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The Size and Development of the Shadow Economies of Serbia/Montenegro and of 9 other East European Transformation Countries: A First and Preliminary Attempt

1. Introduction and Summary

1.1. Introduction

In this short paper a first and preliminary attempt is made to estimate the size and development of the shadow economy of Serbia/Montenegro and of 9 other East European Transformation Countries.[1)] In the following part 2 the shadow economies of Serbia/Montenegro and of 9 other Eastern Transition Countries are presented and compared. In part 3 the methods to estimate the shadow economy are discussed and criticized.

[1)] The literature about the shadow economy is quite large; compare e.g. the latest work by Schneider and Enste (2000a, 2000b and 2002), Alexeev and Pyle (2003), Belev (2003) and Schneider (2003, 2005).

1.2. Summary of the paper

In this paper it has been shown that it is possible to estimate the size and development of the shadow economy of Serbia/Montenegro as well as those of 9 other transition countries, which are Bulgaria, Croatia, Czech Republic, Hungary, Macedonia, Poland, Romania, Slovakia and Slovenia. Using the DYMIMIC method for these 10 Central and Eastern European countries, I get the result that in the year 2003 Macedonia has a larger shadow economy with 41.2% of official GDP, followed by Bulgaria with 35.9% and Romania with 34.9%. Slovakia and the Czech Republic has the lowest values with 17.7% and 17.9% of the official GDP, respectively. The average size of the shadow economy of the 10 Central and Eastern European Transition countries has increased from 21.1% in the year 1990/92 to 23.8% in the year 1994/95 and finally to 28.2% in the year 2002/03; an increase of 7.5 percentage points over the period 1990/92 to 2000/01. If one summarizes these findings, one realizes that the shadow economy has strongly increased in the 90s in all 10 Transition countries, but since 2000 it is staggering or slightly decreasing for most of these 10 Transition countries. If one now turns to the development of the size of the shadow economy of Serbia/Montenegro (again using the DYMIMIC approach) the size of the shadow economy strongly increased from 23.6% in 1990/92 to 29.1% in 1999. This means an increase of 5.5 percentage points over 10 years. From 1999 on the size of the shadow economy of Serbia/Montenegro is staggering or slightly decreasing to 28.1% in 2001 and to 27.6% in 2003. The slight decrease or staggering of the shadow economy in the last 3-4 years can be "explained", with the observation that the official economy of Serbia/Montenegro improved and the labour market was in better shape and the GNP per capita was slightly rising over the last 3 – 4 years. Finally, how reliable these estimates of the size and development of the shadow economy of

Serbia/Montenegro are, is an open question, but these figures give a first hint and show some plausible magnitudes of the size and development of the shadow economy of Serbia/Montenegro and other nine transition countries. To get more information about the structure in which sections the shadow economy is the strongest, more researches needed with the help of the survey technique.

2. The Size of the Shadow Economy in 10 Transition Countries with Special Emphasis to Serbia/Montenegro

2.1. The DYMIMIC Estimation of the Size of the Shadow Economy

In table 2.1 results are presented for the 10 transition countries, which are Bulgaria, Croatia, Czech Republic, Hungary, Macedonia, Poland, Romania, Serbia/Montenegro, Slovakia and Slovenia.

Table 2.1

With the exception of the cause variable "state regulation", all other variables are statistically significant and together the two "tax burden" variables have the quantitative largest impact on the size of the shadow economy; after there the variables "annual rate of GDP per capita", the "unemployment quota" and "burden of state regulation" follow. If the share of direct (indirect) taxation in % of GDP increases by one percentage point the shadow economies of these 10 Nations rise by 0.41 (0.33) percentage points measured in % of official GDP. Also if the unemployment quota increases by on percentage point the shadow economy increases by 0.51 percentage points.[2]

[2] These and the following calculations have been made with the help of simulations using the means of the cause and indicator variables.

The three indicator variables are also statistically significant and the estimated coefficients have the theoretically expected sings. If the shadow economy increases by one percentage point the official employment quota is reduced by 0.58 percentage points and the demand for additional currency (cash) per capita rises by 0.55 percent.

In order to calculate absolute values of the size of the shadow economies from these DYMIMIC estimation results the author used the already available estimations of the size and development of the shadow from the currency demand and other approaches for Croatia, Czech Republic, Hungary from Alexeev and Pyle (2003), Belev (2003), Schneider and Enste (2002) and Lacko (2000). With the help of the absolute values of the shadow economy (in % of GDP) for these countries the absolute values of the shadow economy for all other countries could be calculated. The results are shown in the next section.

