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Schneider, Friedrich; Enste, Dominik

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Shadow Economies Around the World - Size, Causes, and Consequences

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SHADOW ECONOMIES AROUND THE WORLD – SIZE, CAUSES, AND CONSEQUENCES

Friedrich Schneider
Dominik Enste*

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CESifo
Poschingerstr. 5
81679 Munich
Germany
Phone: +49 (89) 9224-1410/1425
Fax: +49 (89) 9224-1409
http://www.CESifo.de

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SHADOW ECONOMIES AROUND THE WORLD - SIZE, CAUSES, AND CONSEQUENCES

Abstract

Using various methods (currency demand, physical input (electricity) method, model approach), which are discussed and criticized, estimates of the size of the shadow economy in 76 developing, transition and OECD-countries are presented. The average size of a shadow economy varies from 12 percent of GDP for OECD, to 23 percent for transition and to 39 percent for developing countries. An increasing burden of taxation and social security contributions combined with rising state regulatory activities are the driving forces for the increase of the shadow economy especially in OECD-countries. According to some findings, a growing shadow economy has a negative effect on official GDP growth, and a positive impact of corruption on the size of the shadow economy can be found.

JEL Classification: O17, O5, D78, H2, H26

Friedrich Schneider
Johannes Kepler University of Linz
Department of Economics
4040 Linz-Auhof
Austria
Email: friedrich.schneider@jk.uni-linz.ac.at

Dominik Enste
University of Cologne
Department of Economic Policy
50923 Cologne
Germany
Email: enste@wiso.uni-koeln.de

1 Introduction

As shadow or underground economic activities are a fact of life around the world, most societies attempt to control these activities through various measures like punishment, prosecution or education rather than through radical reforms of the tax and social security system providing more economic dynamic. Gathering statistics about the allocation of a country's resources in the shadow economy is very important for making effective and efficient decisions in economic policy. Hence, it is crucial to know, who is engaged in shadow economy activities, what are the frequencies with which underground activities are occurring and how big is the size of the shadow economy? Unfortunately, it is very difficult to get accurate information about underground or shadow economy activities, because all individuals engaged in these activities wish not to be identified. Hence, the estimation of the shadow economy activities can be considered as a scientific passion for knowing the unknown.

Although quite a large literature on single aspects of the hidden economy exists, a recent comprehensive survey is missing. The subject is still quite controversial and there are disagreements about the definition of shadow economy activities, the estimation procedures and the use of their estimates in economic analysis and policy aspects. The feature "Controversy: on the hidden economy" in the Economic Journal (Vol. 109, No. 456, June 1999) documents some different opinions e.g. of Vito Tanzi (1999), Jim J. Thomas (1999) and David E.A. Giles (1999a). Nevertheless, around the world there are strong indications for an increase of the shadow economy. The size, the causes and the consequences vary for different types of countries, but there are some comparisons that can be made and which might be interesting for social scientist and helpful for politicians, who need to deal with this phenomenon sooner or later.

The attempts to measure the size of the shadow economy are obviously difficult, since these activities are performed exactly to avoid registration and detection. Moreover, if you ask an academician, a public sector specialist, a policy or economy analyst, or a politician, what the shadow economy is all about, or even how big it is, you will get a wide range of answers. In spite of this, there is growing concern over the phenomenon of the shadow economy and there are several important reasons why politicians should be especially worried about the rise and growth of the shadow economy. Among the most important of these are:

(i) If the increase of the shadow economy is caused by a rise in the overall tax and social security burden together with an "institutional sclerosis" (Mancur Olson, 1982), then this "consecutive flight" into the shadow economy may lead to an erosion of the tax and social security bases. The result can be a vicious circle of a further increase in the budget deficit or of tax rates with the consequence of an additional increase in the shadow economy and eventually the weakening of the economic and social basis of collective arrangements. A growing shadow economy can be seen as a reaction by individuals who feel overburdened by state activities and who rather prefer the "exit option" than the "voice option" (Albert O. Hirschman, 1970).[1]

(ii) Under a growing shadow economy, (economic) policy is based on erroneous „official" indicators (like unemployment, official labor force, income, consumption), or at least indicators that are wrong in magnitude. In such a situation a prospering shadow economy may cause for politicians severe difficulties because it „causes" and „provides" unreliable official indicators, and the direction of the intended policy measures may therefore be questionable.

(iii) In addition, the effects of an increasing shadow economy on the official one need to be considered. On the one hand, a growing shadow economy may provide strong incentives to attract (domestic and foreign) workers away from the official economy and cause more competition for official firms. On the other hand at least two-thirds of the income earned in the shadow economy is immediately spent in the official economy resulting in a considerable (positive) stimulating effect on the official economy.[2]

These growing concerns and the scientific fascination of the underground economy has inspired the authors to undertake the challenging task of collecting all available data on the shadow economy, so that the development and size of the shadow economy over an extended period of time and, for as

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[1] See for further impacts on the analysis of the shadow economy Friedrich Schneider and Dominik H. Enste (1999). Some more general implications for governments are discussed e.g. by Bruno S. Frey (1997), Frey, Felix Oberholzer-Gee and Reiner Eichenberger (1996), Frey and Eichenberger (1996) and Elinor Ostrom (1990).

[2] This figure has been derived from polls of the German and Austrian population about the (effects of) the shadow economy. For further information see Schneider (1998b). These polls also show that two-thirds of the value added produced in the shadow economy would not be produced in the official economy without the activities in the shadow economy.

many countries as possible, can be shown. In section 2 an attempt is made to define shadow economy activities and an overview of some empirical results is given. In section 3 we examine main causes of the development of the shadow economy and in section 4 we analyze the interactions between the official and the unofficial economies. Section 5 provides a preliminary analysis of the link between corruption and the shadow economy and in section 6 the various methods to estimate the size of the shadow economy are presented. In section 7 more detailed empirical findings of the size of the shadow economy for developing, transition and OECD countries are shown and finally, in section 8 a summary is given and some conclusions are drawn.

2 The Shadow Economy: Definition and Size

2.1 What is the Shadow Economy?

Studies trying to measure the shadow economy face first of all the difficulty of how to define it. One commonly used working definition is: all economic activities which contribute to the officially calculated (or observed) Gross National Product, but are currently unregistered. This definition is used for example, by Edgar L. Feige (1989, 1994), Schneider (1994a), Frey and Werner Pommerehne (1984), and Herald Lubell (1991). Philip Smith (1994, p. 18) defines it as „market-based production of goods and services, whether legal or illegal that escapes detection in the official estimates of GDP.“ As these definitions still give no answer to a lot of questions, table 1 might be helpful for developing a better feeling for what could be a reasonable consensus definition of the legal and illegal underground or shadow economy.

Table 1: A Taxonomy of Types of Underground Economic Activities[1)]

Type of Activity	Monetary Transactions		Non Monetary Transactions	
ILLEGAL ACTIVITIES	Trade in stolen goods; drug dealing and manufacturing; prostitution; gambling; smuggling and fraud		Barter: drugs, stolen goods, smuggling etc. Produce or growing drugs for own use. Theft for own use.	
	Tax Evasion	**Tax Avoidance**	**Tax Evasion**	**Tax Avoidance**
LEGAL ACTIVITIES	Unreported income from self-employment; Wages, salaries and assets from unreported work related to legal services and goods	Employee discounts, fringe benefits	Barter of legal services and goods	All do-it-yourself work and neighbor help

[1)] The structure of the table is taken from Rolf Mirus and Roger S. Smith (1997, p. 5), with additional remarks.

From table 1 it becomes clear that the shadow economy includes unreported income from the production of legal goods and services, either from monetary or barter transactions - hence all economic activities which would generally be taxable were they reported to the tax authorities. In general, a precise definition seems quite difficult, if not impossible as „the shadow economy develops all the time according to the 'principle of running water': it adjusts to changes in taxes, to sanctions from the tax authorities and to general moral attitudes, etc.“ (Gunnar Mogensen, Hans K. Kvist, Eszter and Soren Pedersen 1995 p. 5).[3]

Moreover, the definition varies quite often depending on the chosen method to measure the shadow economy. In our analysis of the shadow economy we concentrate on legal value added creating activities, which are not taxed or registered and where the largest part them can be classified as “black” or clandestine labor.[4]

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[3]For a detailed discussion, see “Controversy: on the hidden economy” in Economic Journal (Vol. 109, No. 456, June 1999), Frey and Pommerehne (1984); Feige (1989); Thomas (1992, 1999); and Schneider (1986, 1994a, and 1998a).

[4] This means, unpaid or “pure” household production, voluntary nonprofit (social) services and criminal activities are excluded from the analysis. See Thomas (1992) for a broader view and a comprehensive analysis of the household, the informal, the irregular and the criminal sector in different types of countries.

Our survey does not focus on tax evasion or tax compliance itself. It is some kind of a supplement to the recent survey of James Andreoni, Brian Erard and Jonathan S. Feinstein (1998, p.819), who explicitly excluded the shadow economy: "Unfortunately, there are many important issues that we do not have room to discuss, most notably the vast literature on the underground economy which exists in part as a means of evading taxes."[5] Still, there are some connections between these two research areas. See for example Feinstein (1999), who tries to close the gap between tax evasion and shadow economy research.

2.2 How large is the Shadow Economy?

One of our main focus of this survey is to give an exhaustive summary of all available data on the size of the shadow economy, since until now, there exists no consistent comparison of estimates of the size of the shadow economies of various countries generated by using similar methods. An overview of some results, which are estimated with indirect or „indicator“ methods is given in tables 2 and 3, which serve to indicate approximate magnitudes of the size and development of the underground economy, defined as productive, value-adding activities, which should be part of the official GNP.[6]

Table 2 provides a rough comparison of the size of the shadow economy relative to official GDP for a selection of developing, transition and OECD economies at the beginning of the 1990s, using the physical input (electricity) and currency demand approach. The estimates for some of these countries (Nigeria, Egypt and Thailand) show an underground sector that is nearly three quarters the size of officially recorded GDP. In many countries (especially in Central and South America), the size is

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[5] While there have been many theoretical studies on tax evasion in the last twenty years, empirical studies of tax evasion are harder to find. Most of them are based on tax compliance experiments and cover only some parts of the shadow economy. Convincing empirical evidence for the theoretical hypothesis why people evade taxes, is hard to find and the empirical results are ambiguous (Pommerehne and Hannelore Weck-Hanneman 1992). James Alm (1996) gives an overview of tax compliance explanations in different studies. The theoretical literature on tax evasion is summarized in Frank Cowell (1990); see also Michael G. Allingham and Agnar Sandmo (1972) for their path-breaking study in this area.

[6] The more detailed results for 76 developing, transition and OECD-countries can be found in part 7 (including the sources). The different methods used to measure the size of the shadow economy are described in part 6.

one quarter to one third of GNP. In Asian countries, with a comparatively small public sector, high tax morale and/or high expected punishment (for example in Hong Kong, Singapore), the shadow economy is estimated to be similar to that in many “northern” European countries. Transition economies are estimated to often have substantial unofficial activities, many around one quarter of GNP. The biggest shadow economies have some former Soviet Union transition countries (between 28-43 % of GDP), like Georgia, Ukraine and Belarus. At the lower end ex-Czechoslovakia can be found. According to these estimates, the underground sector is around 10 percent of GDP.

Turning to the OECD countries the South European ones (Greece and Italy) have an underground economy almost one third as large as the officially measured GNP: followed by Spain, Portugal and Belgium, having a shadow economy between 20-24 % of (official) GNP. According to these estimates, the Scandinavian countries also have a sizeable unofficial economy (between 18-20 % of GNP) which is attributed mainly to the high fiscal burden. The “central” European countries (Ireland, the Netherlands, France, Germany and Great Britain) have a smaller shadow economy (between 13-16 % of GNP) probably due to a lower fiscal burden and moderate regulatory restrictions. The smallest underground economies are estimated to exist in countries with relatively small public sectors (Japan, the United States and Switzerland) and comparatively high tax morale (United States and Switzerland).

