Hidden Economy - An Unknown Quantity?

Comparative Analysis of Hidden Economies in Transition Countries in 1989-1995

by

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Abstract

The study investigates the hidden economy, its size, and related features, in post-socialist countries in the course of transition. Attempt is made to estimate the share of the hidden economy by the household electricity method. According to the results in the post-socialist countries the share of the hidden economy varies between 12% and 67% of the official GDP during 1989-1995. In 1995, the largest share was found for Georgia (57%) and Ukraine(53%), while the smallest shares were in the Czech Republic (22%) and Slovenia (23%). Following a uniform growth in the size of the hidden economy in all countries at the beginning of the transition (1989-1993), stagnation or further increase was experienced in the CIS countries, while an explicit declining tendency could be seen in the rest of countries. In these latter countries, in the course of the whole transition period the development of the hidden economy shows a reversed U shaped curve. The results show that the share of the hidden economy in post-socialist countries is significantly larger than in developed market economies. In countries where transition is characterized by a fast, uninterrupted advancement of reforms, the share of private economy has reached a higher level, while the share of the hidden economy a smaller level compared to laggard reformers. In the latter countries not only the size of the hidden economy but that of the corruption has also grown to a higher level, than in committed reforming countries.

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1 Introduction

In the last 10-15 years more attention has been directed to the hidden economy than before both in the market system and in planned and post-socialist countries.

In **market economies** it was usually increasing budget deficits and the ensuing difficulties that have turned the interest of policy makers and researchers toward this not easily discernible part of the economy. In the **socialist countries**, the hidden economy (or to take another term often used in that system, the second economy) was mostly associated with the pervasive shortage situation. The study of this sector commenced when the deficiencies of the state-owned sector surfaced, and systematic empirical research started to describe the actual working of the state sector and its informal supplements. In **post-socialist societies** the analysis of the hidden economy has been put on the agenda because of the rapid increase of budgetary deficits (partly associated with taxpayers concealing their revenues) and the grave output decline registered in official statistics.

Nowadays, in some of the post-socialist countries (especially the successor states of the Soviet Union) the operation of the economy has run out of control, partly due to the excessively large extent of the hidden economy and the pervasive corruption associated with it. In other post-socialist countries, however, the earlier outbreak of the hidden activities seems to decelerate, although the weight of the hidden economy in these countries is still larger than in established market economies.

One main feature of the hidden economy is that, by the virtue of its nature, its measurement is difficult. Various methods have been worked out in order to determine its size in absolute and relative terms both for market economies and post-socialist countries. None of the competing methods has emerged yet as universally applicable and universally accepted. We are far from having calculations about the size of the hidden economy routinely made for a large number of countries and for a long period of time. To attempt making estimations needs the work of a researcher, rather than a statistician. To choose

from the available supply of methods it would be desirable if they and their results would be comparable. The comparison of the different estimations available from the literature is, however, rather uncertain since these estimations operate with different definitions of the hidden economy and with diverse methods of estimation.

In earlier papers of mine (Lackó 1995, 1996, 1998), I analyzed the methods that had been devised in the literature, took into account the major characteristic features of the hidden economy and worked out a new method, the so-called **household electricity approach.** The main premise for this approach was that in each country a part of the household consumption of electricity is used in the hidden economy. I asserted that the electricity consumption of households in a country was determined by a number of factors, such as the size of the population, the level of development, the country's geographical location (climate), the relative price of electricity, access to other energy sources, plus by the size of the hidden economy. This method turned out to be useful in determining the share of hidden economy in market economies and, after some modifications leading to early estimations about a few post-socialist economies.

By adapting this approach to specificities of countries in transition the present paper makes an attempt at the determination of the share of hidden economy in a large number of post-socialist countries. Furthermore, it analyses the features of the hidden economy's development in time, its country to country differences and its relationship with several visible and measurable characteristics of the given economies.

Section 2 of the paper surveys the definitions of the hidden economy while section 3 briefly summarizes the methods and results worked out assessing the size of hidden activities in market economies. Section 4 deals in detail critically with a specific method, and results achieved with that method for the post-socialist countries. These results were published and became quite popular recently. In section 5 a model is presented to use the **household electricity approach** for the measurement of the share of the hidden economy. In sections 6 and 7 the relationships between various features of transition

(such as corruption, non-hidden private economy) and their relation to the hidden economy are analyzed.

2 Alternative definitions of hidden economy

Different authors give different definitions for the concept of the hidden (underground, shadow, informal, irregular, black, second, etc.) economy. In the widest sense the hidden economy comprises all the economic activities that are not registered (Feige, 1979). This definition in fact covers the activities which are not taken into account in the calculation of the GDP of the country, either they escape registration or by convention. Other scholars use a narrower definition: according to Tanzi (1980) and Macafee (1980) the hidden economy is an economy that generates revenues that the official statistics does not register, although it should .

Following the widest definition Carter (1984) calls the first part of the hidden economy the "informal" economy; this, as a rule, is not covered by the definition of GDP, and accordingly, no attempt is usually made to measure it. Activities belonging to this category include the production in households, do-it-yourself activities, reciprocal transactions between individuals, etc.. (The growing importance of households' production is emphasized by Burns, 1977; Gershuny, 1979; and Mattera, 1985.) The second part is usually called the "underground" economy, and comprises activities that are assumed to be measured but escape official registration or measurement. On the one hand, this category covers the activity of registered economic agents who do not report a part of their income and/or costs in order to evade taxes or circumvent licensing obligations. On the other hand, it covers the operation of non-registered economic agents who do not report their revenue from their production or service activity at all. A large part of the latter category of the underground economy takes place in households or earns revenues directly for households. Households also play a pivotal role as a workplace for important categories of registered business: the self-employed often use their home for work, and also firms providing services for households often exercise their activities on the spot.

The part of the underground economy which is based on breaking fundamental laws (not only compulsory registration and tax payment) is called the “criminal” economy, and lends itself even less to economic analysis.

The borders between the informal and underground economies, as well as between different activities within the underground economy are blurred; different parts of these economies are also strongly interrelated.

3 Estimation methods and their results for mature market economies

In this chapter, the two most commonly used estimation methods for the size of hidden economy and their results are reviewed. Then the so-called household electricity approach developed by the author is presented and the results obtained by this approach are analyzed.

The two most commonly used methods for the estimation of the extent of hidden activities in OECD countries are the **currency demand approach** and the **soft model approach**. The **currency demand approach** assumes that hidden transactions are compensated in the form of cash payments, and this results an “excess” demand for currency. This method is applied for each country independently and is based on time-series analysis. The “excess” increase in currency, which is the amount of demand for money unexplained by the traditional factors (development of income, payment habits, interest rates, etc.), is attributed to high tax burden and complicated and strict regulations that encourage economic agents to hide their activities. (For a description of the approach and results obtained with the help of this method see for instance in Marelli, 1984; Lackó, 1992 ;Tanzi and Shome, 1993; and Schneider, 1997).

The **soft modeling method** attempts to take into account several causes and indicators of the hidden economy in the course of estimating the size of the hidden economy. By using

the soft modeling approach Frey and Weck (1984) made a cross-section and time series analysis for 17 OECD countries. In that estimation the following explanatory variables were taken into account: tax rates, burden of regulation by the state (represented by the number of employees in state bureaucracy), tax morality (countries were ranked according to the evidence found in the literature), rate of participation in the official economy, weekly working hours, and the ratio of guest workers to total employed. The system of weights attached to the individual causes and indicators was developed independently from the model. The most significant weight was given to tax rates, then descending weights were applied to tax morality, burden of regulation by the state, participation rate, working hours, and the ratio of guest workers to non-guest workers.

Table 1 presents results of estimations obtained by the use of different approaches. The creators and advocates of both methods themselves admit that there are several weak points and too strong assumptions that they could not avoid applying. Both methods put great emphasis on the role of tax rates. The currency demand approach uses only the tax rates as the proxies of hidden economy and does not take into account characteristics of the labor market. Meanwhile, the soft model approach, although taking into consideration various features of the labor market, supplies the weight of the individual proxies from outside its model and that quite arbitrarily. At the same time, this latter method is based on cross country analysis and so it ensures certain consistency and comparativity between the countries.

The approach reviewed in the following, the so-called **household electricity approach** has cross-sectional features, too (see in detail in Lackó, 1998). It endeavors to determine the share of the hidden economy in 19 OECD countries with the help of a single model. The weights of the proxies of hidden economy, however, are given by the model itself through an endogenous way.

The method is based on an econometric model which uses data of developed market economies. The first premise for the model is that in each country a part of the household

consumption of electricity is used in the hidden economy. We asserted that the electricity consumption of households in a country was determined not only by such visible factors as the size of population, level of development, the country's geographical location (climate), the relative price of electricity, and access to other energy sources, but also by the extent of the hidden economy.

In the model the hidden economy is represented by three proxy variables: the tax/GDP ratio, the inactive/active labor ratio, and the ratio of public social welfare expenditure to GDP. The first two proxies represent well-known relationships: the higher these ratios, ceteris paribus, the higher the share of the hidden economy. Higher shares of taxes encourage more activities to move to the hidden (and untaxed) part of the economy, while the larger the relative size of inactive population the larger the pool of labor which can be utilized in the hidden economy. The third indicator is related to the enforcement of taxes: the higher the third ratio, the stronger efforts are made by the state to collect outstanding taxes, and this decreases the size of the hidden economy.

The parameters of the model were estimated on a cross-section of the countries through a panel data base made up of data for 1989-1990. The estimated parameters proved to be significant, their signs coincided with the expected ones. Accordingly, the results supported the assumptions about the determinants of household electricity consumption, including the impact of the hidden economy. After the estimation of the parameters of the model residential electricity consumption could be decomposed into two parts, one related to the hidden economy and one related to a number of other factors. Thus indicators were created for each country showing the per capita household consumption of electricity related to the hidden economy as a share of total per capita household electricity consumption. The results of this exercise aimed to determine the contribution of the hidden economy to GDP in the individual countries. However, without the knowledge of how much of GDP was produced by one unit of electricity in the hidden economy in each country the share of the hidden economy in the GDP could not be calculated. Since these data was not available an indirect conversion method had to be used.

This method was rather rudimentary: the results of one of the estimations known from the literature were taken as benchmark (a calculation carried out for a single country for the early 1990s), and the other countries' data (their index of hidden economy expressed in terms of residential electricity consumption) were proportioned to this base country. (This conversion method was applied by Frey and Weck ,1984 too.)

The results of this calculation are presented in the third column of Table 1. In Lackó (1998) it was shown, too, that the results did not contradict to the commonly accepted and used assumption, that the size of the hidden economy affects the currency ratio: a cross country currency demand function was built up, which contained the index of the hidden economy (taken from results of the model based on the electricity approach) as an explanatory variable beside the traditional factors (interest rates, inflation rate, velocity of broad money).

The comparison of the results produced by the currency demand approach and the household electricity approach for 14 countries for the year 1990 shows that in the case of ten countries the results were quite near to each other (+ - 3.5%), (see Table 1). However, in the case of four countries (Austria, Ireland, Sweden and Norway) the difference was considerable. In Sweden and Norway a much smaller share of the hidden economy was estimated by the household electricity approach. The reason for this was that not only a characteristic feature of labor market (i.e. low nonactive/active ratio in these countries) was taken into consideration in the electricity based model, but also that tax enforcement activities in these countries were stronger (at least according to the proxy chosen by us). In the case of Austria and Ireland the situation is exactly the opposite to that experienced with Sweden and Norway: these countries were characterized by higher inactivity ratios and this was reflected in the larger share of their hidden economy, too.

4 Estimation method for the post-socialist countries: the Kaufmann-Kaliberda method

A recent attempt to measure the unofficial economy across a large number of transition economies was carried out by Kaufmann and Kaliberda (1996).