2.2. The Size of the Shadow Economy of the 10 Transition Countries

The physical input (electricity method) and the in part 2.1 shown results of the DYMIMIC method[3)] have been applied to calculate the size and development of the shadow economy for these ten transition countries in Central and Eastern Europe. The results are presented in table 2.2.

Table 2.2

They cover the period 1990-1993 (average) on 1990 – 1992 (average)[4] and up to the year 2002/2003. On the basic on the physical input method by Johnson et.al. find for the transition countries of Central and Eastern Europe for the year 1990-

[3)] These methods are explained in part 3.

[4] There two longer periods 1990-1993 and 1990 – 1992 (averages in both cares) have been chosen, as the official data for 1990 and 1991 was not very reliable.

1993 that Macedonia has the largest shadow economy with 34.5%, followed by Bulgaria with 26.3%, and Romania with 26%. The lowest figures are for the Czech Republic with 13.4% and Slovakia with 14.2%. The Johnson et.al. figures show an average shadow economy of Central and Eastern Europe states of 22.4% over 1990-1993 and 25.1% in the year 1994/1995. For the year 1994/1995 again Macedonia has the highest shadow economy with 40.3% in % of GDP, followed by Bulgaria with 32.7% and Hungary with 28.4%.

Using the DYMIMIC method for these 10 Central and Eastern European countries I get the result that in the year 2002/2003 Macedonia has the largest shadow economy with 41.2 of official GDP, followed by Bulgaria with 35.9% and Romania with 34.9%. Slovakia and the Czech Republic have the lowest values, with 17.8% and 17.9% of the official GDP, respectively. The average size of the shadow economy of the 10 Central and Eastern European transition countries has increased from 21.1% in the year 1990-1992 to 28.3% in 2002/2003 to 23.8% in 1994/95 to 28.2% in 2002/2003; an increase of 7.5 percentage points over the period 1990/1992 to 2000/01. If one summarizes these findings one realizes that the shadow economy has strongly increased in the 90s in all 10 transition countries but since 2000 it is staggering or slightly decreasing for most of there 10 countries.

If I now turn to the development of the size of the shadow economy of Serbia/Montenegro the values are shown in table 2.3.

Table 2.3

For the year 1990-1992 the estimates of the shadow economy of Serbia/Montenegro is 30.9% using the electricity method by Johnson et.al. (1997). Using the DYMIMIC approach I calculate values of the shadow

economy over the period 1990 to 2003. The size of the shadow economy strongly increased from 23.6% in 1990-1992 up to 29.1%in 1999. This means an increase of 5.5 percentage points over 10 years. From 1999 on the size of the shadow economy of Serbia/Montenegro is staggering or slightly decreasing to 28.1% in 2001 and to 27.6% in 2003.

2.3. The Development of Some Cause and Indicator Variables in Serbia/Montenegro

In order to give some plausible explanation for the development of the Serbian/Montenegro shadow economy and some background information about the development of the size of the shadow economy in Serbia/Montenegro the development over time of some "key" cause and indicator variables is shown and discussed: In table 2.4 the development of the unemployment (in persons and the rate) in Serbia/Montenegro is presented.

Table 2.4

If one compares the period from 1995 to 2002 total unemployment decreased from 609.000 in 1995 to 480.000 in 2000 with a slight increase to 517.000 in 2002. In principal, unemployment fluctuated around 600.000 up to the year 1998, dropped in the year 1999 to 527.000 and to 480.000 in the year 2000. A similar movement takes place, considering the unemployment quota; here the fluctuation is even less pronounced than in the case of unemployment measured in persons. It varies between 13.4% in the year 1995 and 13.8% in the year 2002 with the lowest value of 12.6% in the year 2000. A similar movement can be shown looking at the unemployment quote of men and women. Hence, over this period 1995 to 2002 the labour market was not in equilibrium but huge fluctuations over this period could not be observed.

If we now turn to the development of the total employment which is shown in table 2.5, again we find a similar picture.

Table 2.5

Between 1995 and 1998 total employment varied between 3.8 and 3.9 million people. From the year 1999 on it went down to 3.3 million people and stayed almost stable at this value up to 2002. A similar drop can be observed in the total employment of male and female, if one looks at the values of table 2.5. In table 2.6 the labour force potential for the year 2002 is shown.