<u>Table 2:</u> **Size of the Shadow Economy Relative to GDP in Various Developing, Transition and OECD Countries, at the Beginning of the 1990s. Estimates Based on the Physical Input (Electricity) and the Currency Demand Approach.**

Developing Countries	
Africa	Size of the Shadow Economy in % of GDP, Average Over 1990-93
Nigeria Egypt	68-76 %
Tunisia Morocco	39-45 %
Central and South America	Size of the Shadow Economy in % of GDP, Average over 1990-93
Guatemala Mexico Peru Panama	40-60 %
Chile Costa Rica Venezuela Brazil Paraguay Columbia	25-35 %
Asia	Size of the Shadow Economy in % of GDP, Average Over 1990-93
Thailand	70 %
Philippines Sri Lanka Malaysia South Korea	38-50 %
Hong Kong Singapore	13 %

Table 2 continued

Transition Economies	
Central Europe	Size of the Shadow Economy in % of GDP, Average over 1990-93
Hungary Bulgaria Poland	20-28 %
Rumania Slovakia Czech Republic	7-16 %
Former Soviet Union Countries	Size of the Shadow Economy in % of GDP, Average over 1990-93
Georgia Azerbaijan Ukraine Belarus	28-43 %
Russia Lithunia Latvia Estonia	20-27 %
OECD countries	Size of the Shadow Economy in % of GDP, Average over 1990-93
Greece Italy Spain Portugal Belgium	24-30 %
Sweden Norway Denmark Ireland France Netherlands Germany Great Britain	13-23 %
Japan United States Austria Switzerland	8-10 %

Source: Own calculations.

Table 3 reports estimates of the growth of the underground economy (relatively to GNP) for selected Western countries and the United States, using the currency demand approach. The Scandinavian countries (Sweden, Norway and Denmark) and the German-speaking countries (Germany and Austria) exhibit a sizeable increase of the underground economy within the 35 years covered (1960-1995). The countries with a low share (Switzerland, Austria and the United States) show also a significant increase; in all three countries the share more than doubled. Sizeable increases have been estimated, with few exceptions, for all types of countries and with all kinds of approaches: the increasing importance of the underground relative to the official economy is a robust phenomenon (see part 7). The main causes of the increase especially in OECD-countries are discussed in the next part.

Table 3: Growth of the Shadow Economy Relative to GNP for Selected West European Countries and the United States, 1960-1995. Estimates Based on the Currency Demand Approach (Rounded Figures).

Country	Size of the shadow economy		Percentage Point Increase of the Shadow Economy
	1960	1995	
Sweden	2 %	16 %	14 %
Denmark	4,5 %	17,5 %	13 %
Norway	1,5 %	18 %	16,5 %
Germany	2 %	13,2 %	11,2 %
United States	3,5 %	9,5 %	6 %
Austria	0,5 %	7 %	6,5 %
Switzerland	1 %	6,7 %	5,7 %

Source: Own calculations.

3 What are the Main Causes of the Increase of the Shadow Economy?

The increase of the shadow economy has been caused by many different factors but the most important and most often cited ones are: [7]

- the rise of the burden of taxes and social security contributions combined with the increase in the density and intensity of regulations in the official economy, especially on labor markets',
- the (forced) reduction of weekly working time, the earlier retirement and the increasing unemployment rate, and
- the long-term decline of civic virtue and loyalty towards public institutions combined with a declining tax morale.

An interdisciplinary analysis of the causes responsible for the increase of the shadow economy seems to be necessary, since the economic factors can only partly explain the increase.[8] Especially micro-sociological, and psychological approaches can provide interesting additional insights in the decision process of individuals choosing to work in the underground (Schneider and Enste 1999). In an interdisciplinary approach (like undertaken in Economic Psychology) variables such as tax morale, which was first discussed by Günter Schmölders (1960, 1975), and other factors like acceptance and perceived fairness of the tax system are considered. A discussion of the importance of interdisciplinary research can be found in the recent articles in this journal by Matthew Rabin (1998), Jon Elster (1998), and Shira B. Lewin (1996). For a broader view see Robert H. Frank (1988) and Frey (1997). However, since our article concentrates on economic factors, we will focus on the economic reasoning.

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[7] When dealing with the various causes in the following sections 3.1 to 3.5 the most important references are given. For an overall view see the studies by Tanzi (1982); Frey and Pommerehne (1984); Thomas (1992) and Schneider and Enste (1999).

[8] Although until now interdisciplinary research focuses on tax compliance, see e.g. Alm, Gary H. McClelland and William Schulze (1999), Cowell (1990), Pommerehne, Albert Hart and Frey (1994) and the special issue on "Economic Psychological Perspectives on Taxation" of the Journal of Economic Psychology (December 1992), it is also useful for explaining other (hidden) activities, see Frey (1997).

3.1 The Influence of Tax and Social Security Contribution Burden

In almost all studies the rise of the tax and social security contribution burdens is one of the most important causes of the increase of the shadow economy.[9] Since taxes affect labor-leisure choices, and also stimulate labor supply in the shadow economy, or the untaxed sector of the economy, the distortion of this choice is a major concern of economists. The bigger the difference between the total cost of labor in the official economy and the after-tax earnings (from work), the greater is the incentive to avoid this difference and to work in the shadow economy. Since this difference depends broadly on the social security system and the overall tax burden, they are key features of the existence and the increase of the shadow economy.

A recent macroeconomic analysis of some of the causes for the increase of the shadow economy is given by Norman V. Loayza (1996). He presents a simple macroeconomic endogenous growth model whose production technology depends on congestable public services. The determinants and effects of excessive taxes and regulations on the informal sector are studied, where the government lacks the capability to enforce compliance. His empirical approach treats the informal sector as an unobserved variable for which multiple causes and multiple indicators exist and he uses the Multiple-Indicator-Multiple-Cause (MIMIC) model (see part 6.3). He estimates the size of the informal sector in 14 Latin American countries and finds some evidence for three determinants being significantly relevant at the 10 percent confidence level. Tax burden (0.33) and labor-market restrictions (0.49) affect the relative size of the informal sector positively, while the strength and efficiency (–0.42) of the government institutions have a negative influence leading to a decrease of the informal sector.[10] Because Loayza´s approaches only show statistical correlations rather than causal relations, he can only partly provide answers to questions like: Why do people choose to work in the shadow economy? What other factors (besides income motive) cause an increase of informal activities? Can other theories provide further help in determine relevant factors? Since, according to

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[9] See e.g. the studies by Tanzi (1982); Frey and Pommerehne (1984); Feige (1989); Susan Pozo (1996); Owen Lippert and Michael Walker (1997); Schneider (1994a, 1994b, 1997, 1998a, 1999); Thomas (1992), Hernando De Soto (1989), Ben-Zion Zilberfarb (1986), Tanzi (1999), Giles (1999a) and Schneider and Enste (1999).

[10] The numbers indicate the change of the size of the informal sector (in standard-deviations) with a one-standard deviation increase in each of the determinants.

the methodological individualism, only individuals can choose, it might be helpful to have a closer look at the individual decision (with respect to the influence of the tax and social security burden) to work in the shadow economy.

The determinants for a household to work in the shadow economy are similar to those of tax evasion, which was first discussed by Allingham and Sandmo (1972), namely: how much of the income should be declared to the tax authorities.[11] Neck, Hofreither and Schneider (1989), who developed a micro economic model of shadow economic activities investigated the determinants of a household's supply of underground labor and its demand for underground goods. Among other results, they showed that, at least under an additive-separable utility function and with a two-stage decision of the consumer, higher marginal income tax rates imply a higher supply of underground labor, and higher wage rates in the official economy imply a lower supply of underground labor. On the other hand, they showed, that the firms demand for underground labor and supply of underground goods depend positively on the indirect tax rate and on the wage rate in the official economy, at least under the assumption of fixed non-human factors of a production and separate production functions for official and underground goods. Disregarding other factors influencing the extend of the shadow economy, one can conjecture that in partial equilibrium higher indirect tax rates and higher marginal income tax rates tend to raise the amount of labor and goods, bought and sold in the underground sector. Official sector wage rate changes may have a positive or negative influence on the equilibrium amount of the underground labor, depending upon whether demand or supply changes dominate. In addition, the equilibrium quantities of the shadow economy labor and goods also depend on other variables like penalty rates and detection probabilities for tax evasion, which are to some extend under control of the government.

One must, however, be very careful not to draw premature policy conclusions from such a model. First the comparative static results have been derived only under special assumptions and do not generalize to arbitrary utility and production functions. Second, Neck, Schneider and Hofreither have concentrated on the determinants of the quantities of goods and labor supplied and demanded by individual firms and households and have not presented a rigorous analysis of market equilib-

[11] For a comprehensive review of the literature see Cowell (1990), Reinhard Neck, Markus Hofreither and Schneider (1989) and Feinstein (1999).

rium conditions. Their model ought to be closed by putting individual decision makers into the context of a general equilibrium model, which in their case would consist of at least two labor markets and two goods markets, the official and the shadow economy markets in each case. Only in such a theoretical framework all spillovers could be analyzed appropriately, and prices and wages, which have been assumed to be given for the individual transactors, could be determined endogenously. Also, on a more general level, an analyses of the effects of the degree of progression on the shadow economy has to take into account differences of reactions across consumers with respect to the total and official economy labor supply. The different effects on official and underground labor supply so far seem to be an open question, which could be appropriately treated in a general equilibrium model, with official and underground markets for labor and goods and with different types of consumers. To our knowledge such a theoretical model is, however, not available at the present time.

In another theoretical micro economic study Schneider and Neck (1993) investigate how the complexity of the tax system effects the size of the shadow economy. They argue, that the literature has not paid much attention to the question of how the complexity of the tax system effects the shadow economy. They try to capture the notion of the complexity of the income tax by making the following observation: A complex income-tax schedule allows for more possibilities of legal tax avoidance than a simple one by providing tax exemptions and reductions of various kinds. For example the Austrian tax reform of 1989 is generally considered to have made the income-tax schedule less complex, because it has reduced marginal income tax rates and simultaneously broaden the tax base by abolishing several assumptions and loopholes in the income-tax schedule. According to this view, a comprehensive income tax can be considered to display a very low degree of complexity. Schneider and Neck show in their theoretical model that a more complex tax system (a tax schedule which admits more assumptions) implies, ceteris paribus, a smaller labor supply in the shadow economy. The economic reason for this is the following: A more complex tax system makes individual efforts to avoid taxation legally more profitable. At the same time it encourages households to do work in the official economy instead of the underground economy, as reduced tax burden makes tax evasion (with a risk of being caught and punished) less attractive. Broadening the income-tax base and removing tax assumptions as done in Austria in 1989, for example, can therefore increase the size of the shadow economy, ceteris paribus. The next step in the paper by Schneider and Neck was to theoretically and empirically analyze the effects of changing tax systems and

structures on the development of the Austrian shadow economy, emphasizing the negative effect of the complexity of the tax system on the extend of the shadow economy. When the tax system and the tax structure was significantly changed by the Austrian government (like e.g. in 1989), one would expect that, for example, a massive increase in the direct tax burden would lead to a decline in the shadow economy. In the major tax reform in Austria in 1989 such a result was actually not found and the explanation offered by Neck and Schneider is, that not only the direct and indirect tax burden is an important factor influencing the shadow economy, but also the complexity of the tax system and the burden of regulation. The theoretical and empirical results in their study clearly indicate, that both factors, i.e. a less complex tax system with a broader tax base and an increase regulation, more than offset the significantly lower tax burden in 1989 showing that only lowering the direct tax burden is not sufficient to bring about a decline of the shadow economy.[12]

The strong influence of indirect and direct taxation on the shadow economy can be further demonstrated by discussing empirical results in the case of Austria and the Scandinavian countries. In the case of Austria, Schneider (1994b) estimates a currency demand function including as driving forces for the shadow economy the following four types of variables:

- The burden of total direct taxation,
- the burden of indirect taxation,
- the complexity of the tax system and
- the intensity of government regulations.