Kaufmann and Kaliberda tried to find a variable that is very closely related to the development of GDP everywhere in the world. Based on the investigations by Dobozi and Pohl (Dobozi and Pohl, 1995, Dobozi, 1995), Kaufmann and Kaliberda suggest that the growth of *total* electricity consumption is the right indicator for representing the growth in GDP. According to this approach, the difference between the growth rate of registered GDP and the growth rate of total electricity consumption can be attributed to the growth of the hidden economy. This method is very simple and appealing, however, as Dobozi and Pohl as well as Kaufmann and Kaliberda confess themselves, there are people who are skeptic towards this method:

"Although our article was generally welcomed as being on the right track to obtain more reliable - and certainly low-cost - estimates of the extent of output retrenchment during the systemic transition, some skeptics argued that while power consumption and economic activity tend to move in tandem in market economies, it may not be relevant for transition economies that are experiencing rapid and massive structural changes. Many argue, that the increase in electricity consumption may reflect structural movement toward higher electricity intensity in GDP." (Dobozi, 1995, page 19)

The analysis in the EBRD Transition Report 1997 based on Kaufmann and Kaliberda also states: "There are a number of reasons why this relation between electricity demand and GDP may not hold during transition. Due to price liberalization, increased energy efficiency and shifts away from energy-intensive sectors, electricity demand may drop during the upswing. At the same time, inefficiencies resulting from higher overheads during capacity under-utilization, lack of basic maintenance due to shortage of funds, and

substitution away from other sources of energy to electricity would tend to push up energy demand. Particularly where recorded output falls have been very large, such as in CIS, enterprises may be unable to reduce electricity consumption commensurately, even without additional unofficial production." (EBRD, 1997, p.74)

According to these considerations, Kaufmann and Kaliberda adjust the income elasticity of the demand for electricity to 0.9 in East-European countries, to 1.15 in the CIS, while in the Baltic countries electricity elasticity is left to be 1.

Table 2 shows the shares of the hidden economy in the shares of the *total* (offical+unofficial) GDP estimated by the Kaufmann-Kaliberda method available in Johnson, Kaufmann and Shleifer (1997). These shares are worth checking by expressing them in terms of percentages of the official rather than *total* GDP (see Table 3). The shares of the initial year, 1989, come from various earlier estimations (Alexeev et al(1987), Arvay and Vértes (1994), Johnson, Kaufmann and Shleifer (1997)).

Looking over the results in Table 3 the author of this paper keeps belonging to the skeptics, despite the fact that she herself is an advocate of the approach that uses indicators of electricity consumption for the estimation of the share of the hidden economy in GDP (see Lackó, 1995,1996, 1998).

Firstly, the skepticism arises from the order of magnitude of the ratio of the hidden economy to the official GDP. Is it possible that in Ukraine just as much was produced in the hidden economy in 1995 as in the total non-hidden (official) economy? At least this is suggested by the 96% share of hidden economy in Ukraine in 1995. The shares proposed for Hungary also contradict other surveys and estimations (Arvay and Vértes, 1994, Ékes, 1993). According to these latter estimations, the share of hidden economy as a percentage of the official GDP was 26-32 % in the early 1990s as opposed to the 37-49% which result from the numbers presented by Kaufmann and Kaliberda.

My skepticism derives from several other factors, too. One cannot avoid asking: how is it possible that according to the calculations of Kaufmann and Kaliberda, the hidden economy did not grow in Romania or Uzbekistan during the years of transition, while in other countries the size of the hidden economy seems to grow very rapidly? It is also surprising, that in 1994 and 1995 the ratio of the unofficial economy in the GDP is much smaller in Slovakia than in the Czech Republic (i.e. in the eastern part of former Czechoslovakia there would be half the size of unofficial economy than it is its western part). The ratio of the unofficial economy in Poland also seems too low to me when comparing to other reform countries and to anecdotal evidence. One may question the validity of this method not only based on the examples of post-socialist countries, but also in view of calculations made on market economies. Applying the Kaufmann-Kaliberda method for Finland, where between 1990 and 1993 GDP decreased by 13.6%, while total electricity consumption far from decreasing, increased by 5.5% , the hidden economy should have increased from 11% to 30% (see Lackó, forthcoming). This result suggest an extraordinary increase in the share of the hidden economy in Finland, that is far from plausible.

In my earlier paper (Lackó, forthcoming), with the help of statistical and econometric analysis on data for 18 post-socialist countries I showed that the measured and registered structural changes are sufficient to explain the changes in *total* electricity intensity in this region, i.e. the change in the size of unofficial economy is not needed for this explanation.

It became clear that the inherited structure of production is also an important factor in determining total electricity consumption: for example in Uzbekistan and in Romania the inherited structure played a major role in the large decline in the electricity intensity. In the mid-1980s, Romania had had by far the largest petrochemical sector in Eastern Europe. Between 1989 and 1992 this industrial branch virtually collapsed: its output decreased by 50%. Due to the high electricity use of petrochemical industries this single specific development has contributed to a large extent to the decline in Romania's total electricity intensity. (See OECD ,1993)

In the case of Uzbekistan it is also the heritage from the past that explains the country's outlier position. During the Soviet era, Uzbekistan became the cotton-growing center of the Soviet Union. The development of basic industries was neglected and the republic was among the least industrialized ones in the USSR (Ebel, 1997). Cotton accounts for 70% of the country's exports, and 50% of its GDP. Exactly because of this reliance on a single commodity, Uzbekistan was barely struck by the transformational recession and thereby the country's electricity intensity did not grow, either. The latter was also connected to the fact that Uzbekistan alone from all the republics of the former Soviet Union managed to increase its oil and gas production in the first years of the transition. Therefore, currently it has control over more energy sources than before the transition, thereby capable of substituting those for electricity.

In sum, it is the structural differences and their rapid changes that has had a dominant impact on total electricity consumption in these countries and its relation to the registered GDP in the course of the transition, and not the hidden economy.

In the following a model-calculations is shown which try to asses the size and development of the hidden economy in transition countries. Special attention is given to avoid the detected deficiencies in the Kaufmann-Kaliberda approach. It investigates 10 countries (Bulgaria, Czech Republic, Croatia, Hungary, Poland, Romania, Russia, Slovak Republic, Slovenia, Ukraine) in the period of 1990-1995. It uses the so-called **household electricity approach** which avoids the problem of inherited structure of the economies and its rapid adjustment in the transition period.

5 Model to determine the share of hidden economy in post-socialist countries: household electricity approach

This model estimates the size of the hidden economy of post-socialist countries using the approach of household electricity consumption. The method assumes that the hidden economy is present in all sectors of the economy, including households. A large part of non-registered economic agents work in households or earn revenues directly for households. Households play a pivotal role as a working place also for important categories of registered business: self-employed often use their home for work, and firms providing services for households also often exercise their activities on the spot.

Equation (1) describes the impact of factors that determine household electricity consumption:

$$\ln ER_{ij} = a_1 lnC_{ij} + a_2 AG_{ij} + a_3 G_{ij} + a_4 Q_{ij} + a_5 PR_{ij} + a_6 H_{ij} + a_7 \qquad (1)$$
$$a_1 \geq 0, a_2 \leq 0, a_3 \leq 0, a_4 \leq 0, a_5 \leq 0, a_6 \geq 0$$

where

i: country

j: year

ER_{ij}: per capita household electricity consumption in country i in year j (kWh)

C_{ij}: per capita real consumption of households (at purchasing power parity)

AG_{ij}: the share of GDP in agriculture in total official GDP

G_{ij}: index for weather-differences = the relative frequency of months with the need of heating in houses (under 10°C) multiplied by the average temperature in January

Q_{ij}: the share of energy sources other than electric energy to all energy sources in household energy consumption

PR_{ij}: real price of consumption of 1 kWh residential electricity in US Dollar (at exchange rate)

H_{ij}: per capita output of the hidden economy

Equation (1) shows that per capita residential electricity consumption is higher, ceteris paribus, the higher is the per capita private consumption, the lower is the share of agriculture in GDP, the lower value is taken by the weather index, the lower is the share of other energy sources, the lower is the price of residential electricity and the higher is the size of the hidden economy.

Equation (2) of the model describes the effect of the factors that determine the hidden economy:

$$H_{ij} = \beta_1 TL_{ij} + \beta_2 TC_{ij} + \beta_3 D_{ij} + \beta_4 I_{ij} + \beta_5 EX_{ij}$$
$$\beta_1 \geq 0, \beta_2 \geq 0, \beta_3 \geq 0, \beta_4 \geq 0, \beta_5 \gtrless 0 \qquad (2)$$

where

TL_{ij}: tax rates on labor income in country i in year j

TC_{ij}: tax rates on capital income in country i in year j

D_{ij}: output decline since 1989: $D_{ij}=1-(GDP_{ij}/ GDP_{i1989})$

I_{ij}: annual inflation rate of consumer prices

EX_{ij}: general government expenditure, per cent of GDP

In equation (2) the first two explanatory factors represent the **tax rates** on labor income and on capital income which, ceteris paribus, increase the size of the hidden economy.

Tax rates levied on labor income (wage income taxes and social security contributions) influence both the employees' decisions about how much labor to supply and the employers' decisions how much labor to employ in the official economy. Taxes on corporations also influence decisions about where it is worth to start-up a business, whether in the official or in the unofficial economy.

It is worth reviewing the results of calculations about tax rates on labor income and on capital income that were published in the EBRD Transition Report of September 1993 (EBRD, 1993). (See Table 4).

From Table 4 it can clearly be seen that in some transition countries taxes on labor income are especially high (these are Poland, Slovenia, Ukraine, Slovakia, Czech Republic, Belarus, Hungary and Croatia), while taxes on capital income compared to the USA are high everywhere, in particular in the successor countries of the Soviet Union. It is also worth mentioning that in most of the countries where taxes on labor income are high taxes on capital income are relatively smaller (exceptions are Croatia and Ukraine where both rates are large). Seeing this generally high level of taxes we have good reason to suppose the relative level of taxes has significant effects on the level of economic activity in the official economy, probably in the way that the heavier the tax burden, the greater are the incentives for tax evasion or disincentives to work and invest.

In the early 1990s, in the transition economies the radical change in the structure of the ownership (the decrease of state ownership and the increase of private ownership) made taxes to important sources of budgetary revenues. This implied that registered business has become obliged to pay taxes; hence incentives emerged for concealing business activities. Since due to the heavy output decline a large proportion of labor was forced to leave traditional employment and wage earners generally suffered a drastic drop in compensation, there were many ways formerly employed citizens attempted to substitute for their earlier source of revenue. One common way for this was joining the hidden economy.

The third explanatory factor in equation (2) is the **output decline**. In the early 1990s, the transition economies suffered a dramatic decline in their aggregate output. The size of decline differs considerably from country to country. This *decline in registered output* occurred mainly due to the fall and structural shift in demand which made the production in certain industries superfluous and called for lengthy adjustments in others. The decline

occurred, however, also because certain features of the emerging market economy made concealed production beneficial.

In equation (2) the coefficient β_3 expresses how households react, ceteris paribus, to the decline in aggregate output, to what extent survival strategies (such as household production or production and service for sale without registration) are applied by them. We assume that households respond not only to the annual decline in output, but also to the **cumulated** losses since 1989.

The impact of taxes on economic activities is exacerbated by **inflation**. In a recent paper Feldstein (1996) quantifies the relative importance of inflation-taxation interactions for economic growth. He finds that even with relatively small price changes the effective tax burden for households and business rises sharply as the rate of inflation rises, and falls sharply as inflation declines. This justifies the use of inflation in equation (2).

The effect of **general government expenditure** is twofold. On the one hand its increase can have a positive effect on the size of the hidden economy since it means an increasing role of the state which can crowd out start-ups in the (official) private sector. On the other hand, if we take into account the function of the state as a controller, the increase of general government expenditures may have a negative effect on the hidden economy; the growth of these expenditures may supply more efforts to fight crime and corruption which, ceteris paribus, distract actors from activities in the hidden economy.