Table 2.6

It has the usual pattern for developing countries. In the age groups of 25 and 34, of 35 and 44, and 45 and 54 the largest labour force potential can be observed.

If we now turn to the development of GDP per capita in constant and current prices one realizes a somewhat higher fluctuation but only for certain years.

Table 2.7

In the years 1999 and 2000 the GDP in national currency at constant prices had it lower values with 14.000 and 15.000 Dinar and then rose again to 18.000 Dinar in the year 2004, a value slightly higher then the one of the year 1998. A similar movement can be shown if one calculates the GDP in USD at current prices with the exception that the GPD has it´s highest value in the year 2003 and 2004. The positive development (increase) of GDP per capita over time is certainly one reason for the staggering size of the shadow economy over the last 4 years.

If we finally turn to the tax structure of Serbia/Montenegro one realizes relative high indirect tax rates like a value added tax of 17% or 20% from this year on. Also a turnover tax of 20% and an interest tax of 20%. The cooperate and

income taxes are rather modest. In general, the development of these cause and indicator variables provides some explanations, why the Serbian and Montenegro shadow economy decreased from 29.1% in 1999 to 27.6% in 2003, because the development of the official economy improved.

Table 2.1: DYMIMIC Estimation of the Shadow Economy of 10 Central and East European Countries, Years 1990/92, 1994/95, 1999/2000 and 2002/2003

Cause Variables	**Estimated Coefficients**
Share of direct taxation (in % of GDP)	λ_1 = 0.480* (2.94)
Share of indirect taxation + custom duties (in % of GDP)	λ_2 = 0.372* (2.31)
Burden of state regulation (share of public administrative employment in % of total employment)	λ_3 = 0.091 (1.03)
Unemployment quota	λ_4 = 0.303* (3.09)
GDP per capita	λ_5 = -0.194* (-3.01)
Indicator Variables	**Estimated Coefficients**
Employment quota (in % of population 18-64)	λ_6 = -0.641* (-4.39)
Annual rate of GDP	λ_7 = -1.00 (Residuum)
Change of currency per capita	λ_8 = 0.361* (2.88)
Test-statistics	RMSEA[1)] = 0.000* (p-value = 0.619) Chi-square[2)] = 309.41 (p-value = 0.00) N = 40 D.F.[3)] = 28

Notes:
t-statistics are given in parentheses ( ); * (*) means | t-statistics | > 1.96 (| t-statistics | > 1.72).
[1)] p-value for test of close fit; RMSEA < 0.05; the p-value varies between 0.0 and 1.0.
[2)] If the structural equation model is asymptotically correct then the matrix S (sample covariance matrix) will be equal to $\Sigma(\theta)$ (model implied covariance matrix). This test has a statistical validity if there are large sample ($N \geq 100$) and multi normal distributions both is given for a all three equations in table 3.1 to 3.3 using for a test of multi normal distributions.
[3)] 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.

Table 2.2: The Size of the Shadow Economy in 10 Transition Countries						
Transition Countries	Size of the Shadow Economy (in % of GDP)					
	Physical Input (Electricity) Method Using Values from Johnson et. al. (1997)		DYMIMIC Method			
	Average 1990-93	Average 1994-95	Average 1990-92	Average 1994/95	Average 2000/01	Average 2002/03
Central and Eastern Europe						
1. Bulgaria	**26.3**	**32.7**	**25.1**	**28.4**	**36.4**	**35.9**
2. Croatia	**23.5**	**28.5**	**22.5**	**25.1**	**32.4**	**31.4**
3. Czech Republic	**13.4**	**14.5**	**12.2**	**14.2**	**18.4**	**17.9**
4. Hungary	**20.7**	**28.4**	**18.4**	**21.0**	**24.4**	**24.1**
5. Macedonia	**34.5**	**40.3**	**31.9**	**34.6**	**40.5**	**40.8**
6. Poland	**20.3**	**13.9**	**19.2**	**23.2**	**27.4**	**26.3**
7. Romania	**26.0**	**28.3**	**24.3**	**27.4**	**33.4**	**33.9**
8. Serbia/Montenegro	**30.9**	**33.4**	**23.6**	**25.1**	**28.4**	**27.8**
9. Slovakia	**14.2**	**15.2**	**13.1**	**14.7**	**18.3**	**17.8**
10. Slovenia	**22.4**	**23.9**	**20.9**	**23.8**	**26.7**	**26.1**
Unweighted Average: Central and Eastern European Countries	***23.2***	***25.9***	***21.1***	***23.8***	***28.6***	***28.2***

Sources: Own calculations using the DYMIMIC method and values using the Physical input method are from Johnson, Kaufmann, and Shleifer (1997, table 1, p. 182-183), Johnson, Kaufmann, and Zoida-Lobatón (1998a, p. 351).

