

# **THE VALUE ADDED OF UNDERGROUND ACTIVITIES: SIZE AND MEASUREMENT OF THE SHADOW ECONOMIES AND SHADOW ECONOMY LABOR FORCE ALL OVER THE WORLD\*)**

by

**Friedrich Schneider\*\*)**

**Abstract:**

Using various methods estimates about the size of the shadow economy in 76 developing, transition and OECD countries are presented. The average size of the shadow economy (in percent of official GDP) over 1989-93 in developing countries is 39%, in transition countries 23% and in OECD countries 14.1%. The average size of the shadow economy labor force (in percent of the official labor force) of the year 1997/98 in 51 developing countries is 50,1%, in 9 transition countries 49,0% and 7 OECD-countries 17,3%. An increasing burden of taxation and social security contributions combined with rising state regulatory activities are the driving forces for the growth and size of the shadow economy (labor force).

JEL-class.: O17, O5, D78, H2, H26.

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\*\*\*) Professor of Economics, Dr. Friedrich Schneider, Department of Economics, Johannes Kepler University of Linz, A-4040 Linz-Auhof, Austria. Phone: 0043-70-2468-210, Fax: 0043-70-2468-209. E-mail: [friedrich.schneider@jk.uni-linz.ac.at](mailto:friedrich.schneider@jk.uni-linz.ac.at), <http://www.economics.uni-linz.ac.at/Members/Schneider.htm> .

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# 1 Introduction

As crime and other underground economic activities (including shadow economic ones) are a fact of life around the world, most societies attempt to control these activities through various measures like punishment, prosecution, economic growth or education. Gathering statistics about who is engaged in underground (or crime) activities, the frequencies with which these activities are occurring and the magnitude of them, is crucial for making effective and efficient decisions regarding the allocations of a country's resources in this area. Unfortunately, it is very difficult to get accurate information about these underground (or as a subset shadow economy) activities on the goods and labor market, 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<sup>1)</sup> on single aspects of the hidden economy exists a comprehensive survey has just been written by Schneider (the author of this paper) and Enste concentrating on the size of the shadow economy in terms of value added. Moreover, the subject is still quite controversial<sup>2)</sup> 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.<sup>3)</sup> Nevertheless around the world, there are strong indications for an increase of the shadow economy. The size, the causes and the consequences are different for different types of countries, but there are some comparisons that can be made and that might be interesting for social scientists, the public in general, and helpful for politicians, who need to deal with this phenomenon sooner or later. These attempts of measurement are obviously very difficult, since the shadow economy activities are performed exactly to avoid official registration. 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.

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<sup>1)</sup> The literature about the „shadow“, „underground“, „informal“, „second“, „cash-“ or „parallel“, economy is increasing. Various topics, on how to measure it, its causes, its effect on the official economy are analyzed. See for example, survey type publications by Frey and Pommerehne (1984); Thomas (1992); Loayza (1996); Pozo (1996); Lippert and Walker (1997); Schneider (1994a, 1994b, 1997, 1998a); Johnson, Kaufmann, and Shleifer (1997), and Johnson, Kaufmann and Zoido-Lobatón (1998a); and for an overall survey of the global evidence of its size in terms of value added Schneider and Enste (2000).

<sup>2)</sup> Compare e.g. in the Economic Journal, vol. 109, no. 456, June 1999 the feature “controversy: on the hidden economy”.

The scientific fascination of the underground economy has inspired me to tackle this difficult question and undertake the challenging task of collecting all available data on the shadow economy, and finally provide some insights about the main causes of the shadow economy and its effect on the official economy. In section 2 an attempt is made to define the shadow economy. Section 3 shortly presents the empirical results of the size of the shadow economy over 76 countries all over the world. Section 4 presents first and preliminary empirical results of the size of the shadow economy labor force (informal employment) over 60 countries all over the world. Section 5 examines the main causes of the shadow economy. In section 6 the various methods to estimate the size of the shadow economy are shortly presented, and in section 7 a summary is given and some conclusions are drawn.

## **2 The Definition of a Shadow Economy: An Attempt**

Most authors trying to measure the shadow economy face the difficulty of how to define it. One commonly used working definition is: all currently unregistered economic activities which contribute to the officially calculated (or observed) Gross National Product.<sup>4)</sup> 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 leave open a lot of questions, table 1 may be helpful for developing a better feeling for what could be a reasonable consensus definition of the legal and illegal underground or shadow economy.