In the investigated countries and for the time period for which data are available, the size of the hidden economy can be obtained with the help of an econometric estimation of the parameters of equations (1) and (2). The model's H_{ij} variable is a latent one: we do not have well-defined regular empirical observations about it. Therefore, the estimation of the parameters of the model can only be accomplished indirectly. By substituting (2) into (1) we get (3):

$$\ln ER_{ij} = \gamma_1 \ln C_{ij} + \gamma_2 AG_{ij} + \gamma_3 G_{ij} + \gamma_4 Q_{ij} + \gamma_5 PR_{ij} + \gamma_6 TL_{ij} + \gamma_7 TC_{ij} + \gamma_8 D_{ij} + \gamma_9 I_{if} + \gamma_{10} EX_{ij} + \gamma_{11}$$

$$\gamma_1 = \alpha_1, \gamma_2 = \alpha_2, \gamma_3 = \alpha_3, \gamma_4 = \alpha_4, \gamma_5 = \alpha_5, \gamma_6 = \alpha_6 \beta_1, \gamma_7 = \alpha_6 \beta_2, \gamma_8 = \alpha_6 \beta_3, \gamma_9 = \alpha_6 \beta_4, \gamma_{10} = \alpha_6 \beta_5$$

(3)

Following the estimation of the parameters of (3) we can calculate the index that shows how much household electricity is used in the hidden economy of the individual countries in the given years.

$$h_{ij} = \frac{\gamma_6 TL_{ij} + \gamma_7 TC_{ij} + \gamma_8 D_{ij} + \gamma_9 I_{ij} + \gamma_{10} EX_{ij}}{\ln ER_{ij}} \qquad (4)$$

5.1. The estimation of the model

A fully satisfactory estimation of the model is impeded to a large extent by the constraint that data are only partially available. In the ideal case, the parameters of the model could be estimated with the help of data for 24 transition countries and in every country for 6 years. Due to the lack of various data we could attempt making the estimation for 10 countries only (Bulgaria, Croatia, Czech Republic, Hungary, Poland, Romania, Russia, Slovak Republic, Slovenia and Ukraine) with the help of annual data of the years 1990-1995. A further problem of data availability is, however, that uniform and comparable data for tax rates for the investigated countries are available for only one year (1993) instead of

the investigated six years. The variable of tax rates had to be substituted by a variable we assumed to be correlated with tax rates and which was available for all the investigated countries and for all years. Based on these considerations tax rates on labor income could be substituted by the ratio of *general government revenue compared to the GDP*.

According to the data that we investigated, the ratio of government revenues to GDP shows a significant positive correlation with tax rates on labor income. Analysis of data for 24 and 10 countries, respectively, illustrates this relationship (see Figures 1 and 2). We have to mention, however, that this substitution inputs some distortion into our calculations. If there was no hidden economy, tax revenues, comprising a large part of government revenues, would be directly proportional to the tax rates. High tax rates, however, cause tax evasion which in turn reduces tax revenues. Therefore, when in the course of our estimation, tax revenues and government revenues are, by necessity, substituted for tax rates, we cannot avoid distorting the model by underestimating the size of the hidden economy. But to tell the truth if we used tax rates, we also could not avoid a distortion by overestimating the size of the hidden economy. This overestimation would occur because statutory tax rates are usually "contaminated" with the effects of tax evasion: statutory rates have often been increased to compensate for the revenue losses associated with tax evasion. It is worth citing Tanzi and Shome (1993) here who recalled the remark that the prominent public finance scholar Luigi Enaudi once made: "If all the Italian tax laws on the books were fully enforced the Italian level of taxation would be 120 percent of national income." (Tanzi and Shome, 1993, page 821)

A further problem is caused by the behavior of tax rates on capital income which contrasts to the behavior of taxes on labor income we found that in the countries concerned: the larger the tax rates were on capital, the smaller were state revenues (compared to GDP). (see Figures 3 and 4)

By reviewing the data carefully it can be seen that the size of output decline was the greatest exactly in those countries where the tax rates on capital income were extremely

high (see Figures 5 and 6). Therefore, we may assume that by including the output-decline in the equations (2) and (3), respectively, the effect of taxes on capital income are taken into account, too.

The econometric estimation of equation (3) was carried out for 10 countries and for the annual data of the years 1990-1995 by the ordinary least squares method. Table 5 contains the estimated parameters, their t-statistics and other results of the analysis of specification of the estimated equation. From the table it can be clearly seen that the tests carried out indicate neither an error of specification, nor distortions caused by heteroscedasticity. The estimated parameters are significant, their signs are as expected. The multicollinearity between the variables were investigated by the correlation between the regressional coefficients. We have to mention that the estimated function has differences in intercept, because our *G* variable is constant over time, and is diffferent across the countries. To test differences in slopes among the countries we ought to have more obvervation in time. We also investigated possibilities for all the possible change points and used the Chow test for that. The values of the Chow test proved to be insignificant. The estimation was also carried out with the generalized least squares method, in which a common autocorrelation parameter was allowed in the time series. The estimated parameters were only slightly different from the parameters obtained by the OLSQ method, and the common AR(1) coefficient for all panels was very low (0.11).

The variable of price (PR_{ij}) is not included in the estimated function, mainly due to the lack of data. Data for the price of household electricity are available only for 5 countries instead of the 10 (Czech Republic, Slovak Republic, Hungary, Poland, Russia). The available data, however, show a close positive correlation with the variables $\ln C_{ij}$ and G_{ij} (correlation coefficients of 0.63 and 0.81 respectively; n=28) variables that are used to explain electricity consumption in the visible economy. Therefore, it can be claimed that these two variables already carry the effect of price within the estimated equation.

In the course of the estimation the variable EX_{ij} (ratio of general government expenditure to the GDP) does not prove to be significant. It was already indicated earlier that in the case of this variable, several effects are play a role which are of contradicting directions: on the one hand a high ratio can indicate a large role of the state in the economy that in turn can crowd out entrepreneurships that would otherwise be active in the non-hidden sphere of the economy (parameter with positive sign). On the other hand, however, the high ratio of the general government expenditure to the GDP can also indicate the increased function of the state as a controller that in turn can deter agents from the participation in the hidden economy (parameter with negative sign). Our calculations indicate that these two effects neutralize each other.

The result of the estimation supports our hypothesis: in the countries concerned and during the investigated years of transition high tax burden, large output decline and high inflation produce an extra consumption of household electricity compared to the electricity consumption that would be explained by the level of private consumption, the ratio of agriculture production in GDP, the need of heating and the share of other kinds of energy.

With the help of the estimated parameters the h_{ij} index can now be calculated which shows the ratio of electricity used in the hidden economy of the individual countries in the given years.

5.2. Calculating the share of the hidden economy in GDP

The estimation in the previous section did not lead to the determination of the hidden economy's contribution to the GDP in the individual countries. For the calculation of this crucial index we need to know, in addition to the results of calculations already accomplished, how much GDP is produced by one unit of electricity in the hidden

economy of each country. We had to face a similar problem when applying the household electricity approach for developed market economies we wanted to measure the share of the hidden economy in GDP (Lackó, 1998). In the course of this calculation, since the same kind of data were not known, we opted for the method followed by Frey and Weck in their study (Frey and Weck, 1984). We took the result (i.e. share of hidden economy in GDP without household production) of one of the known estimations applying another approach that were carried out for a certain market economy, and this proportioned the other countries to this result. According to Morris (1993), in the early 1990s, in the USA the contribution of the hidden economy to GDP was 10-11 percent. In my earlier study I used this result (taking 10.5 percent as a base) to determine the share of hidden economy in GDP for the rest of the investigated market economies. This meant that the relationship between the household-electricity-ratio of the USA coming from the model and the ratio of the hidden economy in GDP, which was 10.5 percent was taken a benchmark ratio. Now, when the so-called household electricity approach is used for transition countries in order to determine the size of the hidden economy without household production, we can use the same benchmark as a converting coefficient. The results are presented in Table 6.

The share of the hidden economy obtained by our calculations is unfortunately rather difficult to compare with other results. Alternative estimations carried out for Hungary for the beginning of the 1990s (Arvay and Vértes, 1994, Ékes, 1993) put this share to 26-32% for 1992 which is in accordance with our results of 26-33%. (This indicates that we could have obtained results similar to those in Table 6 if we hadn't applied the converting coefficient obtained for market economies but if we adopted results from alternative estimations for Hungary as the basis for conversion.)

In the case of Hungary and Poland a modified version of the household electricity approach made for market economies was applied for the year 1990. (see Lackó, 1995,1996, 1998) According to this method, the share of the hidden economy in 1990 was 27% in Hungary and 31% in Poland. These values are also close to the results of the

household electricity approach based on the data of post-socialist countries (Hungary: 26%, Poland: 32%).

Other identities of measure can be observed in the case of Croatia. According to the estimation of Madzarevic and Mikulic (1997), the share of the hidden economy in Croatia was around 38 in 1993, 37 in 1994 and 33% in 1995. In our estimation the corresponding values were 39, 40 and 36%, respectively.

Naturally, it would be misleading to prove the good quality and validity of our approach by these ad hoc correspondences. Nevertheless it is encouraging to find that an estimation for ten post-socialist countries (for a time period of six years for each country) made with unified and identical definition, estimation method and parameters, produces results identical or close to identical with the results of alternative methods.

When looking at Table 6 it can be seen that in the ten countries under investigation, the share of the hidden economy in GDP is between 22% and 55% in the years 1990-1995, and the mean value is 33%. We should recall that in market economies according to the calculations with the household electricity approach for the year 1990 (Table 1), the share of the hidden economy spread between 9% and 23%, and its mean value is approximately 15%. Thus the comparative shares in the transition countries are more than twice of the shares measured in market economies.

In 1995 from the countries included in the sample the largest share of the hidden economy was found in Ukraine (54%) and Russia (40%), followed by Croatia and Bulgaria (34 - 36%), then Hungary, the Slovak Republic and Romania (28 - 30%). The Czech Republic, Slovenia and Poland showed smaller shares of their hidden economy (22 - 24%). These latter shares were approximately the same as found in Spain and Greece in 1990. Spain and Greece were in fact at the head of the list in the sample of developed market economies. It can also be noticed that after a uniform growth (characteristic for all countries) at the beginning of transition the size of the hidden economy in Ukraine, Russia

and Bulgaria the size of the hidden economy stagnates or increases, while in the rest of the countries an explicit declining tendency can be seen since 1993. In course of the transition the hidden economy of these countries moves along a reversed U-shaped curve. It is also worth comparing the size and pattern of development of the hidden economy in the Czech and the Slovak Republics. In the first year after the split the share of the hidden economy in Slovakia jumped by 7 percentage points beyond that in the Czech Republic, and this difference was maintained in the subsequent years.

Before carrying out further analysis we made an additional calculation for assessing the share of hidden economy in GDP. This was an ex post calculation made for the shares of the hidden economy in the course of transition with the help of variables (R_{ij}, D_{ij}, $\ln I_{ij}$) that were included in the estimated form of equation (3).

The parameters obtained for this ex post calculation are the following:

$$H_{ij}/GDP_{ij} = 0.0034 * R_{ij} + 0.534 * D_{ij} + 0.0159 * \ln I_{ij} \qquad (5)$$

Table 7 contains the shares of the hidden economy and their ex post calculations. From this table it can be seen that the original estimations and the ex post calculations are considerably close to each other. The parameters of the ex post calculation above will be used below for an ex ante calculation with the aim to include countries into our analysis which, due to the lack of various data, could not be incorporated in the original sample for the estimation based on electricity consumption.

Variables in (5) explaining the hidden economy (D_{ij}, R_{ij}, I_{ij}) are available for many more post-socialist countries than either the variable of private consumption (C_{ij}) or that of household electricity consumption (Er_{ij}). Without the two latter (C_{ij} and ER_{ij}) no additional country could be included in the original sample.

Now, Table 8 contains the shares of the hidden economy not only for 10 but 20 countries for the period 1989-1995. Numbers that were calculated with the ex post calculation are marked with an asterisk (*). One can notice that while a few shares of hidden economy were missing for the ten countries included in the original sample, they could be calculated by the ex post method and included in Table 8. Thus, a more complete picture could be obtained for both the development and the regional differences of the hidden economy of transition countries.

In order to carry out further comparisons for further checking one can enlarge the circle of the investigated countries and years. In Table 9 we summarize estimations made by the use of other methods for 13 countries for the year 1989.

From the comparison of the two columns in Table 9 we can see that in the case of 9 countries the alternative estimations are similar in order of magnitude (defined as a deviation of 4% or less) to those carried out by us, while in the case of four countries (Bulgaria, the Czech Republic, Slovakia and Romania) the deviation is much larger: in the last year before transition the share of the hidden economy was found much smaller in these alternative estimates in Bulgaria and Romania, and much larger for Slovakia and in the Czech Republic, than in our estimation.