The estimated coefficient of the independent variable, direct tax burden (including social security payments), has the biggest influence, followed by the intensity of regulation and complexity of the tax system on the currency demand. A similar result has been achieved by Schneider (1986) for Scandinavia (Denmark, Norway and Sweden). In all three countries various tax variables (average direct tax rate, average total tax rate (indirect and direct tax rate)) and marginal tax rates have the expected positive direction of influence (on currency demand) and are highly statistically signifi-

[12] For Canada Peter S. Spiro (1993) finds that people once working in the shadow economy like the high profiles from irregular activities, develop social networks and personal relationships and hence will not return in the official economy even in the long run.

cant. Similar results are reached by Gebhard Kirchgaessner (1983, 1984) for Germany and by Jan Klovland (1984) for Norway and Sweden.

Two other recent studies provide strong evidence of the influence of income taxes on the shadow economy: Richard J. Cebula (1997), using Feige data for the shadow economy, found evidence of the impact of government income tax rates, IRS audit probabilities, and IRS penalty policies on the relative size of the shadow economy in the United States. Cebula concludes that a restraint of any further increase of the top marginal income tax rate may at least not lead to a further increase of the shadow economy, while increased IRS audits and penalties might reduce the size of the shadow economy. His findings indicate that there is generally a strong influence of state activities on the size of the shadow economy: For example, if the marginal federal personal income tax rate increases by one percentage point, ceteris paribus, the shadow economy rises by 1.4 percentage points. In another investigation, Roderick Hill and Muhammed Kabir (1996) found empirical evidence that marginal tax rates are more relevant than average tax rates, and that a substitution of direct taxes by indirect taxes seems unlikely to improve tax compliance.

More evidence on the effect of taxation on the shadow economy is presented by Simon Johnson, Daniel Kaufmann and Pablo Zoido-Lobatón (1998a, 1998b), who come to the conclusion that it is not higher tax rates *per se* that increase the size of the shadow economy, but the ineffective and discretionary application of the tax system and the regulations by governments. Their finding, that there is a *negative* correlation between the size of the unofficial economy and the *top* (marginal) tax rates, might be unexpected, but since other factors like tax deductibility, tax reliefs, tax exemptions, the choice between different tax systems, and various other options for legal tax avoidance were not taken into account, it is not all that surprising. Eric Friedman, Johnson, Kaufmann and Zoido-Lobatón (1999) found a similar result in a cross country analysis that *higher* tax rates are associated with *less* unofficial activity as percent of GDP. They argue entrepreneurs go underground not to avoid official taxes but they want to reduce the burden of bureaucracy and corruption. However looking at their empirical (regression) results the finding that higher tax rates are correlated with a lower share of the unofficial economy is not very robust and in most cases, using different tax rates, they do not find a statistically significant result. The overall conclusion of the studies is, that there is a large difference between the impact of either the direct tax or the corporate tax burden and institutional aspects, like the efficiency of the administration, the extent of control rights held by politi-

cians and bureaucrats, the amount of bribery and especially corruption. Johnson, Kaufmann, and Zoido-Lobatón (1998b) think these aspects play a bigger role in the "bargaining game" between the government and the taxpayers than the tax burden.

3.2 Intensity of Regulations

The increase of the intensity of regulations (often measured in the numbers of laws and regulations, like licenses requirements) is another important factor, which reduces the freedom (of choice) for individuals engaged in the official economy.[13] One can think of labor market regulations, trade barriers, and labor restrictions for foreigners. The influence of labor regulations on the shadow economy is clearly described and theoretically derived in studies, e.g. for Germany (Deregulation Commission 1990/91, Monopolkommission 1998). Regulations lead to a substantial increase in labor costs in the official economy. But since most of these costs can be shifted on the employees, these costs provide another incentive to work in the shadow economy, where they can be avoided. Schneider and Günther Pöll (1999) present some empirical evidence of this impact.

Further empirical evidence provides the model of Johnson, Kaufmann and Andrei Shleifer (1997), which predicts, inter alia, that countries with more general regulation of their economies tend to have a higher share of the unofficial economy in total GDP. A one-point increase of the regulation index (ranging from 1 to 5, with 5 = the most regulation in a country), ceteris paribus, is associated with an 8.1 percentage point increase in the share of the shadow economy, when controlled for GDP per capita (Johnson, Kaufmann, and Zoido-Lobatón (1998b, p. 18). They conclude that it is the enforcement of regulation, which is the key factor for the burden levied on firms and individuals, and not the overall extent of regulation - mostly not enforced - which drive firms into the shadow economy. Friedman, Johnson, Kaufmann and Zoido-Lobatón (1999) reach a similar result. In their study every available measure of regulation is significantly correlated with the share of the unofficial economy and the direction of the correlation is unambiguous: *more regulation is correlated with a larger shadow economy*. A one point increase in an index of regulation (ranging from 1-5) is asso-

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[13]See for a psychological, theoretical foundation (theory of reactance) of this feature Jack W. Brehm (1966, 1972), and for a (first) application to the shadow economy Linde Pelzmann (1988). See Schneider and Enste (1999) for an integration of this theory in an interdisciplinary (rational choice) approach.

ciated with a 10 % increase in the shadow economy for 76 developing, transition and developed countries.[14]

These findings demonstrate that governments should put more emphasis on the reduction of the density of regulations or at least on improving enforcement of laws and regulations, instead of increasing the number of regulations. Some governments, however, prefer this policy option (more regulations and laws), when trying to reduce the shadow economy, mostly because it leads to an increase in power of the bureaucrats and to a higher rate of employment in the public sector. Besides, politicians might not really have an interest in a substantial decrease of the shadow economy, since a lot of voters gain from unofficial activities. The signaling of "fighting for law and order" might therefore be more useful for the chances of being reelected than radical reforms of the tax and the social security systems.[15]

3.3 Social Transfers

The social welfare system leads to strong negative incentives for beneficiaries to work in the official economy since their marginal tax rate often equals or nearly reaches 100 percent. This can be derived from the neoclassical leisure-income model as presented by Peter de Gijsel (1984), Volker Riebel (1983, 1984) and Schneider and Enste (1999). For Canada Thomas Lemieux, Bernard Fortin, and Pierre Fréchette (1994) and for Germany for example Siegfried Lamnek, Gaby Olbrich, and Wolfgang Schäfer (1999) found empirical evidence of this impact. Such a system provides major disincentives for individuals who are getting welfare payments to even search for work in the official economy, since their overall income is much higher when they are still receiving these transfers, while possibly working in the underground economy.

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[14] De Soto (1989) describes in his famous book in more detail the costs of regulation in Peru.

[15] See for example Frey (1989) for a first application of the Public Choice Theory to the shadow economy and for a further discussion Schneider and Enste (1999).

3.4 Labor Market

The numerous regulations on the official labor market and the total wage costs are also driving forces for the shadow economy. Two main aspects - the effects of the reduction in official working hours and the influence of the unemployment rate on the increase of the shadow economy - are discussed quite often in this context:

- As in most OECD-countries unemployment is to a large extend caused by the fact that total labor costs are too high, this can be seen as a cause for an increase of the shadow economy.
- The reduction in working hours in the official economy was introduced by governments (e.g. France) and/or labor unions (e.g. Germany) in order to reduce the unemployment rate. An overview of these economic policy measures is given in OECD (1998, pp. 123-188). The idea behind this is that there is only a limited quantity of work, and that this quantity has to be "redistributed". But this idea neglects a key factor that especially a forced reduction of working hours against the preferences of the employees increases the potential of hours that can be worked in the shadow economy, see for example Jennifer Hunt (1999).[16] Early retirements can also lead to more unofficial activities and part time work offers great opportunities to the individual to adopt another job in the untaxed, unregulated economy, as argued by de Gijsel (1984) and Riebel (1983, 1984). The redistribution of work can only be successful, if the reduction is either in accordance to the individual preferences and they want to maximize their leisure time or they are incapable of work, because otherwise they might choose to keep on working – in the underground.[17]

More detailed information of the labor supply decision in the underground economy is given by Lemieux, Fortin, and Fréchette (1994) using micro data from a survey conducted in Quebec City (Canada). The results of their study suggest that hours worked in the shadow economy are quite

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[16] After Volkswagen in Germany reduced the working hours considerably, there is some (until now basically anecdotal) evidence, that in the area around the firm, much more reconstruction and renovation of houses took place compared to similar other regions.

[17] See Gary S. Becker (1965) for the theoretical foundation and F. Thomas Juster and Frank P. Stafford (1991) for a more detailed analysis of the allocation of time.

responsive to changes in the net wage in the regular (official) sector. Their empirical findings clearly indicate, that "participation rates and hours worked in the underground sector also tend to be inversely related to the number of hours worked in the regular sector" (Lemieux, Fortin, and Fréchette 1994 p. 235). In total their results emphasize a large negative elasticity of hours worked in the shadow economy with respect to the wage rate in the regular sector and also a high mobility between the sectors. A (further) reduction of (official) working hours can therefore lead to an increase of the shadow economy, since – for example in Germany – almost all recent empirical investigations show that most of the employees do not want a further reduction at all (Schneider and Enste 1999, DIW 1998, Bosch and Lehndorff 1998). Hence, a reasonable economic policy suggestion is a higher flexibility of working hours in accordance to the preferences of the employees, because this minimizes the distortion of the individual decision by this kind of labor market restrictions.

3.5 Public Sector Services

An increase of the shadow economy leads to reduced state revenues which in turn reduces the quality and quantity of publicly provided goods and services. Ultimately, this can lead to an increase in the tax rates for firms and individuals in the official sector, quite often combined with a deterioration in the quality of the public goods (such as the public infrastructure) and of the administration, with the consequence of even stronger incentives to participate in the shadow economy. Johnson, Kaufmann, and Zoido-Lobatón (1998b) present a simple model of this relationship. Their findings show that smaller shadow economies appear in countries with higher tax revenues, if achieved by lower tax rates, fewer laws and regulations and less bribery facing enterprises. Countries with a better rule of the law, which is financed by tax revenues, also have smaller shadow economies. Transition countries have higher levels of regulation leading to a significantly higher incidence of bribery, higher effective taxes on official activities and a large discretionary framework of regulations and consequently to a higher shadow economy. Their overall conclusion is that "wealthier countries of the OECD, as well as some in Eastern Europe find themselves in the 'good equilibrium' of relatively low tax and regulatory burden, sizeable revenue mobilization, good rule of law and corruption control, and (relatively) small unofficial economy. By contrast, a number of countries in Latin American and the Former Soviet Union exhibit characteristics consistent with a 'bad equilibrium': tax and regulatory discretion and burden on the firm is high, the rule of law is weak,

and there is a high incidence of bribery and a relatively high share of activities in the unofficial economy.“ (Johnson, Kaufmann and Zoido-Lobatón 1998a p. I).

Therefore, in a lot of countries the public sector is facing the challenge to impose substantial reforms of the social security and tax systems to prevent the total defeat of the protective welfare state, because of the vicious circle of high tax and regulation burdens causing an increase of the shadow economy, causing additional pressure on public finance resulting in higher tax rates, which are again increasing the incentives to evade taxes and to escape in the shadow economy and so on. The shadow economy can therefore been seen as a challenge to the welfare state (Manfred E. Streit 1984). Since in a cumulative process existing institutions and rules might lose their acceptance in the society, ending up in a situation, where democratic voting (voice) is less attractive than using the exit option “shadow economy”. Eventually, the loyalty to the democratic political institutions is abandoned or cannot be developed as can be seen in some former Soviet Union states.

4 The Effects of the Shadow Economy on the Official Economy

The analysis of the effects of an increasing shadow economy is quite difficult and comprehensive empirical evidence is not available. Most studies focus on the influence on the allocation of resources and the loss of revenue for the state. But the impact on the official institutions, norms and rules is even more important. The shadow economy can be seen as an indicator of a serious deficit of legitimacy of the present social order and the current rules of official economic activities. The exit-option “shadow economy” is an important restriction for the Leviathan state and can secure economic freedom and liberty.[18]

In order to study the effects of the shadow economy on the allocation of resources in the economy, several studies integrate underground economies into macroeconomic models.[19] John F. Houston (1987) develops a theoretical macro model of business cycle as well as tax and monetary policy

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[18] See for the importance of institutions and the impact of the shadow economy for example Geoffrey Brennan and James M. Buchanan (1980, 1985).