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 state (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.“ (Mogensen, et. al. 1995 p. 5). This paper does not focus on tax evasion or tax compliance, because it would get to long, and moreover tax evasion is a different subject, where already a lot of research has been underway.<sup>5)</sup>

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<sup>3)</sup> Compare the different opinions of Tanzi (1999), Thomas (1999) and Giles (1999).

<sup>4)</sup> This definition is used for example, by Feige (1989, 1994), Schneider (1994a), Frey and Pommerehne (1984), and Lubell (1991).

<sup>5)</sup> Compare, e.g. the recent survey of Andreoni, Erard and Feinstein (1998).

**Table 1: A Taxonomy of Types of Underground Economic Activities<sup>1)</sup>**

Type of Activity	Monetary Transactions		Non Monetary Transactions	
<b>Illegal Activities</b>	Trade with stolen goods; drug dealing and manufacturing; prostitution; gambling; smuggling and fraud		Barter of drugs, stolen goods, smuggling etc. Produce or growing drugs for own use. Theft for own use.	
	<b>Tax Evasion</b>	<b>Tax Avoidance</b>	<b>Tax Evasion</b>	<b>Tax Avoidance</b>
<b>Legal Activities</b>	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

<sup>1)</sup> Structure of the table is taken from Lippert and Walker (1997, p. 5) with additional remarks.

### **3 The Size of the Shadow Economies all over the World – 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. In tables 2 to 4, an attempt is made to undertake a consistent comparison of estimates of the size of the shadow economies of various countries, for a fixed period, generated by using similar methods which will be discussed in chapter 6 <sup>6)</sup>, by reporting the results for the shadow economy for 76 countries all over the world for the periods 1989–90 and 90-93.<sup>7)</sup>

<sup>6)</sup>The physical input (electricity) and the currency demand methods are comparable because both assume an excessive use of a source (electricity and cash, respectively) for shadow economy activities, and in both a „potential GNP“ is calculated. These two methods are also used in a comparable way by Lackó (1999), Portes (1996), and Johnson, Kaufmann, and Zoido-Lobaton (1998a, 1998b), who even calculate one shadow economy series of these two methods for a cross-section country sample.

<sup>7)</sup>One should be aware that such country comparisons give only a very rough picture of the ranking of the size of the shadow economy over the countries, because each method has shortcomings, which are discussed in chapter 6. See, e.g., Thomas (1992, 1999) and Tanzi (1999). 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.

### **3.1 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 2. The physical input (electricity), the currency demand and MIMIC 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 is 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 89-90.

For Central and South American countries, I 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, such as 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 lowest 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). 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 have the lowest shadow economy with 13 percent GNP. In general the sizes of the shadow economies of some developing countries are quite large and one may ask, what is really measured here. I would argue it is more a “parallel” or second economy, which has not been adequately captured by official statistics.

<b>Table 2: The Size of the Shadow Economy in Developing Countries</b>			
<b>Developing countries</b>	<b>Size of the Shadow Economy (in % of GDP)</b>		
	<b>Physical Input (Electricity) Method</b>	<b>Currency Demand Approach</b>	<b>MIMIC-Approach</b>
	Average 1989-90	Average 1989-90	Average 1990-93
<i><b>Africa</b></i>			
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 <sup>1)</sup>	-
7. Tanzania	-	31.0 <sup>2)</sup>	-
8. Tunisia	45.0	-	-
<i><b>Central and South America</b></i>			
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 <sup>3)</sup>	27.1 (35.1) <sup>3)</sup>
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
<i><b>Asia</b></i>			
1. Cyprus	21.0	-	-
2. Hong Kong	13.0	-	-
3. India	-	22.4 <sup>4)</sup>	-
4. Israel	29.0	-	-
5. Malaysia	39.0	-	-
6. Philippines	50.0	-	-
7. Singapore	13.0	-	-
8. South Korea	38.0	-	20.3 <sup>5)</sup>
9. Sri Lanka	40.0	-	-
10. Taiwan	-	-	16.5 <sup>5)</sup>
11. Thailand	71.0	-	-

Sources: Own calculations 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 there exists no value for this period for this country.