Furthermore it is worth comparing the values obtained for this last year before the transition (1989) with those obtained for various market economies . The share of hidden economy of 12 -17% characteristic for the countries of the former Soviet Union and Romania in our estimation, corresponds in the order of magnitude to the average share in the OECD countries (Lackó, 1998, Schneider, 1997), while the 20 - 25% share experienced in Central-East-European countries corresponds to the values experienced in market economies with a large share of hidden economy (Spain, Greece, Italy and Belgium). This finding seems to contradict the general view that before transition, the hidden economy in socialist countries was of smaller magnitude than in market economies. In the socialist system, especially in its last period, activities in the invisible part of the economy were very much more wide-spread than in an “average” market

economy - this we know well from theoretical analyses (Kornai, 1993) as well as from ample anecdotal evidence.

A further possibility for comparison is between the results obtained from the household electricity approach (Table 8) and the results of Kaufmann and Kaliberda (Table 3). Before this, however, exact meaning of Hungarian data have to be clarified. According to my knowledge, the starting data of the share of the hidden economy presented by Kaufmann and Kaliberda in Table 2 is expressed in the percentage of the *official* GDP: Kaufmann and Kaliberda present their data as if it was in the percentage of the total GDP (rather than the percentage of *official* GDP). So, in the case of Hungary, the comparison has to be made with the adequate row in Table 2, not with that in Table 3. The data of Kaufmann and Kaliberda for Hungary are close to our estimations.

According to the calculations of Kaufmann and Kaliberda, the share of the hidden economy in 1995 was much larger in all the successor countries of the Soviet Union, except for Uzbekistan and Belarus, and in Bulgaria than according to our estimated results, while the shares were much smaller in the rest of the countries.

Despite the fact that both methods endeavor to deduce the share of the hidden economy from the development of electricity use, there is a great difference in the results. But now we have also seen that those differences are not of a random nature. The main reason for the discrepancies is that contrary to our approach, the method of Kaufmann and Kaliberda does not eliminate either the diversity in the structure of industrial branches or the structural changes that takes place in these countries, which independently from the hidden economy both influence total electricity consumption and the level of GDP to a great extent.

This is also proved by Figure 7 below. Here, the so-called transition scores characterizing the development of reforms in the individual countries, and the *difference* between the shares of hidden economy suggested by the two methods (Kaufmann-Kaliberda and Lackó) are presented for the year 1995. The transition scores are average numbers that calculated from the “scores” of the reform steps carried out in the countries concerned in

the course of the transition (Stern,1998). From the figure it can be clearly seen that, except for Belarus and Uzbekistan, the share of the hidden economy by the indices of Kaufmann and Kaliberda is as a rule much larger than our estimates, where country showed a smaller transition score. The explanation for this is that in these economies energy-demanding branches that were inherited from socialism, have been reduced less then in the other group of countries. In the case of countries with higher transition scores, the situation is simply the opposite: in these countries (the Czech Republic, Poland, Romania, Slovakia, Estonia) our estimation proved to be larger than that of Kaufmann and Kaliberda, since here the old socialist structures have been shaken off by real restructuring to a much larger extent than in the first group of countries.

6 The hidden economy and its environment

In the literature about hidden economy not only the methods of measurement are widely investigated, but also those social phenomena which are closely related to the hidden economy: levels of bureaucratic and tax control, and their effectiveness, level of legal security, and corruption. In this section we investigate how the differences across countries with regard to this phenomena related to the size of the hidden economy obtained in our calculations.

First of all, we have to notice that to measure and compare these phenomena across countries are at least as difficult, if not more, as the estimation of the share of the hidden economy. The scores which are usually used in the literature, and I will also use them, are rather rough indicators. They are based on recurrent questioning of experts in the given countries and/or outside of them, who rank the countries according to different features of tax control, legal security and corruption.

Johnson et al. (1997) and Johnson et al. (1998) suggest in their papers that “while formal rules may count in some instances, what really matters is how regulations and tax rules are actually implemented. If rules are fine on paper but officials have a great deal of discretion in their interpretation and implementation, this leads to a higher effective burden on

business, more corruption, and a greater incentive to move to the unofficial economy." (Johnson et al., 1998, p.390) Johnson and his co-authors investigated three specific propositions.

First, the share of the unofficial economy in GDP should be higher when there is more regulation and more discretion for officials regarding how the regulatory system operates.

Johnson et al. (1997) investigated the data of 15 post-socialist countries while Johnson et al. (1998) surveyed 47 countries: beside the post-socialist countries, Latin-American and OECD countries were also included in the sample. In both samples for post-socialist countries the authors used the share of the unofficial economy calculated according to the Kaufmann-Kaliberda method. In the course of the analysis strong evidence was found for that less regulation (measured by the Heritage Foundation's measure of regulation (Johnson and Shelly, 1997)) is correlated with a lower share of the unofficial economy.

The measure of regulation is defined by the Heritage Foundation measures as how easy or difficult it is to open and operate a business in a given country. The measure also takes into account the degree of corruption and whether regulations are applied uniformly to all businesses.

In the course of their analysis Johnson et al. (1997) found similar although not too strong correlation between regulation and the unofficial economy for 14 post-socialist countries as they did for the larger sample including mature market and Latin-American economies (Johnson et al.,1998).

Following the analysis of Johnson et al.(1997,1998) I also carried out a similar calculation for the indices of hidden economy and the same indices of regulation. The result was a weak positive correlation.

The second proposition by Johnson et al. (1998) was that the unofficial economy should be larger when there is a bigger tax burden on the firms in the official sector, where "burden" on the firm determined by how the tax system is administered and how high the

tax rates are. This assumption was verified by Jonhnson et al. (1997 and 1998) with correlation calculations both the above described samples of countries.

What would a similar calculation show for the indices of hidden economy we obtained earlier? Figure 8. shows the relationship between the "tax burden" scores used by Johnson at al. (1997) and our estimated shares of the unofficial economy. The tax burden scores are taken from an issue of the Wall Street Journal's Central European Economic Review (CEER: 1995 Jan., 1996 Feb.) in which a panel of experts was asked to rank each of the 26 post-socialist countries on the basis of their attractiveness as a place to do business over the coming year. The experts had to rank countries between 0 and 10, zero being the lowest and ten being the highest score. The highest score indicated the lowest tax burden.

The figure shows a clear trend: the larger the tax burden, the larger the share of the hidden economy. Larger deviations from the trend can be found for Uzbekistan as well as for Latvia, Lithuania and Macedonia. In the latter countries the share of the unofficial economy is considerably larger in relation to the "tax burdens", in Uzbekistan it is considerably smaller.

When carrying out a number of completing correlation calculations (see the results in Table 10) we not only find that the tax burden and the share of the hidden economy are closely related, but also that the effective marginal tax rates on capital income, that have already been analyzed in the course of the exposition of the model, are in close correlation with the size of the unofficial economy as well as with the tax burden scores. These correlation calculations have been carried out for a sample of 15 countries so that a comparison with the estimations of Kaufmann and Kaliberda could also be carried out.

As results in the table indicate the Kaufmann-Kaliberda's estimation of the share of the unofficial economy shows a significant correlation with the tax burden only if Uzbekistan and Belarus are left out of the sample.

The third proposition of Johnson's et al. (1998) was that a larger unofficial economy should be correlated with weaker publicly provided services, as measured by more

extensive corruption and the “rule of law”. Below we also investigate this statement in the light of our estimated shares of the hidden economy.

Figure 9 shows the relationship between the corruption scores and the share of the hidden economy in the case of 19 countries. The corruption scores were again taken from the database of the Wall Street Journal’s Central European Economic Review. (Scale of 0 to 10, with a higher score meaning lower corruption). The tendency is obvious when reviewing Figure 9: the larger the corruption (the lower the score), the larger the share of the hidden economy.

Figure 10 shows the correlation between the legal safeguard scores and the hidden economy. Legal safeguard scores also come from the Wall Street Journal’s Central European Economic Review. (Scale of 0 to 10, the highest score meaning the lowest legal security). The tendency is also obvious from this figure: the lower the legal safeguard score, the larger the share of the hidden economy. This relationship is verified by the correlation relations. (see Table 11)

From the foregoing we can conclude that the results of our calculations for the share of the hidden economy do not contradict the propositions that were presented and tested (on their own indices) by Johnson at al. On the contrary, our results support Johnson’s (1998) propositions despite the fact that our results are rather different from Kaufmann-Kaliberda’s results, which is used in Johnson (1997 and 1998) for post-socialist countries.

7 The relationship between the hidden economy and the private economy in the course of transition

After the investigation of the general business environment in the countries and their impact on the hidden economy, we now turn to the relationship between visible private and the hidden economies in the post-socialist countries.

The dismantling of state ownership and the establishment of the base of privately owned business have progressed at different paces in the individual post-socialist countries. A question arises that whether the development of the visible private economy has any impact on the development of the hidden activities?

Table 12 shows data of 17 post-socialist countries: the shares of the hidden economy and privately owned business are presented for the beginning of transition (1989), and for the year 1995. From the table it can be clearly seen that in the last year before reforms started, the share of the hidden economy was in every country larger than the share of the legal private business. This is understandable, since due to ideological and , accordingly legal reasons, there were very few possibilities for the legal private economy to expand in the period of socialism. This uniform picture has undergone a radical changes by 1995: in certain countries (such as Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Poland, Romania, Russia, Slovak Republic and Slovenia) the share of the private economy has already grown beyond the share of the hidden economy. In other countries, especially in the successor of the Soviet Union (such as Belarus, Georgia, Kazakhstan, Ukraine and Uzbekistan), however, the share of the hidden economy, similarly to the last years of the socialist era, continues to be larger than or equal to the share of the private economy.

From Figure 11 it can be noticed that in countries where the initial share of the hidden economy was larger, its increase by 1995 was of a smaller extent. (Between 1989 and 1995, the share of the hidden economy developed in these countries along an inverted U-shape curve: following an initially large increase until 1993 the share experienced some decline until 1995.)

Figure 12 shows that the smaller the extent with which the share of the hidden economy increased in the course of transition, the larger was the increase in the share of the private economy. This can be formulated also the other way round: the more possibilities were

available for the private economy to develop, the smaller was the pace with which hidden economy expanded.

It is also worth to investigate what relationships can be detected between changes in institutions and in economic policies that took place in the course of transition on the one hand and the development of the size of the hidden economy, on the other. In recent years The European Bank for Reconstruction and Development developed a system of indices, the so called measure of transition indicators that are assumed to represent and measure the most crucial institutional changes and economic policies that happened in the course of transition are called transition score (Stern,1998).

The so-called transition scores is the average value of scores of 9 different categories of transition indices calculated for each country for a certain year. The larger the value of the average value, the more profound, more serious were the reforms carried out in the country, by the given year.

In the following the correlation between the average total transition scores and the levels and changes of the hidden economy and the legal private economy is to be examined. Table 13 shows the correlation relation between the transition scores and the levels of legal private and hidden economies as well as the change of those in the course of transition for a sample 18 transition countries.

From the table it can be seen that the “transition scores” show close connection to all the investigated indicators. In countries where transition is characterized by better scores, the share of private economy compared to GDP is also of a higher level in 1995, due to its faster increase before 1995, while the share of the hidden economy is a smaller level, due to its slower increase before 1995. In the table another interesting correlation can be noticed: transition progressed faster in countries where larger hidden economies were built up by the last year of socialism. This does not necessarily mean that these countries’ earlier experiences with their hidden economy enhanced in the first place a quicker

building up of the market system. The point is rather that in these countries the inefficiency of the economy based on state ownership had become evident earlier. This is why the expansion of the "second economy" was tolerated, in some cases even encouraged. After the transition started, the establishment of elements of a market economy started here with considerably more resolution while sacrifices (such as unemployment) were also more tolerated. With the help of this the legal private economy could force its way through and thereby there was relatively less "room" left for the development of the hidden economy.

8 Summary

The study investigated the hidden economy its size, in particular, and related features in post-socialist countries in course of transition. Attempt was made to answer to the following questions:

- What was the size of the hidden economy at the start of the transition process in the individual post-socialist countries? How did these rates relate to those in mature market economies?
- How did the size of the hidden economy develop in the individual post-socialist countries in the course of transition?
- What kind of phenomena are accompanying the hidden economy?
- How is the development of the legal private economy connected to the development of the hidden economy ?
- Is there any connection between the advancement of reforms and the size of the hidden economy in the post-socialist countries?