[19] For Austria this was done by Schneider, Hofreither, and Neck (1989) and Neck, Hofreither, and Schneider (1989). For further discussion of this aspect see Peter J. Quirk (1996) and Giles (1999a).

linkages with the shadow economy. He concludes from his investigation of the growth of the shadow economy that, on the one side its effect should be taken into account in setting tax and regulatory policies and on the other side the existence of a shadow economy could lead to an overstatement of the inflationary effects of fiscal or monetary stimulus. Markus C. Adam and Victor Ginsburgh (1985) focus on the implications of the shadow economy on "official" growth in their study for Belgium. They find a positive relationship between the growth of the shadow economy and the "official" one and under certain assumptions (i.e. very low entry costs into the shadow economy due to a low probability of enforcement) they conclude that an expansionary fiscal policy has a positive stimulus for both the formal and informal economies. A study for the United States by Ronald Fichtenbaum (1989) argues that the U. S. productivity slowdown over the period 1970 to 1989 was vastly overstated, as the underreporting of income due to the more rapid growth of the U. S. shadow economy during this period was *not* taken into account. Similar impacts were found by Pommerehne and Schneider (1985).

Another hypothesis is, that a substantial reduction of the shadow economy leads to a significant increase in tax revenues and therefore to a greater quantity and quality of public goods and services, which ultimately can stimulate economic growth. Some authors found evidence for this hypothesis. A recent study by Loayza (1996) presents a simple macroeconomic endogenous growth model whose production technology depends on congestable public services. The determinants and effects of the informal sector are studied, where excessive taxes and regulations are imposed by governments and where the capability to enforce compliance is low. The model concludes that in economies where (1) the statutory tax burden is larger than the optimal tax burden and where (2) the enforcement of compliance is too weak, the increase of the relative size of the informal economy generates a reduction of economic growth. The reason for this correlation is the strongly negative correlation between the informal sector and public infrastructure indices, while public-infrastructure is the key element for economic growth. For example, Loayza finds empirical evidence for Latin America countries that if the shadow economy increases by one percentage point (of GDP) - ceteris paribus - the growth rate of official real GDP per capita decreases by 1.22 percentage points. This negative impact of informal sector activities on economic growth is not broadly accepted. For example, the key feature of the model has been criticized. The model is based on the assumption that the production technology essentially depends on tax-financed public services, which are subject to congestion and that is in contrast to the general definition of public goods, which are *not* subject to

congestion (in opposite to private goods). In addition, the informal sector is not paying any taxes but must pay penalties which are not used to finance public services. The negative correlation between the size of the informal sector and economic growth is therefore not very surprising. Patrick K. Asea (1996) gives a more detailed criticism of the Loayza model.

Depending on the prevailing view of the informal sector, one might also come to the opposite conclusion. In the neoclassical view the underground economy is optimal in the sense that it responds to the economic environment's demand for urban services and small-scale manufacturing. From this point of view the informal sector provides the economy with a dynamic and entrepreneurial spirit and can lead to more competition, higher efficiency and strong boundaries and limits for government activities. The informal sector may also offer great contributions "to the creation of markets, increase financial resources, enhance entrepreneurship, and transform the legal, social, and economic institutions necessary for accumulation" (Asea 1996 p. 166). The voluntary self-selection between the formal and informal sectors, as described above in microeconomic models, may provide a higher potential for economic growth and, hence, a positive correlation between an increase of the informal sector and economic growth. The effects of an increase of the shadow economy on economic growth therefore remain considerably ambiguous.

The empirical evidence of these opposite hypotheses is also not clear. Since many Latin American countries had or still have a tradition of excessive regulations and weak government institutions, Loayza (1996) finds some evidence of the implications of his growth model in the early 1990s in these countries: The increase in the size of the shadow economy negatively affects growth (1) by reducing the availability of public services for everyone in the economy, and (2) by using the existing public services less efficiently, or not at all. But the positive „side effects" of shadow economy activities must be considered, too. Empirical findings of Schneider (1998b) show clearly that over 66 percent of the earnings in the shadow economy are rather immediately spent in the official sector. This additional expenditure has positive effects for economic growth and for the (indirect) tax revenues. Dilip K. Bhattacharyya (1993, 1999) found clear evidence for the United Kingdom (1960-1984) that the hidden economy has a positive effect on consumer expenditures of non durable goods and services, but an even stronger positive effect on consumer expenditures of durable goods and services. A close interaction between official and unofficial economies is also emphasized in Giles (1999a) and in Tanzi (1999).

5 Corruption and the Shadow Economy - Substitutive or Complementary Effects?

Over the last ten years, corruption has gained growing attention among scientists, politicians, and public officials. Its origins, consequences and ways to fight it, have been analyzed. The literature is quite large and only some (basically recent) publications can be mentioned here: Susan Rose-Ackermann (1978, 1997, 1999), Arvind Jain (1998), Shleifer and Robert W. Vishny (1993), Tanzi (1994, 1998), Tanzi and Hamid Davoodi (1997), Johnson, Kaufmann and Zoido-Lobatón (1998a, 1998b), Kaufmann and Jeffrey Sachs (1998); for the latest survey see Pranab Bardhan (1997).

Corruption has been defined in many different ways but „the most popular and simplest definition of corruption is that it is the abuse of public power for private benefit“(Tanzi, 1998, p.8). In this definition the private sector seems to be excluded, which is, of course, not the case, - a more general definition is „that corruption is the intentional non-compliance with arm's length relationship from this behavior for oneself or for related individuals“ (Tanzi 1998, p. 8). There are various kinds of corruption including cost-reductions in response to bribes and cash payments, and in the literature extensive analysis' of factors stimulate corruption can be found. Activities in which corruption is sometimes involved include:

- regulations or licenses to engage particular activities (e.g. opening a shop, a taxi license);
- land zoning and other similar official decision;
- access to the publicly provided goods and services;
- control over decision-making regarding procurement or public investment contracts;
- control over the provision of tax incentives; and
- control over hiring and promotion within the public sector.

The effects of corruption on the official economy can be seen from two different perspectives: Paul Romer (1994) has suggested that corruption, as a tax on ex-post profits, may in general stimulate the entry of new goods or technology, which require an initial fixed-cost investment. Paolo Mauro (1995) finds a significant negative correlation between a corruption index and the investment rate or rate of GDP growth. A one-standard-deviation improvement in the corruption index is estimated by Mauro to increase the investment rate by about 3 percent. Johnson, Kaufmann, and Zoido-Lobatón

(1998b, p. 39) find a significant relationship between corruption and GDP growth (an increase in corruption on an indexed scale from 0 to 6 by a 1 point decreases GDP growth by 0.84 percentage points) but the relationship becomes insignificant if the shadow economy is entered as an independent variable. In contrast to that, Bardhan (1997, p. 1329) concludes, that „it is probably correct to say that the process of economic growth ultimately generates enough forces to reduce corruption"- a view which is supported by Rose-Ackermann (1997), who further argues that any reform that increases the competitiveness of the economy will help reduce incentives for corruption. Thus, policies that liberalize foreign trade and remove entry barriers for industry promote competition and reduce corruption. Such reforms will also encourage firms to move from the shadow economy into the official economy, where they can obtain access to capital at market rates. Rose-Ackermann (1997, p. 21) concludes that „going underground is a *substitute* for bribery, although sometimes firms bribe officials in order to avoid the official states."

There are only a few studies which empirically investigate the relationship between the shadow economy and corruption, either in a country or over a sample of countries. See e.g. Johnson, Kaufmann, and Zoido-Lobatón (1998a, 1998b); Johnson, Kaufmann, and Shleifer (1997), and Kaufmann and Sachs (1998). Johnson, Kaufmann, and Zoido-Lobatón (1998, p. 21) find, in their empirical investigation of 49 countries of Latin America, the OECD, and the post-communist countries of Eastern Europe and the Former Soviet Union, a statistically highly significant relationship between the various measures of bribery or corruption and the shadow economy: a 1 point improvement (= less corruption) in the corruption index ICRG[20] leads to about an 8.0 – 11.0 percentage point decline in the shadow economy, ceteris paribus. Using another measure for corruption, the transparency International Corruption Index[21] Johnson, Kaufmann, and Zoido-Lobatón (1998b) found that a 1 point increase in this index (= less corruption) decreases the shadow economy by 5.1 percentage points, ceteris paribus. Friedman, Johnson, Kaufmann and Zoido-Lobatón (1999, p.27) conclude: "In summary, the relationship between the share of the unofficial economy and rule of law (including corruption) is strong and consistent across eight measures provided by six distinct organizations.

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[20]This index ranks between 1 and 6 (best = no corruption) and was averaged by Johnson, Kaufmann, and Zoido-Lobatón (1998b, p. 21) for the nineties.

[21]This index ranks between 0 and 10 (= best = no corruption).

All eight of the indices suggest, that countries with more corruption have a higher share of the unofficial economy". In their investigation they show, that a one point increase in the index of corruption increases the share of the unofficial economy by 7.6 percentage points in the year 1997.

To summarize, the relationship between the size of the shadow economy and the amount of corruption is strong and consistent, as different measures show. Countries with more corruption and briberies have a higher share of the shadow economy of official GDP. Whereas Rose-Ackermann concludes from her work, that going underground is a *substitute* for corruption (bribery), the empirical results of Johnson, Kaufmann, and Zoido-Lobatón (1998b) point more to a complementary process: Countries with more corruption, ceteris paribus, have higher shares of the shadow economy.

6 Methods to Estimate the Size of the Shadow Economy

To measure the size and development of the shadow economy three different types of methods are most widely used. They are described and briefly discussed in the following three subsections. A more detailed discussion is given in Frey and Pommerehne (1984), Feige (1989), Thomas (1992, 1999) and Schneider (1986, 1994a, 1998a, 1999).

6.1 Direct Approaches

These are micro approaches which employ either well designed surveys and samples based on voluntary replies or tax auditing and other compliance methods. Sample surveys designed for estimation of the shadow economy are widely used in a number of countries to measure the shadow economy. The direct method of voluntary sample surveys has been extensively used for Norway by Arne J. Isachsen, Jan Klovland and Steinar Strom (1982), and Isachsen and Strom (1985). For Denmark this method is used by Mogensen, Kvist, Pedersen, Pedersen (1995), in which they report „estimates" of the shadow economy of 2.7 percent of GDP for 1989, of 4.2 percent of GDP for 1991, of 3.0 percent of GDP for 1993 and of 3.1 percent of GDP for 1994. Further results for other countries can be found in table 8.

The main disadvantage of this method is that it presents the flaws of all surveys: average precision and results depend greatly on the respondents willingness to cooperate. It is difficult to asses the rise of the undeclared work from a direct questionnaire. Most interviewed hesitate to confess a fraudulent behavior and quite often responses are rarely reliable so that it is difficult, from this type

of answers, to calculate a real estimate – in monetary terms – of the extend of undeclared work. The main advantage of this method lies in the detailed information about the structure of the shadow economy, but the results from these kinds of surveys are very sensitive to the way the questionnaire is formulated. The advantages and disadvantages of this method are extensively dealt by Mogensen, Kvist, Pedersen, Pedersen (1995) in their excellent and very carefully done investigation.

Estimates of the shadow economy can also be based on the discrepancy between income declared for tax purposes and that measured by selective checks. Fiscal auditing programs have been particularly effective in this regard. Designed to measure the amount of undeclared taxable income, they have been used to calculate the shadow economy in several countries. For the United States see for example IRS (1979, 1983), C. P. Simon and A. D. Witte (1982), Witte (1987), Charles T. Clotefelter (1983), and Feige (1986). A more detailed discussion is given in Bruno Dallago (1990) and Thomas (1992).