Table 2.3. Estimation of the Shadow Economy (in % of GDP at market prices) using the DYMIMIC approach for the year									
Country	**Johnson et.al. (1997) (Physical input method)**	**DYMIMIC**							
	Average 1990-1993	**1990-92**	**1994/95**	**1999**	**2000**	**2001**	**2002**	**2003**	**Average 1989-2003**
Serbia/Montenegro	**30.9**	**23.6**	**25.1**	**29.1**	**28.7**	**28.1**	**28.0**	**27.6**	**28.3**

Source: Own calculations and Johnson et.al. (1997).

Table 2.4: Development of the Unemployment Rate in Serbia and Montenegro over 1995 to 2002

Unemployment [1) 2)]	1995	1996	1997	1998	1999	2000	2001	2002
Total (Persons)	609.269 [3)]	598.554 [4)]	613.106	616.962	527.962 [5)]	480.520	490.213	517.287
Male (Persons)	287.984 [3)]	294.455 [4)]	310.814	303.406	248.943 [5)]	223.563	242.531	261.466
Female (Persons)	321.285 [3)]	304.099 [4)]	302.292	313.556	279.019 [5)]	256.957	247.682	255.821
Rate, total	13,4 [3)]	13,2 [4)]	13,8	13,7	13,7 [5)]	12,6	12,8	13,8
Rate, male	11,3 [3)]	11,3 [4)]	12,2	11,8	11,7 [5)]	10,6	11,1	12,4
Rate, female	16,1 [3)]	15,6 [4)]	16,1	16,1	16,2 [5)]	15,2	15,0	15,8

Notes: [1)] October of each year [2)] Persons of age from 15 and older. [3)] Average of the values of March and September. [4)] Value of May. [5)] Beginning of the year 1999 (averaged).

Source: Labour force survey; in ILO, Geneva (CH); http://laborsta.ilo.org**, Download May 12, 2004**

Table 2.5: Total Employment in Serbia and Montenegro

Total Employment [1) 2)]	1995	1996	1997	1998	1999	2000	2001	2002
Total (Persons)	3.947.254 [3)]	3.949.330 [4)]	3.821.844	3.891.939	3.325.017 [5)]	3.323.985	3.349.953	3.220.797
Male (Persons)	2.268.038 [3)]	2.307.610 [4)]	2.241.792	2.259.899	1.882.262 [5)]	1.889.080	1.941.814	1.853.386
Female (Persons)	1.679.216 [3)]	1.642.169 [4)]	1.580.052	1.632.040	1.442.755 [5)]	1.434.905	1.408.139	1.367.411

Notes: [1)] October of each year [2)] Persons of age from 15 and older. [3)] Average of the values of March and September. [4)] Value of May. [5)] Beginning of the year 1999 (averaged)..

Source: Labour force survey; in ILO, Geneva (CH); http://laborsta.ilo.org**, Download May 12, 2004**

Table 2.6: Labour Force Potential in Serbia and Montenegro, October 2002, According to Age

Age	Montenegro	Serbia	Sum of Montenegro and Serbia
15 - 24	28.891	196.164	225.055
25 - 34	50.037	583.345	633.382
35 - 44	75.886	667.102	742.988
45 - 54	70.789	842.773	913.562
55 - 64	9.451	225.981	235.432
65 +	253	7.857	8.110
Total 15 +	**235.307**	**2.523.222**	**2.758.529**

Source: ILO, Geneva, 2004.