In order to find answer to the questions listed above first the size of the hidden economy had to be estimated for the post-socialist countries. The idea was to adjust and use an estimation method that was developed and successfully applied for 20 developed market economies

earlier (see Lackó, 1998). This approach is the so called "household electricity method". The method assumes that the hidden economy is present in all sectors of the economy, including households. A large part of non-registered economic agents work in households or earn revenues directly for households. Households play a pivotal role as a working place also for important categories of registered business: self-employed often use their home for work, and firms providing services for households also often exercise their activities on the spot.

The cross-country model based on household electricity use assumed that per capita residential electricity consumption was higher, ceteris paribus, the higher the aggregate private consumption, the lower the share of agriculture production of GDP, the lower the value of a climate index, the lower the price of residential electricity and the higher the size of the hidden economy. In the model the indicators related to the hidden economy were: various tax rates, the cumulative output decline since 1989 and the inflation rate.

With the help of econometric estimation of the coefficients of this model, carried out on panel data base of ten countries in 1990-1995, we could obtain estimations for the size of the hidden economy in Bulgaria, the Czech Republic, Croatia, Hungary, Poland, Romania, Russia, Slovak Republic, Slovenia, Ukraine. Based on the results of this econometric estimation we also formulated a direct function, where the share of the hidden economy was explained by its indicators directly. With the help of this function we could obtain calculations for the share of hidden economy additional countries and years. These additional countries were Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, FYR Macedonia, Uzbekistan. In sum through the steps of this estimation described above we could calculate the share of the hidden economy in GDP for 20 post-socialist countries for the years 1989-1995.

According to these results the share of the hidden economy in the investigated countries varied between 12% and 67% of the official GDP during 1989-1995. In 1995 the largest share of the hidden economy in official GDP was found for Georgia (57%)and Ukraine (53%) , while the smallest shares were in the Czech Republic (22%) and Slovenia (23%).

In the last year of socialism, 1989, the share of the hidden economy stood at 12%-17% in the republics (later successor countries) of the Soviet Union and in Romania, and that share corresponded to the order of magnitude of the average shares in the OECD countries (Lackó, 1998, Schneider, 1997). The 20-25% share experienced in the Central-East -European countries in 1989, however, corresponded to the values experienced in market economies with a large share of hidden economy (such as Spain, Greece, Italy and Belgium). This finding contradicts the general view that before transition, the hidden economy in socialist countries was, as a rule, of smaller magnitude than in market economies.

Following a uniform growth in the size of the hidden economy, characteristic for all countries at the beginning their transition (1989-1993), in CIS countries the share of the hidden economy showed stagnation or further increase, while in the rest of countries an explicit declining tendency could be seen. In these latter countries, in course of the transition the hidden economy moves along a reversed U shaped curve.

Investigating the conditions that give rise to the hidden economy we could support Johnson et al.(1998) in their following propositions:

1. The share of the hidden economy in GDP is usually higher when there is more regulation by the state and more discretion is left for officials regarding how the regulatory system operates.

2. The hidden economy is larger when there is a bigger tax burden on the firms in the official sector. (Here the burden on the firms is defined by the way the tax system is administered and by the level of the tax rates.)

3. A larger hidden economy correlates with weaker publicly provided services, as measured by more extensive corruption and the lack of "rule of law".

We also analyzed the relationship between the hidden economy and the legal private economy in the course of transition. The dismantling of state ownership and the establishment of the

base of privately owned business have progressed at different paces in the individual post-socialist countries. A question arose whether the development of the visible private economy had any impact on the development of the hidden activities.

It turned out that in 1989, in the last year before reforms started, the share of the hidden economy was in every country larger than the share of legal private business. This is understandable, since in the period of socialism, due to ideological and, accordingly legal reasons, there were very few possibilities for the legal private economy to expand. This uniform picture has undergone a radical changes by 1995: in certain countries (such as Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Russia, Slovakia and Slovenia) the share of the private economy has already grown beyond the share of the hidden economy. In other countries, especially in some successor states of the Soviet Union (such as Belarus, Georgia, Kazakhstan, Ukraine and Uzbekistan), however, the share of the hidden economy, similarly to the last years of the socialist era, continues to be larger than or more or less equal to the share of the private economy.

In countries where transition is characterized by a fast, uninterrupted advancement of reform, the share of private economy compared to GDP has achieved a higher level by 1995, due to its faster increase, while the share of the hidden economy is at a smaller level, due to its slower increase before 1995 compared to laggard reformers. It also can be seen that transition progressed faster in those countries where larger hidden economies were built up by the last year of socialism. This does not necessarily mean that these countries' earlier experiences with their hidden economy would have enhanced in the first place a quicker building up of the market system. The point is rather that, in these countries, the inefficiency of the economy based on state ownership had become evident earlier. This is why the expansion of the "second economy" (as the hidden economy was called in the period of socialism) was tolerated, in some cases even encouraged. In these countries after transition began, the establishment of elements of a market economy started here with considerably more resolution while sacrifices (such as unemployment) were also

more tolerated than in the other group of countries. With the help of this commitment the legal private economy could force its way through and thereby there was relatively less “room” left for the development of the hidden economy.

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Table 1
Estimation results of the ratio of the hidden economy in market economies
(% of the official GDP)

Country	Soft model approach 1978	Currency demand approach 1978	Currency demand approach 1990	Household electricity approach 1990
Austria	8.9	5.0*	5.1 - 7.2	15.5
Belgium	12.1	16.4*	19.6	19.8
Canada	8.7	10.1 - 11.2*	-	11.7
Denmark	11.8	6.7 - 8.0	9.0 - 13.4	16.9
Germany	8.6	8.1 - 9.2	11.4 - 13.1	14.6
Greece	-	-	-	21.8
Finland	7.6	-	-	13.3
France	9.4	6.7	9.4	12.3
Ireland	7.2	-	11.7	20.6
Italy	11.4	16.7*	23.4	19.6
Japan	4.1	-	-	13.2
Netherlands	9.6	9.1*	13.9	13.4
Norway	9.2	9.6 - 10	14.5 - 16.0	9.3
Spain	6.5	18.0	21.0	22.9
Sweden	13.2	12.5 - 13.6	15.8 - 16.7	11.0
Switzerland	4.3	6.2	6.9	10.2
Great Britain	8.0	12.0	14.3	13.1
USA	8.3	3.7 - 5.3	5.1 - 8.6	10.5

* 1980

Source: Schneider (1997, pp. 14-15)

Table 2

Share of the unofficial economy in GDP, 1989-1995, selected transition economies (in per cent of total GDP) Kaufmann-Kaliberda method

Country	1989	1990	1991	1992	1993	1994	1995
Azerbaijan	12.0	21.9	22.7	39.2	51.2	58	60.6
Belarus	12.0	15.4	16.6	13.2	11.0	18.9	19.3
Bulgaria	22.8	25.1	23.9	25.0	29.9	29.1	36.2
Czech Republic	6.0	6.7	12.9	16.9	16.9	17.6	11.3
Estonia	12.0	19.9	26.2	25.4	24.1	25.1	11.8
Georgia	12.0	24.9	36.0	52.3	61.0	63.5	62.6
Hungary	27.0	28.0	32.9	30.6	28.5	27.7	29.0
Kazakhstan	12.0	17.0	19.7	24.9	27.2	34.1	34.3
Latvia	12.0	12.8	19.0	34.3	31.0	34.2	35.3
Lithuania	12.0	11.3	21.8	39.2	31.7	28.7	21.6
Moldova	12.0	18.1	27.1	37.3	34.0	39.7	35.7
Poland	15.7	19.6	23.5	19.7	18.5	15.2	12.6
Romania	22.3	13.7	15.7	18.0	16.4	17.4	19.1
Russia	12.0	14.7	23.5	32.8	36.7	40.3	41.6
Slovak Republic	6.0	7.7	15.1	17.6	16.2	14.6	5.8
Ukraine	12.0	16.3	25.6	33.6	38.0	45.7	48.9
Uzbekistan	12.0	11.4	7.8	11.7	10.1	9.5	6.5

Source: Johnson-Kaufmann-Shleifer, 1997

Table 3

Share of the unofficial economy, 1989-1995, selected transition economies (in percent of official GDP)

Country	1989	1990	1991	1992	1993	1994	1995
Azerbaijan	13.6	28.0	29.4	64.5	104.9	138.1	153.8
Belarus	13.6	18.2	19.9	15.2	12.4	23.3	23.9
Bulgaria	29.5	33.5	31.4	33.3	42.7	41.0	56.7
Czech Republic	6.4	7.2	14.8	20.3	20.3	21.4	12.7
Estonia	13.6	24.8	35.5	34.0	31.8	33.5	13.4
Georgia	13.6	33.2	56.3	109.6	156.4	174.0	167.4
Hungary	37.0	38.9	49.0	44.1	39.9	38.3	40.8
Kazakhstan	13.6	20.5	24.5	33.2	37.4	51.7	52.2
Latvia	13.6	14.7	23.5	52.2	44.9	52.0	54.6
Lithuania	13.6	12.7	27.9	64.5	46.4	40.3	27.6
Moldova	13.6	22.1	37.2	59.5	51.5	65.8	55.5
Poland	18.6	24.4	30.7	24.5	22.7	17.9	14.4
Romania	28.7	15.9	18.6	22.0	19.6	21.1	23.6
Russia	13.6	17.2	30.7	48.8	58.0	67.5	71.2
Slovak Republic	6.4	8.3	17.8	21.4	19.3	17.1	6.2
Ukraine	13.6	19.5	34.4	50.6	61.3	84.2	95.7
Uzbekistan	13.6	12.9	8.5	13.3	11.2	10.5	7.0

Source: Transformated data from Table 2

Table 4

Effective marginal tax rates on labour income and on capital income in post-socialist countries

Country	Effective marginal tax rates on labour income 1993 (in per cent)	Effective marginal tax rates on capital income 1993 (in per cent)
Albania	32	87.9
Armenia	57	96.8
Azerbaijan	49	99.5
Belarus	71	99.2
Bulgaria	57	93.5
Croatia	85	99.8
Czech Republic	69	85.2
Estonia	49	74.9
FYR Macedonia	30	94.0
Hungary	73	81.0
Kazakhstan	62	98.6
Kyrgistan	58	96.7
Latvia	55	80.0
Lithuania	53	94.3
Moldova	37	97.2
Poland	62	84.0
Romania	57	94.2
Russia	55	97.8
Slovakia	68	87.6
Slovenia	63	92.6
Tajikistan	42	97.8
Turkmenistan	30	96.5
Ukraine	63	99.3
Uzbekistan	45	97.8
Germany	62	-
Japan	63	-
U.K.	65	-
United States	50	63
OECD norm	*62*	-

Source: EBRD 1993, page 49-50

Table 5
Estimation results of the household electricity consumption equation

Dependent variable: ln ERij

	Coefficients	**t-statistics**	**Standard coefficient**
ln Cij	1.245	9.86	0.884
AGij	-0.016	-2.061	-0.167
Gij	-0.092	-4.036	-0.313
Qij	-1.615	-4.85	-0.3
Rij	0.0182	3.55	0.231
Dij	2.825	8.14	0.52
lnIij	0.05	2.51	0.166
duBULG91	0.461	2.78	0.141
aR^2	0.923		
F(8, 32)	60.61		
RMSE	0.1413		
Ramsey Reset			
test F(3, 29)	1.79		
Prop>F	0.171		
Heteroscedasticity			
Cook-Weisberg test			
chi2(1)	0.56		
Prop> chi2	0.4549		

Table 6

The ratio of the hidden economy expressed in household electricity consumption and in the official GDP

Country	Year	The share of the hidden economy in electricity	in GDP
Bulgaria	1990		
	1991	25.00	34.00
	1992	26.00	34.00
	1993	26.00	34.00
	1994	27.00	36.00
	1995	26.00	34.00
Croatia	1990		
	1991		
	1992	29.00	39.00
	1993	30.00	39.00
	1994	30.00	40.00
	1995	27.00	36.00
Czech Republic	1990		
	1991		
	1992		
	1993	29.00	27.00
	1994	18.00	25.00
	1995	16.00	22.00
Hungary	1990	19.00	26.00
	1991	23.00	31.00
	1992	25.00	33.00
	1993	25.00	34.00
	1994	24.00	31.00
	1995	22.00	30.00
Poland	1990	24.00	32.00
	1991	24.00	33.00
	1992	24.00	32.00
	1993	23.00	31.00
	1994	21.00	28.00
	1995	18.00	24.00