A number of difficulties beset this approach. Firstly, using tax compliance data is equivalent to using a (possibly biased) sample of the population. However, since in general a selection of tax payers for tax audit is not random, but based on properties of submitted (tax) returns which indicate a certain likelihood of (tax) fraud, such a sample is not a random one of the whole population. This factor is likely to bias compliance – based estimates of the black economy. Secondly, estimates based on tax audits reflect that portion of black economy income which the authorities succeeded in discovering and this is likely to be only a fraction of hidden income.

A further disadvantage of the two direct methods (surveys and tax auditing) is that they lead only to point estimates. Moreover, it is unlikely that they capture all „shadow“ activities, so they can be seen as providing lower bound estimates. They are unable (at least at present) to provide estimates of the development and growth of the shadow economy over a longer period of time. As already argued, they have, however at least one considerable advantage - they can provide detailed information about shadow economy activities and the structure and composition of those who work in the shadow economy.

6.2 Indirect Approaches

These approaches, which are also called „indicator“ approaches, are mostly macroeconomic ones and use various economic and other indicators that contain information about the development of

the shadow economy (over time). Currently there are five indicators which leave some „traces“ of the development of the shadow economy: and are discussed now.

6.2.1 The Discrepancy between National Expenditure and Income Statistics

This approach is based on discrepancies between income and expenditure statistics. In national accounting the income measure of GNP should be equal to the expenditure measure of GNP. Thus, if an independent estimate of the expenditure site of the national accounts is available, the gap between the expenditure measure and the income measure can be used as an indicator of the extend of the black economy.

This approach has been used by A. Franz (1983) for Austria; by Kerrick MacAfee (1980), Michael O'Higgins (1989) and James D. Smith (1985) for Great Britain; by Hans-Georg Petersen (1982) and Daniela Del Boca (1981) for Germany and by T. Park (1979) for the United States. The latest international comparison of the shadow economy using micro level data has been undertaken by Tiho Yoo and Jin K. Hyun (1998). They calculate the size of the shadow economy of Korea (1996: 20,3 percent), Taiwan (1995: 16,5 percent), Italy (1995: 19,2 percent), Spain (1990: 50,5 percent), Russia (1995: 74,9 percent) and Hungary (1994: 56,9 percent). See Thomas (1992) for a survey and critical remarks.

Since national accounts statisticians will be anxious to minimize this discrepancy, the initial discrepancy or first estimate, rather than the published discrepancy should be employed for this purpose. If all the components of the expenditure site where measured without error, then this approach would indeed yield a good estimate of the scale of the shadow economy. However, unfortunately, this is not the case and the discrepancy, therefore, reflects all omissions and errors everywhere in the national accounts statistics as well as the shadow economy activity. These estimates may therefore be very crude and of questionable reliability.[22]

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[22] A related approach is pursued by C. Pissarides and G. Weber (1988), who use micro data from household budget surveys to estimate the extend of income understatement by self-employed. In this micro approach more or less the same difficulties arise and the figures calculated for the shadow economies seem to be crude.

6.2.2 The Discrepancy between the Official and Actual Labor Force

A decline in participation of the labor force in the official economy can be seen as an indication of increased activity in the shadow economy. If total labor force participation is assumed to be constant, a decreasing official rate of participation can be seen as an indicator of an increase in the activities in the shadow economy, ceteris paribus. Such studies have been made for Italy (Bruno Contini 1981, 1982; Del Boca 1981) and for the United States (David M. O'Neill 1983).

The weakness of this method is that differences in the rate of participation may also have other causes. Moreover, people can work in the shadow economy and have a job in the „official' economy. Therefore such estimates may be viewed as weak indicators of the size and development of the shadow economy.

6.2.3 The Transactions Approach

This approach has been developed by Feige (1979, 1989 and 1996). A further application can be found for the Netherlands (Werner C. Boeschoten and Marcel M. G. Fase 1984), and for Germany (Enno Langfeldt 1984). Feige assumes, that there is a constant relation over time between the volume of transaction and official GNP. This approach therefore starts from Fisher's quantity equation, M*V = p*T (with M = money, V = velocity, p = prices, and T = total transactions). Assumptions have to be made about the velocity of money and about the relationships between the value of total transactions (p*T) and total (=official + unofficial) nominal GNP. Relating total nominal GNP to total transactions, the GNP of the shadow economy can be calculated by subtracting the official GNP from total nominal GNP. However, to derive figures for the shadow economy, Feige has to assume a base year in which there is no shadow economy, and therefore the ratio of p*T to total nominal (official = total) GNP was „normal" and would have been constant over time, if there had been no shadow economy.

This method, too, has several weaknesses: for instance, the assumption of a base year with no shadow economy, and the assumption of a „normal" ratio of transactions constant over time. Moreover, to obtain reliable estimates, precise figures of the total volume of transactions should be available. This availability might be especially difficult to achieve for cash transactions, because they depend, among other factors, on the durability of bank notes, in terms of the quality of the papers on which they are printed. In this approach the additional assumption is made that all variations

in the ratio between the total value of transaction and the officially measured GNP are due to the shadow economy. This means that a considerable amount of data is required in order to eliminate financial transactions from “pure” cross payments, which are totally legal and have nothing to do with the shadow economy. For a detailed criticism of the transaction approach see Boeschoten and Fase (1984), Frey and Pommerehne (1984), Kirchgaessner (1984), Tanzi (1982, 1986), Dallago (1990), Thomas (1986, 1992, 1999) and Giles (1999a). In general, although this approach is theoretically attractive, the empirical requirements necessary to obtain reliable estimates are so difficult to fulfil, that its application may lead to doubtful results.

6.2.4 The Currency Demand Approach

The currency demand approach was first used by Phillip Cagan (1958), who calculated a correlation of the currency demand and the tax pressure (as one cause of the shadow economy) for the United States over the period 1919 to 1955. 20 years later, Pierre M. Gutmann (1977) used the same approach, but did not use any statistical procedures; instead he „only“ looked at the ratio between currency and demand deposits over the years 1937 to 1976.

Cagan´s approach was further developed by Tanzi (1980, 1983), who econometrically estimated a currency demand function for the United States for the period 1929 to 1980 in order to calculate the shadow economy. His approach assumes that shadow (or hidden) transactions are undertaken in the form of cash payments, so as to leave no observable traces for the authorities. An increase in the size of the shadow economy will therefore increase the demand for currency. To isolate the resulting „excess“ demand for currency, an equation for currency demand is econometrically estimated over time. All conventional possible factors, such as the development of income, payment habits, interest rates, and so on, are controlled for. Additionally, such variables as the direct and indirect tax burden, government regulation and the complexity of the tax system, which are assumed to be the major factors causing people to work in the shadow economy, are included in the estimation equation. The basic regression equation for the currency demand, proposed by Tanzi (1983), is the following:

$$ln\,(C / M_2)_t = b_O + b_1\, ln\,(1 + TW)_t + b_2\, ln\,(WS / Y)_t + b_3\, ln\, R_t + b_4\, ln\,(Y / N)_t + u_t$$

with $b_1 > 0$, $b_2 > 0$, $b_3 < 0$, $b_4 > 0$

where

- ln denotes natural logarithms,
- C / M_2 is the ratio of cash holdings to current and deposit accounts,
- TW is a weighted average tax rate (to proxy changes in the size of the shadow economy),
- WS / Y is a proportion of wages and salaries in national income (to capture changing payment and money holding patterns),
- R is the interest paid on savings deposits (to capture the opportunity cost of holding cash) and
- Y / N is the per capita income.

The „excess“ increase in currency, which is the amount unexplained by the conventional or normal factors (mentioned above) is then attributed to the rising tax burden and the other reasons leading people to work in the shadow economy. Figures for the size and development of the shadow economy can be calculated in a first step by comparing the difference between the development of currency when the direct and indirect tax burden (and government regulations) are held at its lowest value, and the development of currency with the current (much higher) burden of taxation and government regulations. Assuming in a second step the same income velocity for currency used in the shadow economy as for legal M1 in the official economy, the size of the shadow can be computed and compared to the official GDP. The estimation of such a currency demand equation has been criticized by Thomas (1999) but part of this criticism has been considered in the work of Giles (1999a, 1999b) and Bhattacharyya (1999), who both use the latest econometric techniques.

The currency demand approach is one of the most commonly used approaches. It has been applied to many OECD countries (e.g. Schneider 1997, 1998a; Johnson, Kaufmann and Zoido-Lobatón (1998a), and Colin C. Williams and Jan Windebank (1995). But has nevertheless been criticized on various grounds (e.g. Thomas 1986, 1992, 1999; Feige 1986 and Pozo 1996). The most commonly raised objections to this method are:

(i) Not all transactions in the shadow economy are paid in cash. Isachsen and Strom (1980, 1985) used the survey method to find out that in Norway, in 1980, roughly 80 percent of all

transactions in the hidden sector were paid in cash. The size of the total shadow economy (including barter) may thus be even larger than previously estimated.

(ii) Most studies consider only one particular factor, the tax burden, as a cause of the shadow economy. But others (such as the impact of regulation, taxpayers' attitudes toward the state, „tax morality" and so on) are not considered, because reliable data for most countries is not available. If, as seems likely, these other factors also have an impact on the extent of the hidden economy, it might again be higher than reported in most studies.[23]

(iii) A further weakness of this approach, at least when applied to the United States, is discussed by Gillian Garcia (1978), Park (1979) and Feige (1996), who point out that increases in currency demand deposits are due largely to a slowdown in demand deposits rather than to an increase in currency caused by activities in the shadow economy.

(iv) Derek Blades (1982) and Feige (1986, 1997), criticize Tanzi's studies on the grounds that the US dollar is used as an international currency. Tanzi should have considered (and controlled for) the US dollars, which are used as an international currency and held in cash abroad.[24] Moreover, Frey and Pommerehne (1984) and Thomas (1986, 1992, 1999) claim that Tanzi's parameter estimates are not very stable.[25]

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[23]One (weak) justification for the use of only the tax variable is that this variable has a very strong impact on the size of the shadow economy in the studies known to the authors. One exception is the study by Frey and Weck-Hannemann (1984) where the variable „tax immorality" has a quantitatively larger and statistically stronger influence than the direct tax share in the model approach. In the study of Pommerehne and Schneider (1985), for the U.S., besides various tax measures, data for regulation, tax immorality, minimum wage rates are available, the tax variable has a dominating influence and contributes roughly 60-70 percent to the size of the shadow economy. See also Zilberfarb (1986).

[24] In another study by Tanzi (1982, especially pp. 110-113), he explicitly deals with this criticism. A very careful investigation of the amount of US-$ used abroad and the US currency used in the shadow economy and to "classical" crime activities has been undertaken by Kenneth Rogoff (1998), who concludes that large denomination bills are major driving force for the growth of the shadow economy and classical crime activities due to reduced transactions costs.

[25] However in studies for European countries Kirchgaessner (1983, 1984) and Schneider (1986) reach the conclusion that the estimation results for Germany, Denmark, Norway and Sweden are quite robust when using the currency demand method. Hill and Kabir (1996) find for Canada that the rise of the shadow economy varies with respect to the tax variable used; they conclude „when the theoretically best tax rates are selected and a range of plausible velocity values

(v) Another weak point of this procedure, in most studies, is the assumption of the same velocity of money in both types of economies. As Hill and Kabir (1996) for Canada and Klovland (1984) for the Scandinavian countries argue, there is already considerable uncertainty about the velocity of money in the official economy; the velocity of money in the hidden sector is even more difficult to estimate. Without knowledge about the velocity of currency in the shadow economy, one has to accept the assumption of an „equal“ money velocity in both sectors.

(vi) Finally, the assumption of no shadow economy in a base year is open to criticism. Relaxing this assumption would again imply an upward adjustment of the figures attained in the bulk of the studies already undertaken.

6.2.5 The Physical Input (Electricity Consumption) Method

(1) The Kaufmann - Kaliberda Method

This method was used earlier by C. Lizzeri (1979), Del Boca and Francesco Forte (1982), and then much later by Alejandro Portes (1996), Kaufmann and Aleksander Kaliberda (1996) and Johnson, Kaufmann and Shleifer (1997). For a critique see Mária Lackó (1996, 1997a, 1997b, 1998). 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. This method is very simple and appealing, however, it can also be criticized on different grounds:

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is used, this method estimates underground economic growth between 1964 and 1995 at between 3 and 11 percent of

(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) 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.