Table 2.7: GDP per Capita at constant and current Prices; 1998 – 2004; Serbia/Montenegro

Variable – Description	Currency	1998	1999	2000	2001	2002	2003 [1)]	2004 [2)]
GDP per Capita at constant Prices	**National Currency (Dinar)**	17.999,631	14.326,368	15.098,587	15.948,127	16.604,226	17.247,670	18.088,344
GDP per Capita at constant Prices	**National Currency (US-Dollar)**	1.708,750	1.349,320	1.421,846	1.500,578	1.561,700	1.621,451	1.700,043
GDP per Capita at current Prices	**US-Dollar**	1.708,750	1.219,827	1.031,263	1.389,494	1.884,283	2.506,099	2.625,909
GDP per Capita at current Prices	**National Currency (Dinar)**	17.999,631	23.034,993	45.751,738	92.632,272	120.987,898	147.128,060	168.031,911

Source: World Economic Outlook Database (WEO; September 2003), International Monetary Fund; http://www.imf.org; Download May 12, 2004

[1)] Preliminary Values [2)] Forecast

Table 2.8: Tax Rates and Tax Structure in Serbia/Montenegro; Year 2004

Tax	in %	Notes
Corporate tax	14,0	
Wage tax	14,0	
Income tax	17,5	
Value added tax	17,0	so far only in Montenegro
	20,0	effective from the middle of 2004 in Serbia
Turnover tax	20,0	Standard Rate
Withholding tax	20,0	
Property tax	0,25	
Property acquisition tax	5,0	

Source: Raiffeisen Landesbank http://www.raigate.at/downloads/rlb/folder_serbien.pdf**, S. 6 download: May 12, 2004**

3. Three Methods to Estimate the Size of the Shadow Economy

It is well known that undertaking attempts to measure the size of the shadow economy is a difficult and challenging task. Everybody knows, that no method is perfect, and all have their weaknesses and strengths. The three methods which I presented and used in this paner, are now shortly presented and discussed, so that the reader can make himself a judgement how reliable these estimates are. It is really not so easy to undertake this challenging task to estimate the size and development of the shadow economy in these 10 transition countries. Hence, this chapter should give the reader an impression about these difficulties.

3.1. The Physical Input (Electricity) Approach: The Lackó-Method

Lackò's approach (1998, p.133) can be described by the following two equations:

(1) $\ln Ei = á1 \ln Ci + á2 \ln PRi + á3\, Gi + á4\, Qi + á5\, Hi + ui$

with $á1 > 0, á2 < 0, á3 > 0, á4 < 0, á5 > 0$

(2) $Hi = â1\, Ti + â2\, (Si - Ti) + â3\, Di$

with $â1 > 0, â2 < 0, â3 > 0$

where

i: the number assigned to the country,

Ei: per capita household electricity consumption in country i in Mtoe,

Ci: per capita real consumption of households without the consumption of electricity in country i in US dollars (at purchasing power parity),

PRi: the real price of consumption of 1 kWh of residential electricity in US dollars (at purchasing power parity),

Gi: the relative frequency of months with the need of heating in houses in country i,

Qi: the ratio of energy sources other than electricity energy to all energy sources in household energy consumption,

Hi: the per capita output of the hidden economy,

Ti: the ratio of the sum of paid personal income, corporate profit and taxes on goods and services to GDP,

Si: the ratio of public social welfare expenditures to GDP, and

Di: the sum of number of dependants over 14 years and of inactive earners, both per 100 active earners.

Lackó proceeds in the following way:

1) In a cross-country study she econometrically estimates equation (1) substituting Hi by equation (2).
2) The econometric estimation results can then be used to establish an ordering of the countries with respect to electricity use in their shadow economies.
3) For the calculation of the actual size (value added) of the shadow economy, Lackò should know how much GDP is produced by one unit of electricity in the shadow economy of each country. Since such data is not available she takes the result of one of the known shadow-economy estimations, carried out for a market economy for the early 1990s through another approach, and applies this proportion to the other countries.
4) Lackò uses the shadow economy of the United States as such a base - the shadow economy value of 10.5 percent of GDP taken from Morris(1993); then she calculates the size of the shadow economy for other countries.

3.2. The Physical Input (Electricity) Approach: The Kaufmann-Kaliberda-Method

To measure overall (official and unofficial) economic activity in an economy, Kaufmann and Kaliberda (1996) assume that electric-power consumption is regarded as the single best physical indicator of overall economic activity. Overall (official and unofficial) economic activity and electricity consumption have been empirically observed throughout the world to move in lockstep with an electricity/GDP elasticity usually close to one. By having a proxy measurement for the overall economy and subtracting it from estimates of official GDP, Kaufmann and Kaliberda derive an estimate of unofficial GDP. This means, that Kaufmann and Kaliberda suggest, that the growth of total electricity consumption is an indicator for representing a growth of official and unofficial GDP. According to this approach, the difference between the gross rate of registered (official) GDP and the cross rate of total electricity consumption can be attributed to the growth of the shadow economy.