Table 6 (continued)

Country	Year	The share of the hidden economy in electricity	in GDP
Romania	1990	18.00	24.00
	1991	28.00	37.00
	1992	29.00	39.00
	1993	28.00	37.00
	1994	26.00	34.00
	1995	21.00	28.00
Russia	1990		
	1991		
	1992	28.00	38.00
	1993	27.00	36.00
	1994	29.00	39.00
	1995	29.00	39.00
Slovenia	1990	20.00	27.00
	1991	21.00	27.00
	1992	24.00	31.00
	1993	21.00	28.00
	1994	19.00	25.00
	1995	17.00	23.00
Slovak Republic	1990		
	1991		
	1992		
	1993	26.00	34.00
	1994	24.00	32.00
	1995	21.00	28.00
Ukraine	1990		
	1991		
	1992	28.00	37.00
	1993	35.00	47.00
	1994	41.00	55.00
	1995		

Table 7

The shares of the hidden economy by the household electricity approach and its ex-post calculations

Country	Year	The share of the hidden economy in the GDP	Ex-post calculation
Bulgaria	1990		
	1991	0.34	0.35
	1992	0.34	0.36
	1993	0.34	0.36
	1994	0.36	0.37
	1995	0.34	0.35
Croatia	1990		
	1991		
	1992	0.39	0.41
	1993	0.39	0.42
	1994	0.40	0.40
	1995	0.36	0.35
Czech Republic	1990		
	1991		
	1992		
	1993	0.27	0.29
	1994	0.25	0.27
	1995	0.22	0.24
Hungary	1990	0.26	0.25
	1991	0.31	0.31
	1992	0.33	0.32
	1993	0.34	0.32
	1994	0.31	0.31
	1995	0.30	0.30
Poland	1990	0.32	0.31
	1991	0.33	0.31
	1992	0.32	0.30
	1993	0.31	0.29
	1994	0.28	0.26
	1995	0.24	0.23

Table 7 (continued)

Country	Year	The share of the hidden economy in the GDP	Ex-post calculation
Romania	1990	0.24	0.22
	1991	0.37	0.32
	1992	0.39	0.35
	1993	0.37	0.35
	1994	0.34	0.32
	1995	0.28	0.27
Russia	1990		
	1991		
	1992	0.38	0.37
	1993	0.36	0.38
	1994	0.39	0.41
	1995	0.39	0.42
Slovenia	1990	0.27	0.29
	1991	0.27	0.30
	1992	0.31	0.33
	1993	0.28	0.30
	1994	0.25	0.27
	1995	0.23	0.25
Slovak Republic	1990		
	1991		
	1992		
	1993	0.34	
	1994	0.32	0.34
	1995	0.28	0.32
Ukraine	1990		0.29
	1991		
	1992	0.37	
	1993	0.47	0.37
	1994	0.55	0.45
	1995		0.50

Table 8
The ratio of the hidden economy to the official GDP
Household electricity approach

Country	1989	1990	1991	1992	1993	1994	1995
Bulgaria	23.3*	28.9*	33.7	34.1	34	35.9	34
Croatia				38.6	39.3	40.4	36
Czech Republic	21.7*	24.3*	31.7*	31.8*	27.1	24.5	21.8
Hungary	24.6*	25.6	31.1	33.2	33.6	31.4	29.6
Poland	22.9*	31.6	32.5	31.7	31.1	27.9	23.9
Romania	17.3*	24.4	36.9	39	37.5	34.2	28.3
Russia				37.8	36	39.1	39.2
Slovakia	21.7*	24.3*	32.0*	32.0*	34.1	32	28.4
Slovenia	26.7*	26.8	27.4	31.2	28.4	25	22.7
Ukraine			28.1*	37.4	47	54.6	52.8*
Azerbaijan			31.2*	43.9*	47.9*	50.5*	47.6*
Belarus			21.2*	33.7*	40.3*	44.3*	46.4*
Estonia	16.9*	22*	32.0*	37.4*	38.4*	38.1*	35.8*
Georgia			33.3*	58.0*	61.3*	67.1*	57.0*
Kazakhstan	12.0*	13.9*	22.4*	33.8*	33.1*	38.5*	37.9*
Kyrgyzstan	12.9*	14.8*	16.9*	27.7*	36.8*	39.2*	35.1*
Latvia	17.3*	19.4*	22.6*	41.7*	45.5*	43.1*	43.7*
Lithuania	17*	21.0*	31.7*	47.4*	52.2*	47.6*	46.0*
FYR Macedonia			30.4*	44.8*	46.0*	48.8*	44.2*
Uzbekistan	12*	15.7*	23.7*	26.4*	27.5*	29.4*	29.5*

** based on ex-post calculation*

Table 9
The share of the hidden economy: Comparison between estimations according to the household electricity approach and other estimations, 1989

Country	other estimations	household e. app.
Bulgaria	29.8	23.3
Czech Republic	6.9	21.7
Estonia	13.6	16.9
Hungary	27	24.6
Kazakhstan	13.6	12
Kyrgistan	13.6	12.9
Latvia	13.6	17.3
Lithuania	13.6	17
Poland	18.6	22.9
Romania	28.7	17.3
Slovakia	6.3	21.7
Uzbekistan	13.6	12

Notes:
Sources of other estimations:
Bulgaria, Czech Republic, Poland, Romania, Slovakia: Johnson-Kaufmann-Shleifer, 1997 and Kaliberda
Hungary: Ekes (1993)
Kazakhstan, Kyrgistan, Estonia, Latvia, Lithuania, Uzbekistan: Alexeev et al. , (1987)

Table 10

Correlations among tax burden scores, effective marginal tax rates on capital income and the share of the hidden economy

n=19

	Tax burden	Taxes on capital	Hidden economy (Lackó)
Tax burden	1		
Taxes on capital	- 0.71*	1	
Hidden economy (Lackó)	-0.56*	0.39	1

Countries: Azerbaijan, Belarus, Bulgaria,Croatia, Czech Republic, Estonia, Hungary, Kazakhstan, Kyrgistan, Latvia, Lithuania, Macedonia, Poland, Romania, Russia, Slovakia, Slovenia, Ukraine, Uzbekistan

n=15

	Tax burden	Taxes on capital	Hidden economy (Lacko)	Hidden economy (Kaufmann)
Tax burden	1			
Taxes on capital	-.80*	1		
Hidden economy (Lackó)	-0.62*	0.45	1	
for 13 countries				
(excl. Uzbekistan, Belarus)	-0.76*	0.47		
Hidden economy (Kaufmann)	-0.43	0.42	.68*	1
for 13 countries				
(excl. Uzbekistan, Belarus)	-.86*	0.62*	0.75*	

* significant at the 1% level

Countries: Azerbaijan, Belarus, Bulgaria, Czech Republic, Estonia, Hungary, Kazakhstan, Latvia, Lithuania, Poland, Romania, Russia, Slovakia, Ukraine, Uzbekistan

Table 11

Correlations among corruption scores, legal safeguard scores and the share of the hidden economy

n=19

	Corruption	Legal safeguard
Hidden economy (Lackó)	-.6047*	-.59*

Countries: Azerbaijan, Belarus, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Kazakhstan, Kyrgistan, Latvia, Lithuania, Macedonia, Poland, Russia, Slovakia, Slovenia, Ukraine, Uzbekistan

n=15

	Corruption	Legal Safeguard
Hidden economy (Lackó)	-.56*	-.58*
for 13 countries (excl. Uzbekistan, Belarus)	-0.66*	-0.69*
Hidden economy (Kaufmann)	-0.48	-0.45
for 13 countries (excl. Uzbekistan, Belarus)	-.75*	-0.75*

Counries: Azerbaijan, Belarus, Bulgaria, Czech Republic, Estonia, Hungary, Kazakhstan, Latvia, Lithuania, Poland, Romania, Russia, Slovakia, Ukraine, Uzbekistan

* significant at the 1% level

Table 12

Private and hidden economy in the years 1989 and 1995

	"Initial"(1989)		"Final" (1995)	
Country	Private economy* share in official GDP	Hidden economy	Private economy** share in official GDP	Hidden economy
Bulgaria	10	23	45	34
Belarus	5		15	46
Czech Republic	5	22	70	22
Estonia	10	17	65	36
Georgia	10		30	57
Hungary	15	25	60	30
Kazakhstan	10	12	25	38
Kyrgistan	10	13	40	35
Latvia	10	17	60	43
Lithuania	10	17	55	46
Poland	15	23	60	24
Romania	10	17	40	28
Russia	5		55	39
Slovak Republic	10	27	60	28
Slovenia	5	22	45	23
Ukraine	5		35	53
Uzbekistan	5	12	30	30

* Source: Johnson-Kaufmann-Schleifer, 1997, p.37

**Source: Stern, 1998

Table 13
Correlations among the transition scores, the share of the hidden and private economy and its changes

n=18

	Transition scores
Transition scores	1
Share of the hidden economy 1989	0.75*
Share of the private economy 1989	0.28
Share of the hidden economy 1995	- 0.73*
Share of the private economy 1995	0.84*
Changes in the share of the private economy 1989-1995	0.77*
Changes in the share of the hidden economy 1989-1995	- 0.81*

** significant at the 1% level*

Countries: Azerbaijan, Belarus, Bulgaria, Croatia, Czech Republic, Estonia, Hungary, Kazakhstan, Kyrgistan, Latvia, Lithuania, Poland, Russia, Slovakia, Slovenia, Ukraine, Uzbekistan