(iii) There may be considerable differences or changes in the elasticity of electricity/GDP across countries and over time. Johnson, Kaufmann and Shleifer (1997) make an attempt to adjust for changes in the elasticity of electricity/GDP.

(2) The Lackó Method

Lackó (1996, 1998, 1999) assumes that a certain part of the shadow economy is associated with the household consumption of electricity. It comprises, among others, the so-called household production, do-it-yourself activities, and other non registered production and services. Lackó assumes that in countries where the section of the shadow economy associated with the household electricity consumption is high, the rest of the hidden economy, that is the part Lackó cannot measure, will also be high. Lackó (1996, pp.19 ff.) assumes that in each country a part of the household consumption of electricity is used in the shadow economy.

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

(1) $\ln E_i = a_1 \ln C_i + a_2 \ln PR_i + a_3 G_i + a_4 Q_i + a_5 H_i + u_i$

with $a_1 > 0, a_2 < 0, a_3 > 0, a_4 < 0, a_5 > 0$

(2) $H_i = b_1 T_i + b_2 (S_i - T_i) + b_3 D_i$

with $b_1 > 0, b_2 < 0, b_3 > 0$

where

GDP." (Hill and Kabir, 1996, p. 1553).

- i: the number assigned to the country,
- E_i: per capita household electricity consumption in country i in Mtoe,
- C_i: per capita real consumption of households without the consumption of electricity in country i in US dollars (at purchasing power parity),
- PR_i: the real price of consumption of 1 kwh of residential electricity in US dollars (at purchasing power parity),
- G_i: the relative frequency of months with the need of heating in houses in country i,
- Q_i: the ratio of energy sources other than electricity energy to all energy sources in household energy consumption,
- H_i: the per capita output of the hidden economy,
- T_i: the ratio of the sum of paid personal income, corporate profit and taxes on goods and services to GDP,
- S_i: the ratio of public social welfare expenditures to GDP, and
- D_i: the sum on number of dependants over 14 years and of inactive earners, both per 100 active earners.

In a cross country study, she econometrically estimates equation (1) substituting H_i by equation (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. For the calculation of the actual size (value added) of the shadow economy, Lackó should know how much GDP is produced by one unit of electricity in the shadow economy of each country. Since these data are not known, she takes the result of one of the known shadow economy estimations, that were carried out for a market economy with another approach for the early 1990s, and she applies this proportion to the other countries. Lackó used the shadow economy of the United States as such a base (the shadow economy value of 10.5% of GDP taken from B. Morris 1993), and then she calculates the size of the shadow economy for other countries. Lackó's method is also open to criticism:

(i) Not all shadow economy activities require a considerable amount of electricity and other energy sources can be used.

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

(iii) It is doubtful whether the ratio of social welfare expenditures can be used as the explanatory factor for the shadow economy, especially in transition and developing countries.

(iv) It is questionable which is the most reliable base value of the shadow economy in order to calculate the size of the shadow economy for all other countries, especially, for the transition and developing countries.

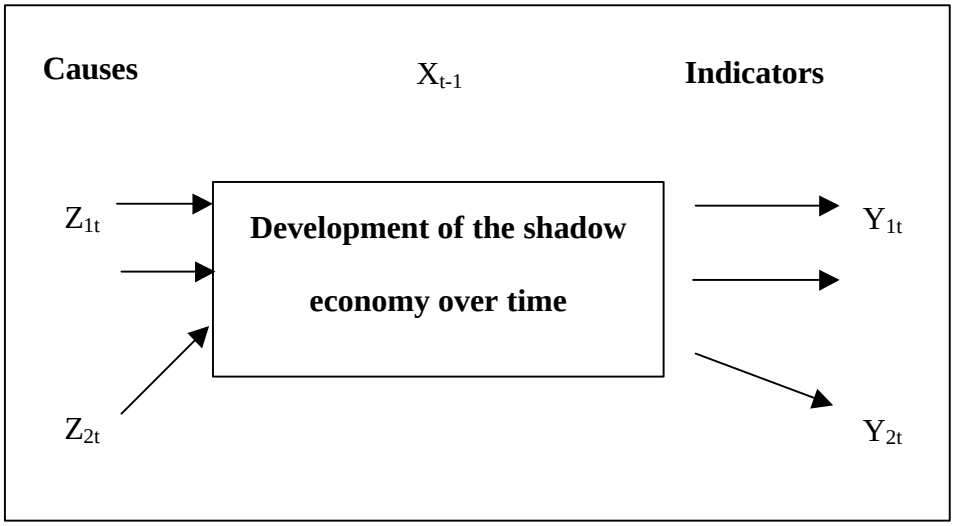
6.3 The Model Approach

The pioneers of this approach are Weck (1983), Frey and Weck (1983a, 1983b), Frey and Weck-Hannemann (1984), who applied this approach to cross-section data from the 24 OECD countries for various years. Before turning to this approach they developed the concept of „soft modeling“ (Frey, Weck, and Pommerehne 1982, Frey and Weck 1983a and 1983b), an approach which has been used to provide a ranking of the relative size of the shadow economy in different countries.

All methods described so far that are designed to estimate the size and development of the shadow economy consider just one indicator that “must” capture all effects of the shadow economy. However, it is obvious that its 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 so far. 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 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 (see Dennis Aigner, Schneider, and Victor Ghosh 1988).

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 Z_{it} (i = 1, 2, ..., k) the size of the shadow economy X_t, and the indicators Y_{jt} (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[26] on the possible causes and indicators of the shadow economy, in which the following three types of causes are distinguished:

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.

[26] See part 3 and Thomas (1992); Schneider (1994a, 1997); Pozo (1996); Johnson, Kaufmann and Zoido-Lobatón (1998a, 1998b); and Giles (1999a, 1999b).

(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.

When applying this approach for European countries, Frey and Weck-Hannemann (1984) had the difficulty in obtaining reliable data for the cause series, besides the ones of direct and indirect tax burden. Hence, their study was criticized by Claus Helberger and Hans Knepel (1988), who argue that the results were unstable with respect to changing variables in the model and over the years.

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 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) and by Giles, Linsey M. Tedds and Gugsa Werkneh (1999). They basically estimate a comprehensive (dynamic) MIMIC model to get a time-series 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-series data in both models. Again

this MIMIC 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 MIMIC model can be used to calculate a level and the percentage units of the shadow economy. Giles latest combination of the currency demand and MIMIC 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.

7 The Empirical Findings in more Detail

7.1 How large is the Shadow Economy? Findings for 76 Countries.

For single countries and sometimes for a group of countries (like the OECD or transition countries), research has been undertaken to estimate the size of the shadow economy using various methods and different time periods. Until now, there has not been a consistent comparison of estimates of the size of the shadow economies of various countries, for a fixed period, generated by using similar methods. In tables 4 to 6, such an attempt is made by reporting the results for the shadow economy for 76 countries for the periods 1989–90 and 1990-93 using the physical input (electricity) method, the currency demand approach and the model (MIMIC) approach. Unfortunately, at least two methods have not been applied for all 76 countries, so that a comparison of the size of the shadow economy between countries remains crude.[27]

[27] A least in this comparison the same time periods (either 1989–90 or 1990–93) are used for all countries. If possible, the values were calculated as averages over the period 1989–90 or 1990–93, respectively.

7.1.1 Developing Countries

The physical input (electricity) method, the currency demand and the model approach are used for the developing countries. The results are shown in table 4. All these methods are used for Central and South America. In Africa, the results from eight countries are reported. Nigeria and Egypt have the largest shadow economies with 76.0 percent and 68.0 percent of GDP, the smallest shadow economy has Mauritius with 20 percent. Applying the currency demand approach, Tanzania had a shadow economy of 31.0 percent (of GDP) in 1989–90 and South Africa, a western type industrial country, had a shadow economy of 9.0 % in 1989-90. The ranking of the size of the shadow economy for the African countries is supported by similar findings and anecdotal evidence from Lubell (1991), Lawrence Chickering and Muhamed Salahdine (1991), and Pozo (1996).

For Central and South American countries, we have two estimates - one using the physical input method (Lackó 1996) and one from the MIMIC approach (Loayza 1996). For some countries, the estimates of the size of the shadow economy are quite similar, e.g. Venezuela, Brazil, and Guatemala. For others there are great differences, e.g., Panama, Peru, and Mexico.

Using the MIMIC approach for a ranking of the South American countries, the biggest shadow economies can be found in Bolivia with 65.6 percent of GDP, Panama with 62.1 percent, Peru with 57.4 percent, and Guatemala with 50.4 percent. The smallest shadow economies can be found in Costa Rica with 23.2 percent, Argentina with 21.8 percent, and Chile with 18.2 percent (all over the period 1990–93). This ranking of the size of the shadow economy for Central and South America is also supported by similar findings in Pozo (1996), Lippert and Walker (1997), and Lubbel (1991). For Mexico, the results from all three methods are shown. Whereas the MIMIC-approach and the currency demand method are in a similar range (27.1 percent MIMIC and currency demand method 35.1 percent); the physical impact measure provides a size of 49.1 percent, far above the other two. In Asia, Thailand ranks number one with 71.0 percent followed by the Philippines with 50 percent and Sri Lanka with 40 percent. Hong Kong and Singapore rank lowest with a shadow economy of 13 percent GNP.

Table 4: The Size of the Shadow Economy in Developing Countries

DEVELOPING COUNTRIES	Size of the Shadow Economy (in % of GDP)		
	Physical Input Method	**Currency Demand Approach**	**MIMIC-Approach**
	Average 1989-90	Average 1989-90	Average 1990-93
Africa			
1. Botswana	27.0	-	-
2. Egypt	68.0	-	-
3. Mauritius	20.0	-	-
4. Morocco	39.0	-	-
5. Nigeria	76.0	-	-
6. South Africa	-	9.0[1)]	-
7. Tanzania	-	31.0[2)]	-
8. Tunisia	45.0	-	-
Central and South America			
1. Argentina	-	-	21.8
2. Bolivia	-	-	65.6
3. Brazil	29.0	-	37.8
4. Chile	37.0	-	18.2
5. Colombia	25.0	-	35.1
6. Costa Rica	34.0	-	23.2
7. Ecuador	-	-	31.2
8. Guatemala	61.0	-	50.4
9. Honduras	-	-	46.7
10. Mexico	49.0	33.0[3)]	27.1 (35.1)[3)]
11. Panama	40.0	-	62.1
12. Paraguay	27.0	-	-
13. Peru	44.0	-	57.4
14. Uruguay	35.2	-	-
15. Venezuela	30.0	-	30.8
Asia			
1. Cyprus	21.0	-	-
2. Hong Kong	13.0	-	-
3. India	-	22.4[4)]	-
4. Israel	29.0	-	-
5. Malaysia	39.0	-	-
6. Philippines	50.0	-	-
7. Singapore	13.0	-	-
8. South Korea	38.0	-	20.3[5)]
9. Sri Lanka	40.0	-	-
10. Taiwan	-	-	16.5[5)]
11. Thailand	71.0	-	-

Sources: Own calculations using values for developing countries in Africa and Asia from Lackó (1996, table 18). For Central- and South-America from Loayza (1996). A slash means that no value exists for this country for this period.

1) Source: For South Africa: G. M. Hartzenburg and A. Leimann (1992); they used the currency demand approach.

2) Source: For Tanzania M. S. D. Bagachwa, and A. Naho (1995, p. 1394), they used the currency demand approach.

3) For Mexico Pozo (1996) estimates the size of the shadow economy (in % of GDP): 33.0% (1989-90) and 35.1% (1990-93) using the currency demand approach.

4) Own calculations using the absolute figures of Bhattacharyya (1999).

5) For Taiwan the income discrepancy method is used also for South Korea for 1990-93. Source Yoo and Hyun (1998).

In general the sizes of the shadow economies of some developing countries are quite large and one may ask, what is really measured here. We think it is more a "parallel" or second economy, which has not been adequately captured by official statistics.