3.3. Criticism of Both Methods

Both methods are very simple and appealing, however, they can be criticized on five grounds:

(i) Not all shadow economy activities require a considerable amount of electricity (e.g. personal services), and other energy sources can be used (gas, oil, coal, etc.), so that only a part of the shadow economy will be captured.

(ii) Shadow economy activities do not take place only in the household.

(iii) Over time, there has been considerable technical progress. Both the production and use of electricity are more efficient than in the past, and that will apply in both official and unofficial uses.

(iv) There may be considerable differences or changes in the elasticity of electricity/GDP across countries and over time.[5)]

(v) It is very difficult to find the most reliable base value of the shadow economy in order to convert the amount of "black" used electricity into a value added figure of the shadow economy.

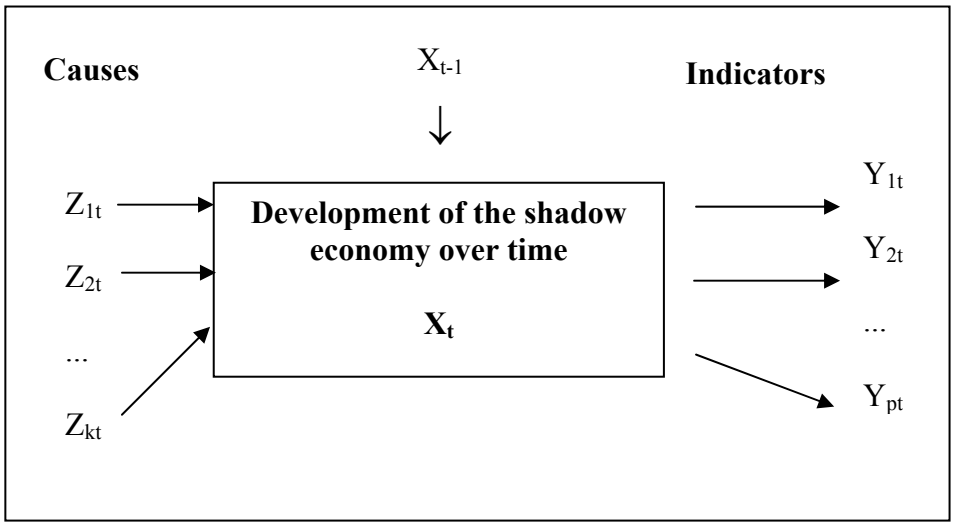
3.4. The Latent Estimation (DYMIMIC) Approach

All methods described so far that are designed to estimate the size and development of the shadow economy consider just one indicator that should capture all effects of the shadow economy. However, it is obvious that these effects show up simultaneously in the production, labor, and money markets. An even more important critique is that the causes which determine the size of the hidden economy are taken into account only in some of the monetary approach studies which usually consider one cause, the burden of taxation. The model approach explicitly considers multiple causes leading to the existence and growth as well as the multiple effects of the shadow economy over time. The empirical method used is quite different from those used traditionally. It is based on the statistical theory of unobserved variables, which considers multiple causes and multiple indicators of the phenomenon to be measured. For the

[5)]Johnson, Kaufmann and Shleifer (1997) make an attempt to adjust for changes in the elasticity of electricity/GDP.

estimation, a factor-analytic approach is used to measure the hidden economy as an unobserved variable over time. The unknown coefficients are estimated in a set of structural equations within which the "unobserved" variable cannot be measured directly. The DYMIMIC (dynamic multiple-indicators multiple-causes) model consists in general of two parts, the measurement model links the unobserved variables to observed indicators. The structural equations model specifies causal relationships among the unobserved variables. In this case, there is one unobserved variable, the size of the shadow economy. It is assumed to be influenced by a set of indicators for the shadow economy's size, thus capturing the structural dependence of the shadow economy on variables that may be useful in predicting its movement and size in the future. The interaction over time between the causes Zit (i = 1, 2, ..., k) the size of the shadow economy Xt, and the indicators Yjt (j = 1, 2, ..., p) is shown in Figure 1.

Figure 1: Development of the shadow economy over time.