Figure 1
General government revenues'ratio and marginal tax rates on labor

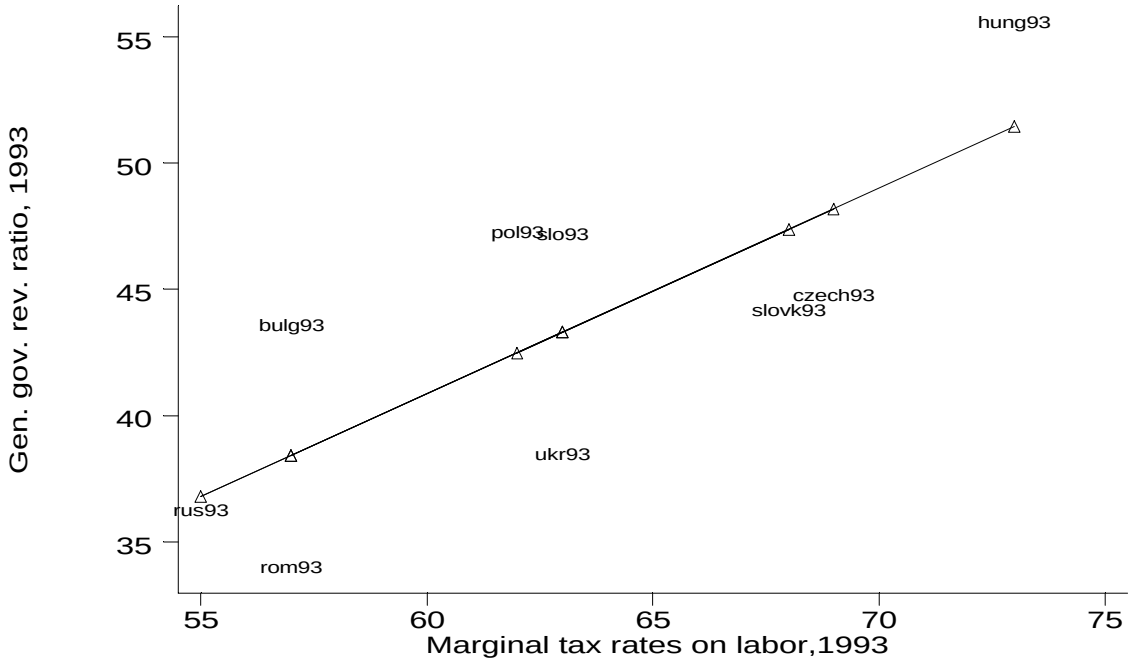

Figure 2
General government revenues'ratio and marginal tax rates on labor

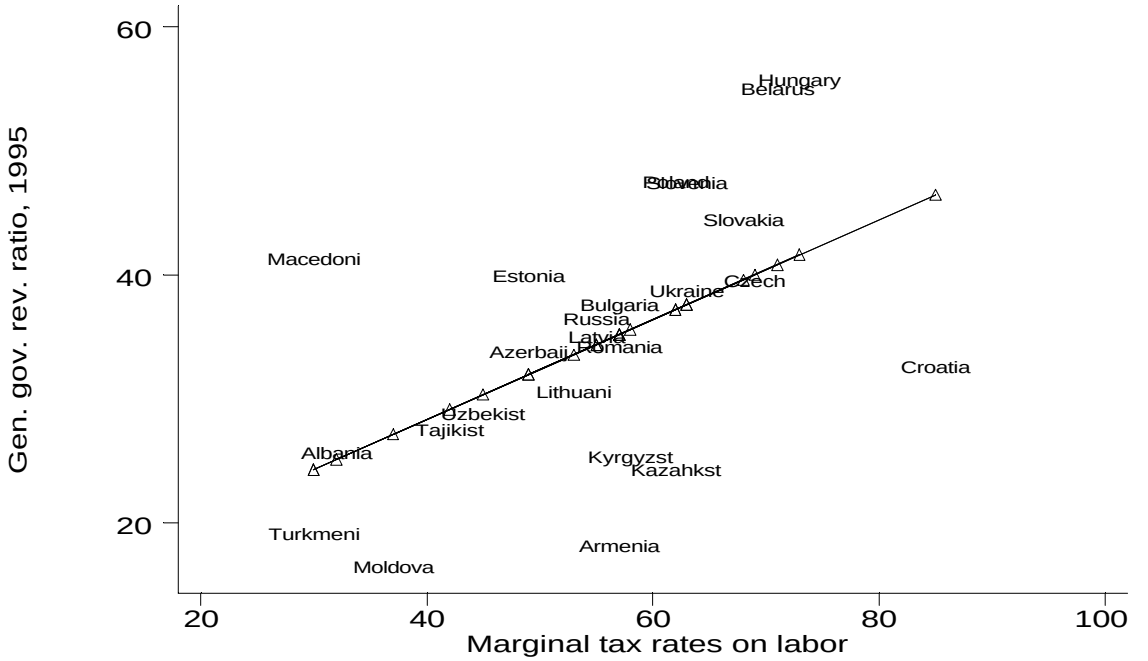

Figure 3
General government revenues'ratio and marginal tax rates on capit

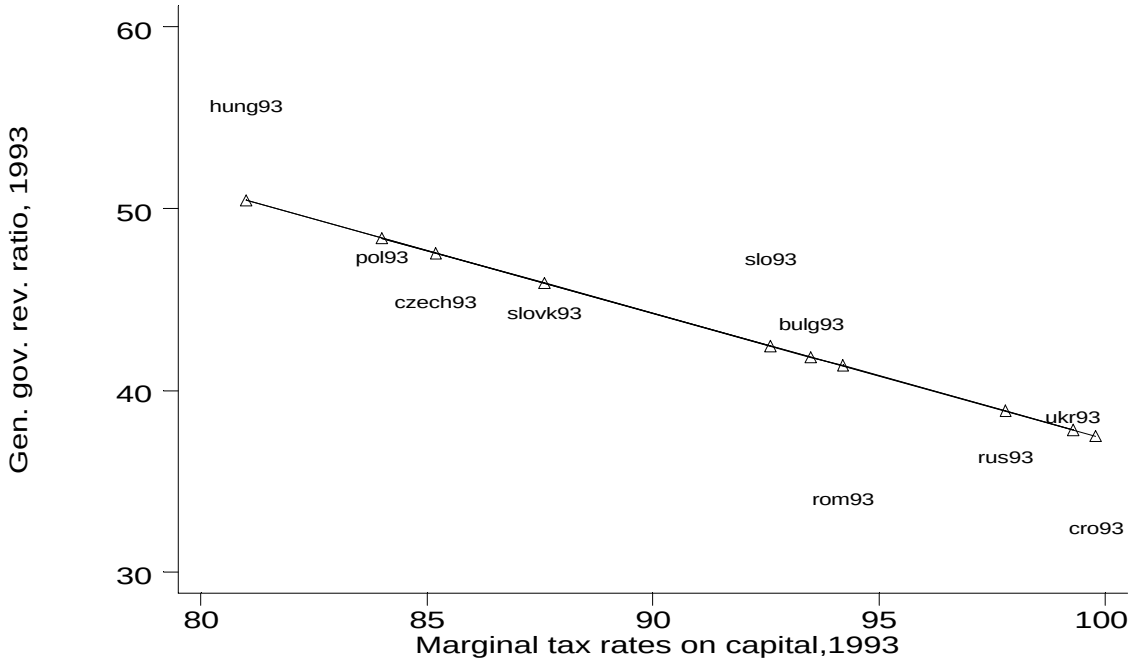

Figure 4
General government revenues'ratio and marginal tax rates on capit

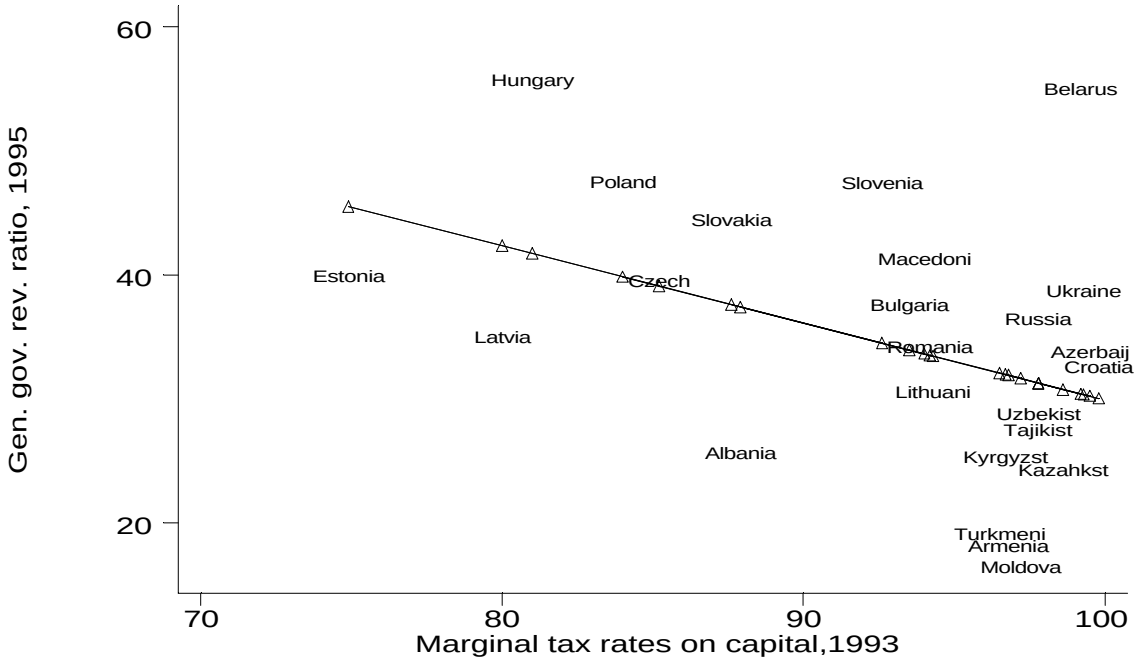

Figure 5
Output decline, 1989-1995 and marginal tax rate on capital

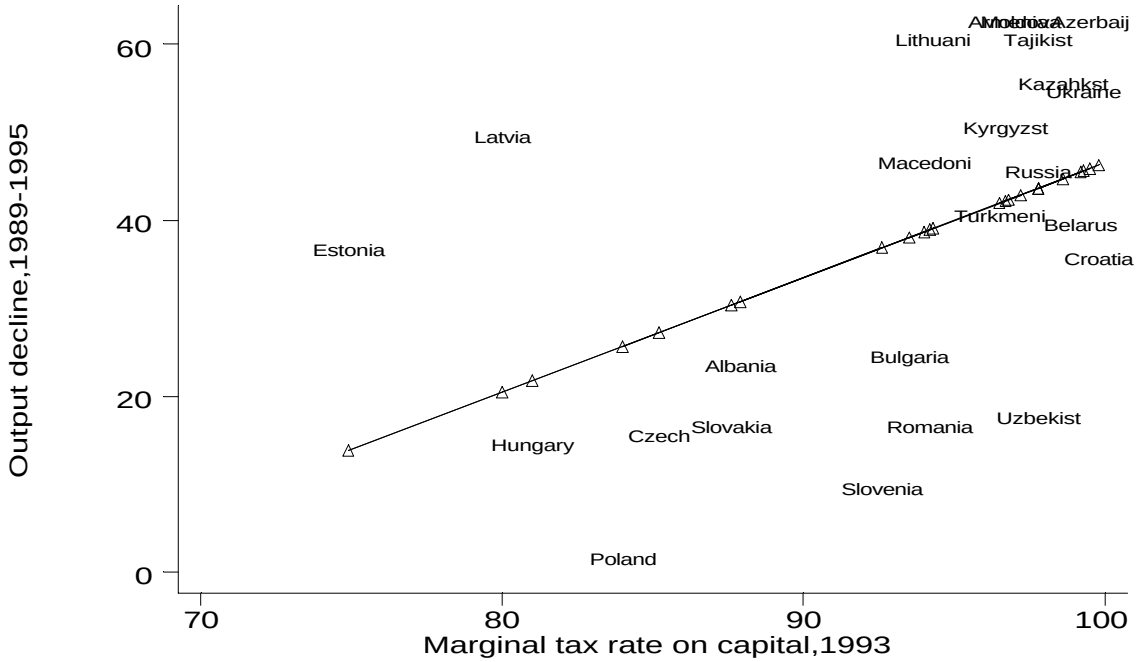

Figure 6
Output decline,1989-1993and marginal tax rates on capital