7.1.2 Transition Countries

The physical input (electricity) method has been applied to the transition countries in Central and Eastern Europe and to states of the former Soviet Union. The results are shown in table 3; they cover the periods 1989-90, 1990-93 and 1994-95.[28] Considering the physical input method by Johnson et. al (the Lacko values) and the countries of the former Soviet Union over the period 1990–93,[29] Georgia has the largest shadow economy with 43.6 (50.8) percent of GDP, followed by Azerbaijan with 33.8 (41.0) percent and Moldova 29.1 percent. Russia can be found in middle with a shadow economy of 27 (36.9) percent. According to the Johnson, Kaufmann, and Zoido-Lobatón (1998b) figures Belarus with 14 percent and Uzbekistan with 10.3 percent have the smallest values. Except Uzbekistan (only for the Johnson figures) all other former Soviet Union countries experienced a strong increase in the shadow economy from an average of 25.7 (Lacko value: 34.9) percent for 1990-93 to 35.3 (Lacko value: 43.6) percent for 1994–95, calculated over all 12 countries of the former Soviet Union. A more detailed analysis of the situation in the Ukraine is given by Kaufmann (1997).

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[28] For the first period 1989-90 the results can only be seen as very crude ones, because the collapse of the communist regimes took place in the years 1989 and 1990.

[29] The period 1989-90 is not discussed here because in this period the former Soviet Union was breaking up.

Table 5: The Size of the Shadow Economy in Transition Countries

TRANSITION COUNTRIES	Size of the Shadow Economy (in % of GDP) Physical Input (Electricity) Method Using Values from Johnson; Kaufmann, Shleifer (1997) and values in "( )" from Lacko (1999)					
	Average 1989-90		Average 1990-93		Average 1994-95	
Former Soviet Union [1)]						
1. Azerbaijan	21.9	(-)	33.8	(41.0)	59.3	(49.1)
2. Belarus	15.4	(-)	14.0	(31.7)	19.1	(45.4)
3. Estonia	19.9	(19.5)	23.9	(35.9)	18.5	(37.0)
4. Georgia	24.9	(-)	43.6	(50.8)	63.0	(62.1)
5. Kazakhstan	17.0	(13.0)	22.2	(29.8)	34.2	(38.2)
6. Kyrgyzstan	-	(13.9)	-	(27.1)	-	(35.7)
7. Latvia	12.8	(18.4)	24.3	(32.2)	34.8	(43.4)
8. Lithuania	11.3	(19.0)	26.0	(38.1)	25.2	(47.0)
9. Moldavia	18.1	(-)	29.1	(-)	37.7	(-)
10. Russia	14.7	(-)	27.0	(36.9)	41.0	(39.2)
11. Ukraine	16.3	(-)	28.4	(37.5)	47.3	(53.7)
12. Uzbekistan	11.4	(13.9)	10.3	(23.3)	8.0	(29.5)
Average: former Soviet Union states	*16.7*	*(16.2)*	*25.7*	*(34.9)*	*35.3*	*(43.6)*
Central and Eastern Europe						
1. Bulgaria	24.0	(26.1)	26.3	(32.7)	32.7	(35.0)
2. Croatia	22.8 [2)]	(-)	23.5 [2)]	(39.0)	28.5 [2)]	(38.2)
3. Czech Republic	6.4	(23.0)	13.4	(28.7)	14.5	(23.2)
4. Hungary	27.5	(25.1)	30.7	(30.9)	28.4	(30.5)
5. Macedonia	-	(-)	-	(40.4)	-	(46.5)
6. Poland	17.7	(27.2)	20.3	(31.8)	13.9	(25.9)
7. Romania	18.0	(20.9)	16.0	(29.0)	18.3	(31.3)
8. Slovakia	6.9	(23.0)	14.2	(30.6)	10.2	(30.2)
9. Slowenia	-	(26.8)	-	(28.5)	-	(24.0)
Average: former Central and Eastern Europe states	*17.6*	*(17.6)*	*20.6*	*(32.4)*	*20.9*	*(31.6)*

Sources: Own calculations using values of Johnson, Kaufmann, and Shleifer (1997, table 1, p. 182-183), Johnson, Kaufmann, and Zoido-Lobatón (1998a, p. 351) and for the values in brackets Lackó (1999, table 8).

1) For the former Soviet Union in the column 1989/90 only data for 1990 was available using the source from Johnson, Kaufmann and Shleifer (1997).

2) For Croatia see Sanja Madzarevic and Davor Milkulic (1997, table 9, page 17), they used the discrepancy method.

Turning to the transition countries of Central and Eastern Europe and considering the period 1990-93 and the Johnson, Kaufmann, and Zoido-Lobatón (1998b) figures Hungary has the largest shadow

economy with 30.7 percent of GNP followed by Bulgaria with 26.3 percent. The lowest two are the Czech Republic with 13.4 percent and Slovakia with 14.2 percent. Considering the Lackó figures Macedonia has the largest shadow economy with 40.4 percent, followed by Croatia with 39.0 percent. Whereas for the former Soviet Union countries a strong increase over the two periods 1990-93 and 1994-95 has been observed, the average size of the shadow economy of Central and Eastern European states was almost stable over these two periods. The Johnson, Kaufmann, and Zoido-Lobatón (1998b) figures show an average shadow economy of the Central and Eastern European states of 20.6 (Lackó 32.4) over 1990-93 and over the period 1994-95 Johnson, Kaufmann, and Zoido-Lobatón (1998b) show an average size of the shadow economy of the Central and Eastern European states of 20.9 (Lackó 31.6).

If one compares the results of Johnson, Kaufmann, and Zoido-Lobatón (1998b) with the ones of Lacko, one realizes that Lacko gets on average a much higher value of the shadow economy for former Soviet Union countries and Central and Eastern European countries. One reason for this may be that Lacko uses an econometric estimation of household electricity consumption whereas Johnson, Kaufmann, and Zoido-Lobatón (1998b) calculate their figures from a macro (over all electricity consumption) approach.

7.1.3 OECD-Countries

For the 21 OECD western-type countries either the currency demand method or the physical input method were used. For the currency demand method, two series of figures are shown—one from Schneider and one obtained from Johnson, Kaufmann, and Zoido-Lobatón (1998a, 1998b). The main difference between the two series is that Johnson, Kaufmann, and Zoido-Lobatón (1998a, 1998b) use average values of the size of the shadow economy of a country coming from different sources, if a monetary approach was applied, whereas in Schneider the currency-demand approach is used for these countries and only one value for that year (or an average over a time period) is used. The problem using averages from various sources is (a) that the time period is greater (1985–95); and (b) the specification of the monetary approaches from different authors may be quite different.

Table 6: The Size of the Shadow Economy in OECD Countries

OECD-COUNTRIES	Size of the Shadow Economy (in % of GDP) using:			
	Physical Input (Electricity) Method	**Currency Demand Method** Schneider figures	**Currency Demand Method** Schneider figures	**Currency Demand Method** Johnson et. al. figures
	Year 1990	Average 1989/90	Average 1990/93	Average 1990/93
1. Australia	15.3	10.1	13.0	13.1
2. Austria	15.5	5.1	6.1	5.8
3. Belgium	19.8	19.3	20.8	15.3
4. Canada	11.7	12.8	13.5	10.0
5. Denmark	16.9	10.8	15.0	9.4
6. Finland	13.3	-	-	-
7. France	12.3	9.0	13.8	10.4
8. Germany	14.6	11.8	12.5	10.5
9. Great Britain	13.1	9.6	11.2	7.2
10. Greece	21.8	-	-	27.2
11. Ireland	20.6	11.0	14.2	7.8
12. Italy	19.6	22.8	24.0	20.4
13. Japan	13.2	-	-	8.5
14. Netherlands	13.4	11.9	12.7	11.8
15. New Zealand[1)]	-	9.2	9.0	9.0
16. Norway	9.3	14.8	16.7	5.9
17. Portugal	16.8	-	-	15.6
18. Spain [2)]	22.9	16.1	17.3	16.1
19. Sweden	11.0	15.8	17.0	10.6
20. Switzerland	10.2	6.7	6.9	6.9
21. USA	10.5	6.7	8.2	13.9
Average over 21 OECD countries	*15.1*	*11.9*	*13.5*	*11.3*

Sources: Physical input method Lackó (1996, 1997a, 1997b, 1999), Currency demand approach Schneider (1994a, 1998a), Johnson, Kaufmann, and Zoido-Lobatón (1998a/b), and Williams and Windebank (1995).

1) The Figures are calculated using the MIMIC-method and Currency demand approach. Source Giles (1999b).

2) The figures have been calculated from Ignacio Mauleon (1998).

Considering the period 1990–93 and using the series by Johnson, Kaufmann, and Zoido-Lobatón, where estimates of the shadow economy for most OECD countries are available (20 out of the 21 investigated countries), the southern European countries have the largest shadow economies: Greece (27.2 percent), Italy (20.4 percent), Spain (16.1 percent), and Portugal (15.6 percent). A similar result can be found when using figures of Schneider, and to a much lesser extent the ones achieved by the physical input (electricity) method by Lackó (1997b). At the lower end, Johnson, Kaufmann, and Zoido-Lobatón rank Switzerland (6.9 percent), Norway (5.9 percent), and Austria (5.8 percent); whereas Schneider finds the USA (8.2 percent), Switzerland (6.9 percent), and Austria (6.1 percent). In general, this ranking of the size of the shadow economies of the OECD countries calculated by Schneider is supported by other studies. Frey and Pommerehne (1984), Frey and Weck-Hannemann (1984), Williams and Windebank (1995), Thomas (1992), and Lippert and Walker (1997) reach quite similar rankings.

In table 7, the latest results are shown for OECD countries over the period 1994-95, and for the period 1996-97. In principle the ranking of the sizes of the shadow economies of the results are similar to the ones in table 6. However, the shadow economy has increased compared to the results of the period 1990-93, in all OECD countries: whereas the average size of the shadow economy of the investigated OECD countries was 13.5 percent of the GDP in 1990-93, this value increased to 16.0 percent of GDP in the years 1994-95. A further increase can be observed for the investigated OECD countries to 16.9 percent for the period 1996-97. From these results it is obvious that even in the late nineties the shadow economy is still growing in most OECD countries.

Table 7: Size of the Shadow Economy of OECD countries 1994-1997

OECD-COUNTRIES	Size of the Shadow Economy (in % of GDP) using Currency Demand Approach	
	Average 1994-95	Average 1996-97
1. Australia	13.8	13.9
2. Austria	7.0	8.6
3. Belgium	21.5	22.2
4. Canada	14.8	14.9
5. Denmark	17.8	18.2
6. France	14.5	14.8
7. Germany	13.5	14.8
8. Great Britain	12.5	13.0
9. Greece	29.6	30.1
10. Ireland	15.4	16.0
11. Italy	26.0	27.2
12. Japan	10.6	11.3
13. Netherlands	13.7	13.8
14. New Zealand	11.3[1)]	-
15. Norway	18.2	19.4
16. Portugal	22.1	22.8
17. Spain	22.4	23.0
18. Sweden	18.6	19.5
19. Switzerland	6.7	7.8
20. USA	9.2	8.8
Averages over 20 OECD countries	*16.0*	*16.9*

Sources: Own calculations using the data by Schneider (1998a) and Schneider and Pöll (1999).
1) Only 1994, Source Giles (1999b).

7.2 A Comparison of the Results of the Estimations of the Shadow Economy Using different Methods

As already discussed in chapter 6, there are at least nine different methods used to estimate the shadow economy. In table 8, the empirical results of these methods which were applied to Canada, Germany, Great Britain, Italy and the United States, are shown.

