immediately obvious how we should quantify the reliability of our estimates. For this purpose we are faced with two options: either stick to our deterministic framework and use value ranges to conduct a sensitivity analysis, or define a stochastic framework, make distributional assumptions, and then construct the appropriate confidence intervals. Our preference is to use a deterministic sensitivity analysis (e.g. by how much does our estimate for country X change if the statutory tax rate were higher (lower) by 3 percentage points). The reason is that the construction of distributional assumptions regarding the estimates of the statutory tax rate, the savings rate and final household consumption would be, in our view, artificial and more questionable than a deterministic sensitivity analysis. It may be that we would have to use non-normal distributions, and these would in any case have to be calibrated to make value intervals that we know to be incorrect extremely unlikely (or of probability zero). In light of this, it makes more sense in our view to define 'by hand' the value ranges that can be justified with regard to the data that we have, and then produce lower and higher bounds for our estimates. We are currently in the process of defining what the value ranges should be. Initial tests suggest variations within plus or minus 5 percentage points around our point estimates. The most sensitive input is the statutory VAT rate. The statutory personal income tax and employee social security contribution rates are also quite sensitive. The average excise tax rate has only a weak impact.

Conclusion

In this research we sought to develop an independent method for estimating the size of the shadow economy based on tax evasion and avoidance in the household sector. Our approach still requires certain improvements notably with regard to the issues of savings and cash hoardings, the non-captured informal activities of the corporate sector, and the taxation of savings. We have also been made aware of the inherent difficulties linked to estimating statutory household tax rates for a large number of countries. On the other hand, we would like to think that our approach contributes to the economic research on the shadow economy. Our work provides alternative estimates which give information on the shadow economy for a large number of countries, and some interesting discussions could perhaps arise in more detailed comparisons that could be made with more established sources of such estimates.

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