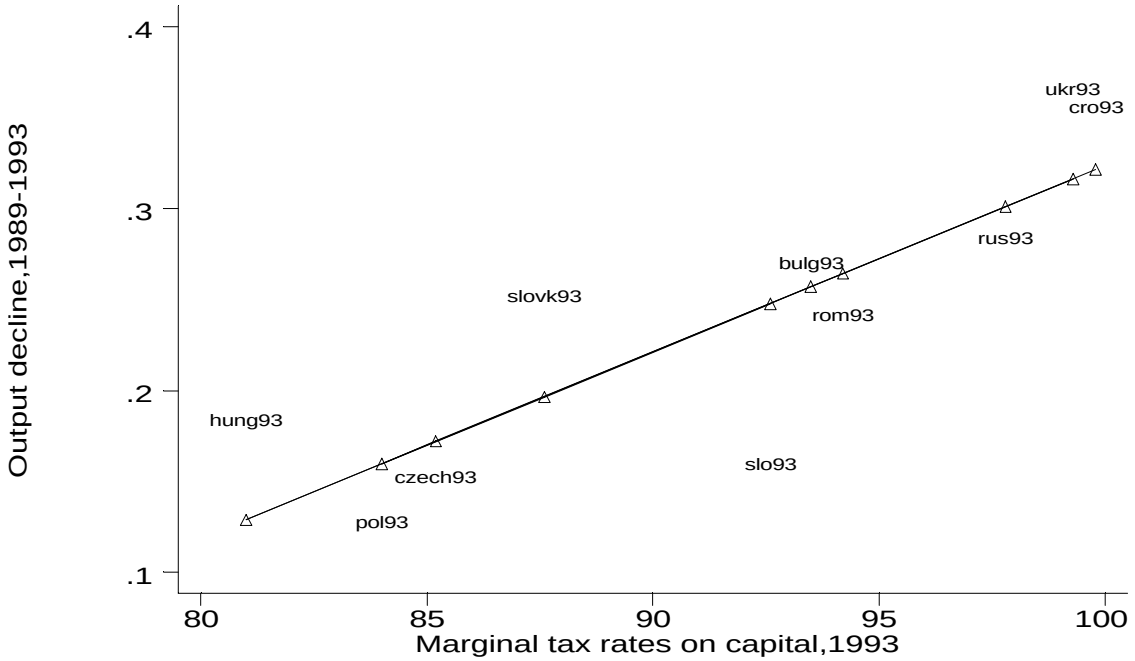

Figure 7
Transition score and difference between two estimations

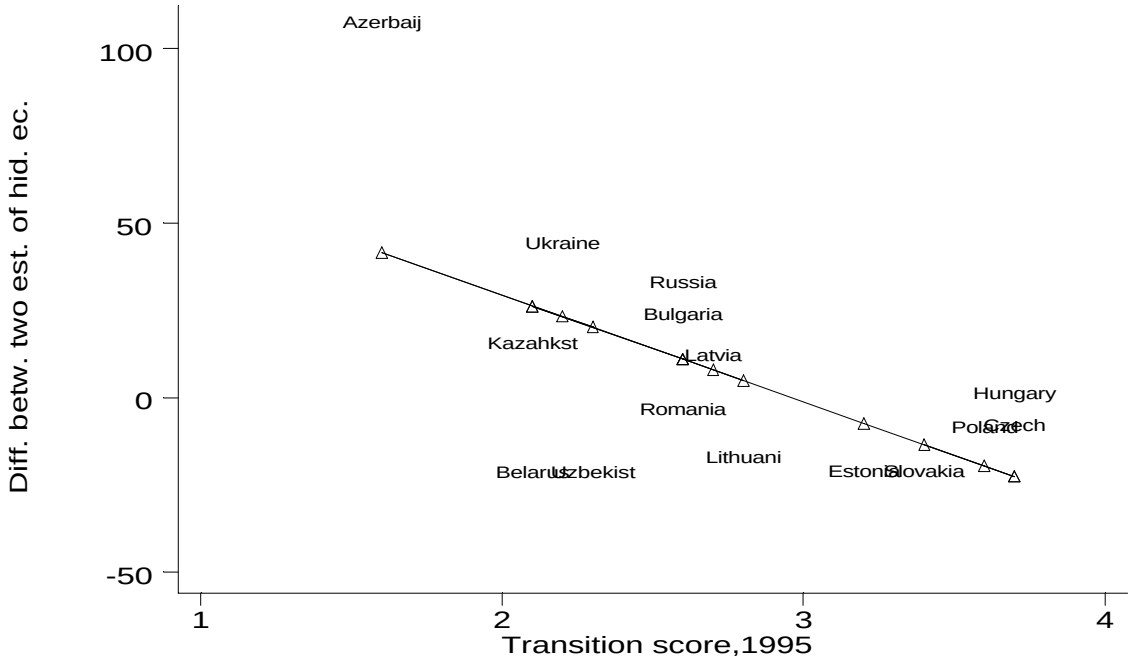

Figure 8
The share of the hidden economy and the tax burden score

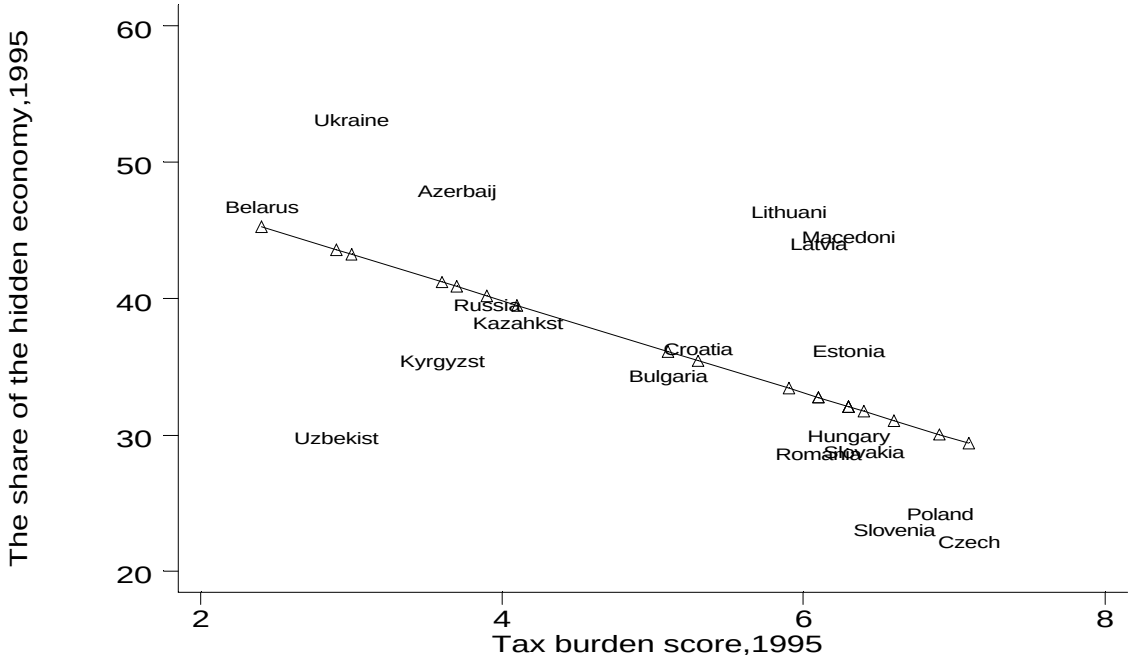

Figure 9
The share of the hidden economy and the corruption score

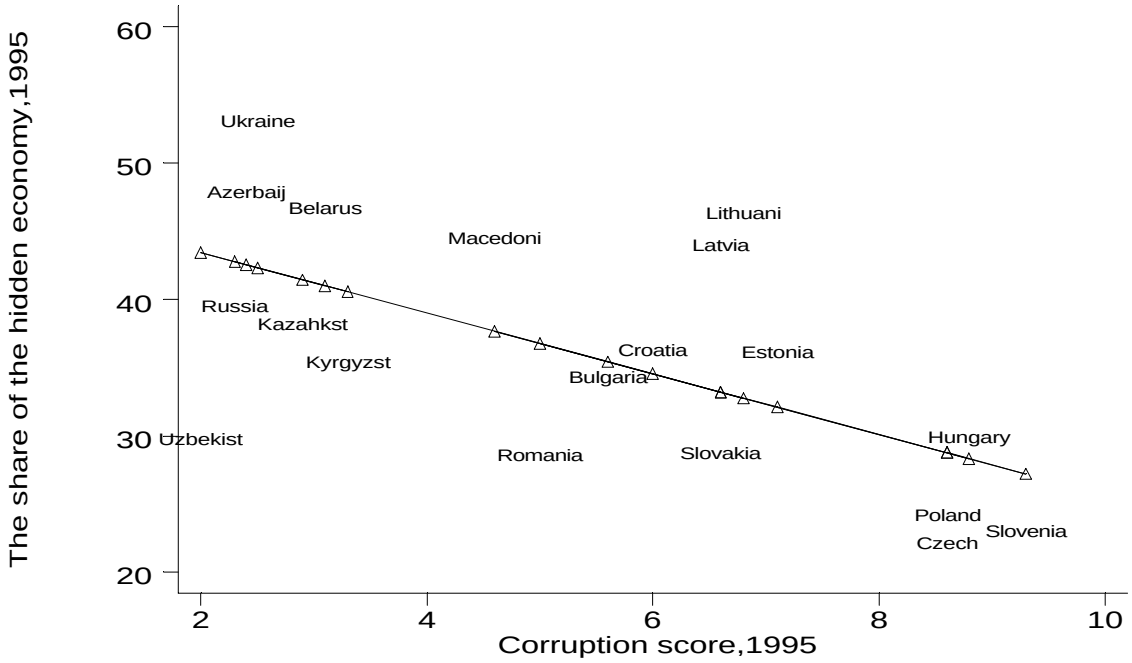

Figure 10
The share of the hidden economy and the legal safeguard score

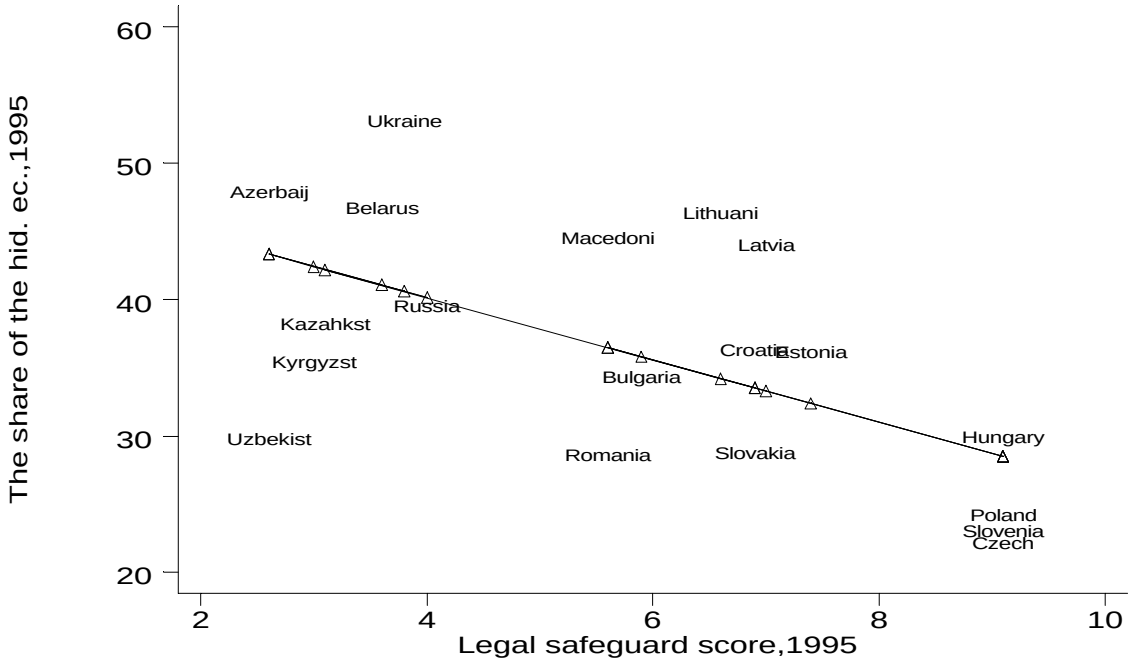

Figure 11
The share of the hidden economy,1989 and its change,1989-1995

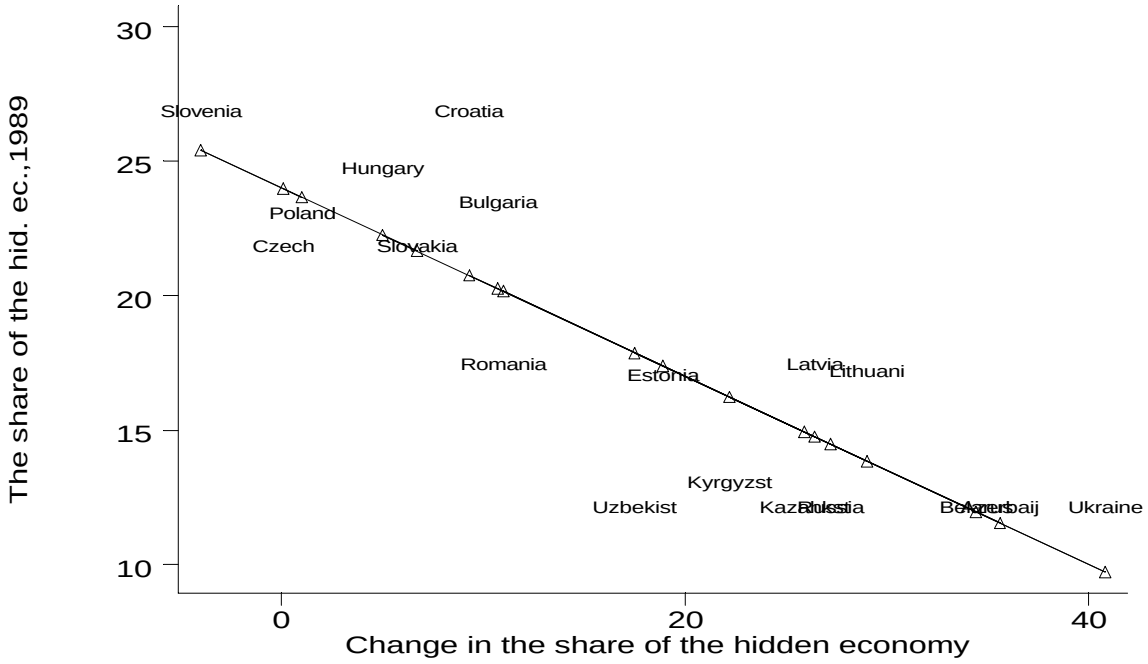

Figure 12
Changes of the hidden and private economy, 1989-1995