There is a large body of literature[6)] on the possible causes and indicators of the shadow economy, in which normally the following three types of causes are distinguished[7]:

Causes

(i) The burden of direct and indirect taxation, both actual and perceived: a rising burden of taxation provides a strong incentive to work in the shadow economy.

(ii) The burden of regulation as proxy for all other state activities: it is assumed that increases in the burden of regulation give a strong incentive to enter the shadow economy.

(iii) The „tax morality" (citizens' attitudes toward the state), which describes the readiness of individuals (at least partly) to leave their official occupations and enter the shadow economy: it is assumed that a declining tax morality tends to increase the size of the shadow economy.

Indicators

A change in the size of the shadow economy may be reflected in the following indicators:

(i) Development of monetary indicators: if activities in the shadow economy rise, additional monetary transactions are required.

(ii) Development of the labor market: increasing participation of workers in the hidden sector results in a decrease in participation in the official economy. Similarly, increased activities in the hidden sector may be expected to be reflected in shorter working hours in the official economy.

(iii) Development of the production market: an increase in the shadow economy means that inputs (especially labor) move out of the official

[6)] Thomas (1992); Schneider (1994a, 1997, 2005); Schneider and Enste (2002); Pozo (1996); Johnson, Kaufmann and Zoido-Lobatón (1998a, 1998b); and Giles (1999a, 1999b).

[7] In this study the cause variable „tax morality" is missing.

economy (at least partly); this displacement might have a depressing effect on the official growth rate of the economy.

The latest use of the model approach has been undertaken by Giles (1999a, 1999b), by Giles, Tedds and Werkneh (1999), and by Giles and Tedds (2002). They basically estimates a comprehensive (dynamic) DYMIMIC (multiple indicators and multiple causes) model to get a time serious index of the hidden/measured output of New Zealand or Canada, and then estimate a separate "cash-demand model" to obtain a benchmark for converting this index into percentage units. Unlike earlier empirical studies of the hidden economy, they paid proper attention to the non-stationary, and possible co-integration of time serious data in both models. Again this DYMIMIC model treats hidden output as a latent variable, and uses several (measurable) causal variables and indicator variables. The former include measures of the average and marginal tax rates, inflation, real income and the degree of regulation in the economy. The latter include changes in the (male) labor force participation rate and in the cash/money supply ratio. In their cash-demand equation they allow for different velocities of currency circulation in the hidden and recorded economies. Their cash-demand equation is not used as an input to determine the variation in the hidden economy over time – it is used only to obtain the long-run average value of hidden/measured output, so that the index for this ratio predicted by the DYMIMIC model can be used to calculate a level and the percentage units of the shadow economy. Giles latest combination of the currency demand and DYMIMIC approach clearly shows that some progress in the estimation technique of the shadow economy has been achieved and a number of critical points have been overcome.

To estimate the size of the Serbia/Montenegro shadow economy with the help of the DYMIMIC method the following procedure was chosen:

1) The ten countries (mentioned in table 2.1.) were used for cross section time series model for the years 1990/92, 1994/95, 1999/2000 and 2002/03 using the DYMIMIC approach.
2) With the help of Lackó's electricity method one gets estimation of the absolute size and development of the Hungarian shadow economy for the years 1999/00 and 2000/01. With the help of these values of Hungarian shadow economy the relative estimated coefficients of the size of the shadow economy of nine countries using the DYMIMIC approach can be transformed into absolute values. Also the data from the studies of Alexeev and Pyle (2003) and Belev (2003) were used in a similar way.
3) This has been done for the case of Serbia/Montenegro, too. The missing values have been interpolated. Hence, there was no DYMIMIC estimation for the case of Serbia/Montenegro, only.

3.5. Comparison of the Methods

As one can see from sections 3.1. and 3.4. each method has some weaknesses. The weaknesses of the physical input approach have been discussed in section 3.3.. The model or DYMIMIC approach has the biggest weakness that it provides only relative estimates and that one has to use another method to calculate absolute values. I used here values of the size of shadow economy of Lackó from Hungary and values from Alexeev and Pyle and Belev to transform the relative estimated coefficients of the shadow economy to absolute values. Also the model approach has the weakness that quite often this approach provides highly sensitive estimates and if one adds or drops one variable/or data point one might get out quite a remarkable change in the size of the estimated coefficients. Comparing both approaches, I think, I can only recommend to use the DYMIMIC approach with caution, in order to get a better feeling about the

magnitude of the size and development of the shadow economy in Serbia/Montenegro and the other countries.

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