The survey method, which has been used for all five countries, provides lower bound estimates ranging from 1.5 percent to 4.5 percent for the period 1970-80. The tax auditing method provides higher estimates of the shadow economy ranging from 2.9 percent to 8.2 percent for the period

1970-80. Both methods also show that the shadow economy increases over time (e.g. for the United States). The two discrepancy methods (expenditure versus income and official versus actual labor force) show no clear pattern. For some countries they „produce“ high shadow economy values (compared to the other methods for these countries, e.g. Germany), for some low (e.g. Canada). Also, they do not show a consistent time pattern. The physical input (electricity) method, for which only values for the period 1986-90 are available for all five countries, shows values in the middle size range for all countries (average value of 12.7 percent over all countries and all periods). If one compares the three monetary approaches (currency demand, cash-deposit ratio and transactions approach), a clear pattern shows up. The largest size of the shadow economies for all five countries were achieved using the transactions approach (Feige method) ranging from 15 percent to 35 percent of GNP (average value of 21.9 percent over all countries and periods). Somewhat lower results are achieved with the cash-deposit ratio (Gutmann method), ranging between 10 percent and 30 percent for all countries (average value of 15.5 percent over all countries and all periods). Considerably lower values were achieved using the currency demand approach, ranging from 4 percent to 20 percent of GNP over the period 1970-90 for all five countries (average value of 8.9 percent over all countries and periods). The currency demand approach shows a strongly rising shadow economy in all five countries, a result opposite that given by the transactions and cash deposit methods. The model approach shows values in the medium range from 6.1 percent to 10.5 percent for the period 1976-80 (average value of 7.9 percent for all countries over all periods). In general, these results demonstrate quite clearly what a huge range of estimates of the shadow economy for a country in a given time span are achievable using different “calculation” methods. Hence one should be very careful when interpreting the size of shadow economy in a country using only one method.

Table 8: A Comparison of the Results of the Estimations of the Shadow Economies of 5 OECD Countries Using Nine Different Methods Over the Period 1970-90

Method	Canada Average over				Germany Average over				Great Britain Average over			
	1970-75	1976-80	1981-85	1986-90	1970-75	1976-80	1981-85	1986-90	1970-75	1976-80	1981-85	1986-90
Surveys of households	-	-	1.3	1.4	3.6	-	-	-	1.5	-	-	-
Tax auditing	-	-	2.9	-	-	-	-	-	-	-	-	-
Discrepancy between exp. and income	-	-	-	-	11.0	10.2	13.4	-	2.5	3.6	4.2	-
Discrepancy bet. off. and actual employment.	-	-	-	-	23.0	38.5	34.0	-	-	-	-	-
Physical input method	-	-	-	11.2	-	-	-	14.5	-	-	-	13.2
Currency demand (Tanzi)	5.1	6.3	8.8	12.0	4.5	7.8	9.2	11.3	4.3	7.9	8.5	9.7
Cash deposit ratio (Gutmann)	13.8	15.9	11.2	18.4	-	-	-	-	14.0	7.2	6.2	-
Transactions approach (Feige)	-	26.5	15.4	21.2	17.2	22.3	29.3	31.4	17.2	12.6	15.9	-
MIMIC-method (Frey /Weck-H.)	-	8.7	-	-	5.8	6.1	8.2	-	-	8.0	-	-
Number of used methods	*2*	*4*	*5*	*5*	*6*	*5*	*5*	*3*	*5*	*5*	*4*	*2*

Table 8 continued

Method	Italy Average over				United States Average over			
	1970-75	1976-80	1981-85	1986-90	1970-75	1976-80	1981-85	1986-90
Surveys of households	-	-	-	-	3.7	4.5	5.6	-
Tax auditing	3.0	3.9	-	10.0	4.9	6.3	8.2	10.0
Discrepancy between exp. and income	3.2	4.3	-	9.3	3.2	4.9	6.1	10.2
Discrepancy bet. off. and actual employment.	-	18.4	-	-	-	-	-	-
Physical input method	-	-	-	19.3	-	-	7.8	9.9
Currency demand (Tanzi)	11.3	13.2	17.5	21.3	3.5	4.6	5.3	6.2
Cash deposit ratio (Gutmann)	23.4	27.2	29.3	-	8.8	11.2	14.6	-
Transactions approach (Feige)	19.5	26.4	34.3	-	17.3	24.9	21.2	19.4
MIMIC-method (Frey /Weck-H.)	-	10.5	-	-	-	8.2	-	-
Number of used methods	*5*	*7*	*3*	*4*	*6*	*7*	*7*	*5*

Notes: The value were grouped (when possible, averaged) in the time periods 1970-75, 1976-80, 1981-85, 1986-90 in order to undertake a rough comparison. The sources of the values are given by country.

Source: Own calculations by using the following sources:

1. For Canada Lippert and Walker (1997), Thomas (1992), Hill and Kabir (1996), Schneider (1997), and Jacques Bendelac and Pierre-Maurice Clair (1993).

2. For Germany Lippert and Walker (1997), Schneider (1994a, 1994b) and Schneider (1997).

3. Great Britain Thomas (1992), Lippert and Walker (1997), Schneider (1994a, 1994b, 1997), Pozo (1996).

4. Italy Thomas (1992), Lippert and Walker (1997), Pozo (1996), Schneider (1994a, 1994b, 1997), Bendelac and Clair (1993).

5. United States Thomas (1992), Lippert and Walker (1997), Pozo (1996), Schneider (1994a, 1994b, 1997), Bendelac and Clair (1993), Tanzi (1986), Feige (1986), Thomas (1986).

7.3 Some Remarks on a Shadow Economy Labor Force

Having extensively examined the size and rise of the shadow economy in terms of value added over time, the analysis in this last section focuses on the „shadow“ labor market. Within the official labor market there is a particularly close contact among those people who are active in the shadow econ-

omy. Moreover, every shadow economic activity involves the labor market to some extent: Hence, the "shadow labor market" includes all cases, where the employees or the employers, or both, occupy a „shadow economy position". This is true regardless of whether such employees or employers also have official (legal) position, as long as the production is for the market. Pioneering and recent work in this area has been done by L. Frey (1972, 1975, 1978, 1980), M. A. Cappiello (1986), Lubell (1991), Pozo (1996), Bruce Bartlett (1998) and Tanzi (1999).

Why do people work in the shadow economy? On the official labor market, the costs that firms (and individuals) have to pay when "officially" hiring someone are tremendously increased by the burden of tax and social contributions on wages, as well as the legal administrative regulation to control economic activity. In various OECD countries, these costs are greater than the wage effectively earned by the worker – providing a strong incentive to work in the shadow economy. This is especially true in Europe (e.g. in Germany and Austria), where the total tax and social security burden adds up to 100% on top of the wage effectively earned (see section 4.2 and for Italy Dallago 1985, 1990).

The underground use of labor may consist of a second job after (or even during) regular working hours. A second form is shadow economy work by individuals who do not participate in the official labor market. A third component is the employment of people (e.g. clandestine, social fraud or illegal immigrants), who are not allowed to work in the official economy.

The research of the shadow economy labor market is as difficult as the one of the shadow economy of the value added, hence, it is not easy to provide some empirical facts. The few existing results are shown in table 9 for western-type OECD countries.[30] The figures in table 9 provide a rough estimate of the size of the shadow labor market. The estimations are either based on the survey or discrepancy method (e.g. for Denmark, Italy, France) or on a calculation using the value added values of the shadow economies subtracting all material inputs and assuming certain average values of earnings paid per hour in the shadow economy. Under these assumptions the results for Denmark show that the population of adult Danes engaged in the shadow economy ranged from 8.3 percent

[30]For developing countries some literature about the shadow labor market exists, e.g. the latest works by Dallago (1990), Pozo (1996), Loayza (1996), especially Chickering and Salahdine (1991).

(of the total labor force) in 1980 to 15.4 percent in 1994. In Germany, this figure rose from 8.0 percent-12.0 percent in 1974-82 to 22.0 percent in 1998. This documents for both countries a very strong increase.

Table 9: Estimates of the Size of the "Shadow Economy Labor Force" in Some OECD Countries 1974-1998

Countries	Year	Participants in 1000 people[1)]	Participants in % of Labor Force[2)]	Size of the Shadow Economy (in % of GDP) Currency Demand Approach[3)]	Sources of the Figures for the Participants
Austria	1990-91 1997-98	300 500	9.6 16.0	5.47 8.93	Schneider (1998)
Denmark	1980 1986 1991 1994	- - - -	8.3 13.0 14.3 15.4	8.6 - 11.2 17.6	Mogensen, Kvist, Körmendi, Pedersen, Pedersen (1995)
France	1975-82 1997-98	800-1500 1400-3200	3.0-6.0 6.0-12.0	6.9 14.7	Raffaele De Grazia (1983) and own calculations
Germany	1974-82 1997-98	2000-3000 5000	8.0-12.0 22.0	10.6 14.7	De Grazia (1983) Schneider (1998b)
Italy	1979 1997	4000-7000 6600-11400	20.0-35.0 30.0-48.0	16.7 27.3	D. Gaetani and G. d'Aragona (1979); own calculations
Spain	1979-80 1997-98	1250-3500 1500-4200	9.6-26.5 11.5-32.3	19.0 23.1	Benito S. M. Ruesga (1984); own calculations
Sweden	1978 1997	750 1150	13.0-14.0 19.8	13.0 19.8	De Grazia (1983) and own calculations
European Union	*1978* *1997-98*	*10 000* *20 000*	-	*14.5*	De Grazia (1983) and own calculations
OECD	*1978* *1997-98*	*16 000* *35 000*	-	*15.0*	De Grazia (1983) and own calculations

1) Estimated full-time jobs, including unregistered workers, illegal immigrants, and second jobs.

2) In percent of the population aged 20-69, survey method. In Denmark: In percent of the population aged 20-69, survey method (% heavily engaged in shadow economy activities).

3) Source of size of shadow economy: Schneider (1994a, 1998b, 1999).

In other countries the amount of the shadow economy labor force is quite large, too: in Italy 30.0-48.0 percent (1997-98); Spain 11.5-32.3 percent (1997-98); Sweden 19.8 percent (1997) and France 6.0-12.0 percent (1997-98). In the European Union at least 20 million and in all OECD countries about 35 million (1997-98) are engaged in shadow economy activities and work "black" (illicit/ irregular/ unofficial). Within 20 years the amount doubled. These figures demonstrate that the shadow economy labor market is lively and may provide one explanation, why we observe such high and persistent unemployment in many countries.

8 Summary and Conclusions

There are many obstacles to be overcome to measure the size of the shadow economy and to analyze its consequences on the official economy, although some progress has been made. In this survey it has been shown that though it is difficult to estimate the size of the shadow economy, it is not impossible. We have demonstrated that with various methods, e.g. the currency demand, the physical input measure and the model approach, some insights can be provided into the size and development of the shadow economy of the developing, transition and the OECD countries. There is no „best" or commonly accepted method. Each approach has its specific strengths and weaknesses and can provide specific insights and results. The general impression from the results of these estimates is that for all countries investigated the shadow economy has reached a remarkably large size. Although the different methods provide a rather wide range of estimates, there is a common finding that the size of the shadow economies for most transition and all investigated OECD countries has been growing over the recent decade. A similar finding can be made for the „shadow labor market" which is attracting a growing attention due to high unemployment in European OECD countries.

The analysis of causes in this survey shows that an increasing burden of taxation and social security payments, combined with rising state regulatory activities and labor market restrictions (e.g. forced reduction in working hours) are the major driving forces for the size and growth of the shadow economy. But an interdisciplinary approach seems to be necessary for a more comprehensive analysis, which would consider aspects like tax morale, perceived fairness of the tax system and institutional aspects as well.

The results on the effects of the shadow economy on the official one are ambiguous. According to some studies, a growing shadow economy has a negative impact on official GDP growth. But other

studies show the opposite effect. Hence, it is important to undertake further research to get a more precise knowledge of the effects of the shadow economy on the official economy (e.g. the official growth rate and the tax revenue). First studies about the interaction of the shadow economy and corruption find a positive impact on the amount of corruption, i.e. the larger the corruption the larger is the shadow economy. But clearly, more research is needed here, too.

To conclude: we provided some preliminary knowledge of the size of the shadow economy and its causes and consequences. But more research is needed to develop a comprehensive (interdisciplinary) theoretical and empirical approach to find answers to questions like: why do people work in the shadow economy and what are the effects on the official economy?

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