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

2) Source: For Tanzania Bagachwa, and 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).

### **3.2 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 1990-93 and 1994-95. Considering the physical input method by Johnson et. al (in brackets the Lacko values) and the countries of the former Soviet Union over the period 1990–93, 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 et. al. 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. Turning to the transition countries of Central and Eastern Europe and considering the period 1990-93 and the Johnson et. al. 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. According to Lackó the lowest two are Slovenia with 28.5 percent and the Czech Republic with 28.7 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 et. al figures show an average shadow economy of the Central and Eastern European states of 20.6 (Lacko 32.4) over 1990-93 and over the period 1994-95 Johnson et. al. shows an average size of the shadow economy of the Central and Eastern European states of 20.9 (Lacko 31.6).

### **3.3 OECD-Countries**

For the 21 OECD western-type countries either the currency demand method or the DYMIMIC method were used; the results are shown in table 4. Considering the periods 1989/90 and 1990–93 the southern European countries have the largest shadow economies: Greece (27.6 and 24.9%), Italy (22.8 and 24.0%), Spain (16.1 and 17.3%), and Portugal (15.9 and 17.2%). At the lower end are the USA (6.7 and 8.2%), Switzerland (6.7 and 6.9%), and Austria (6.9 and 7.1%). In general, this ranking of the size of the shadow economies of the OECD countries calculated by Schneider is supported by other studies.<sup>8)</sup>

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<sup>8)</sup>See Frey and Pommerehne (1984), Frey and Weck-Hannemann (1984), Williams and Windebank (1995),  
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<b>Table 3: The Size of the Shadow Economy in Transition Countries</b>				
<b>Transition countries</b>	<b>Size of the Shadow Economy (in % of GDP)</b>			
	<b>Physical Input (Electricity) Method using values from Johnson et. al. (1997) and values in “( )” from Lacko (1999)</b>			
	<b>Average 1990-93</b>		<b>Average 1994-95</b>	
<i>Former Soviet Union<sup>1)</sup></i>				
1. Azerbaijan	33.8	(41.0)	59.3	(49.1)
2. Belarus	14.0	(31.7)	19.1	(45.4)
3. Estonia	23.9	(35.9)	18.5	(37.0)
4. Georgia	43.6	(50.8)	63.0	(62.1)
5. Kazakhstan	22.2	(29.8)	34.2	(38.2)
6. Kyrgyzstan	-	(27.1)	-	(35.7)
7. Latvia	24.3	(32.2)	34.8	(43.4)
8. Lithuania	26.0	(38.1)	25.2	(47.0)
9. Moldavia	29.1	(-)	37.7	(-)
10. Russia	27.0	(36.9)	41.0	(39.2)
11. Ukraine	28.4	(37.5)	47.3	(53.7)
12. Uzbekistan	10.3	(23.3)	8.0	(29.5)
Average: former Soviet Union states	25.7	(34.9)	35.3	(43.6)
<i>Central and Eastern Europe</i>				
1. Bulgaria	26.3	(32.7)	32.7	(35.0)
2. Croatia	23.5 <sup>2)</sup>	(39.0)	28.5 <sup>2)</sup>	(38.2)
3. Czech Republic	13.4	(28.7)	14.5	(23.2)
4. Hungary	30.7	(30.9)	28.4	(30.5)
5. Macedonia	-	(40.4)	-	(46.5)
6. Poland	20.3	(31.8)	13.9	(25.9)
7. Romania	16.0	(29.0)	18.3	(31.3)
8. Slovakia	14.2	(30.6)	10.2	(30.2)
9. Slovenia	-	(28.5)	-	(24.0)
Average: former Central and Eastern Europe states	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 Zoida-Lobatón (1998a, p. 351) and for the values in ( ) Lacko (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 et.al. (1997).

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

<b>Table 4: The Size of the Shadow Economy in OECD Countries</b>				
<b>OECD-Countries</b>	<b>Size of the Shadow Economy (in % of GDP) using:</b>			
	<b>Currency Demand Method</b>			
	Average 1989/90	Average 1990/93	Average 1994/95	Average 1997/98
1. Australia	10.1	13.0	13.5	14.0
2. Austria	6.9	7.1	8.6	9.0
3. Belgium	19.3	20.8	21.5	22.5
4. Canada	12.8	13.5	14.8	16.2
5. Denmark	10.8	15.0	17.8	18.3
6. Finland	13.4	16.1	18.2	18.9
7. France	9.0	13.8	14.5	14.9
8. Germany	11.8	12.5	13.5	14.9
9. Great Britain	9.6	11.2	12.5	13.0
10. Greece	22.6	24.9	28.6	29.0
11. Ireland	11.0	14.2	15.4	16.2
12. Italy	22.8	24.0	26.0	27.3
13. Japan	8.8	9.5	10.6	11.1
14. Netherlands	11.9	12.7	13.7	13.5
15. New Zealand <sup>1)</sup>	9.2	9.0	11.3	11.9
16. Norway	14.8	16.7	18.2	19.6
17. Portugal	15.9	17.2	22.1	23.1
18. Spain <sup>2)</sup>	16.1	17.3	22.4	23.1
19. Sweden	15.8	17.0	19.5	19.9
20. Switzerland	6.7	6.9	7.8	8.1
21. USA	6.7	8.2	8.8	8.9
<b>Average over 21 OECD countries</b>	<b>13.2</b>	<b>14.3</b>	<b>15.7</b>	<b>16.8</b>

Sources: Currency demand approach own calculations and Schneider (1994a, 1998a).

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

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

In table 4, the latest results are shown for OECD countries over the period 1994-95, and for the period 1997-98, too. In principle the ranking of the sizes of the shadow economies of the results are similar to the periods 1989/90 and 1990/93. However, the shadow economy has increased compared to the results of the periods 1989/90 and 1990-93, in all OECD countries: whereas the average size of the shadow economy of the investigated OECD countries was 13.2 percent of the GDP in 1989/90 and 14.3% of GDP in 1990-93, this value increased to 15.7 percent of GDP in the years 1994-95. A further increase can be observed for the

investigated OECD countries to 16.8 percent for the period 1997/98. From these results it is obvious that even in the late nineties the shadow economy is still growing in most OECD countries.

### **3.4 Average Size of the Shadow Economy in Developing, Transition and OECD-Countries**

If one finally compares the average sizes of the shadow economies for the three types of countries, one gets the following results, which are shown in table 5:

**Table 5: Average Size of the Shadow Economy for Developing, Transition and OECD Countries**

<b>Countries (Estimation methods)</b>	<b>Average Size of the Shadow Economy (in % of GDP) 1989-93</b>	
<b><u>Developing countries</u> (Electricity method)</b>		
Africa	43.9	(9.4) <sup>1)</sup>
Central and South America	38.9	
Asia	35.0	
<b><u>Transition countries</u> (Electricity method)</b>		
Former Soviet Union	25.7	34.9 <sup>2)</sup>
Eastern Europe	20.7	32.4 <sup>2)</sup>
<b><u>OECD countries</u> (Electricity Method)</b>	15.1	
<b>(Currency Demand Method)</b>	14.2	

Source: own calculations using tables 2-4.

1) Value of South Africa.

2) Using the values from Lackó (1999) over 1990-93.

A comparison of the size of the shadow economy between the various countries and types of countries is very difficult and only a „crude“ comparison can be made, because in the various studies (i) different independent variables (e.g., tax variables) and (ii) different specifications of the dependent variable and of estimation equations were used; (iii) different assumptions about the velocity of currency are made, and (iiii) different additional influences on the electricity consumption were used. As can be seen from the table 6 the developing countries have by far the largest average shadow economies, between 35 and 44 percent, followed by

the transition countries, between 20.7 percent and 34.9 percent, and finally the OECD countries with an average shadow economy of 15.1 percent using the electricity approach and 14.2 percent using the currency demand approach. But as already argued this comparison can only give some hints, since the methods, statistical approaches and specifications are quite different in the various studies.

#### **4 The size of the shadow economy labor force all over the world – Findings for 67 countries**

Having extensively examined the size and rise of the shadow economy in terms of value added over time, the analysis in this part focuses on the „shadow“ labor market, as within the official labor market there is a particularly tight relationship and “social network” between people who are active in the shadow economy.<sup>9)</sup> Moreover, by definition every activity in the shadow economy involves a “shadow” 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“. Why do people work in the shadow economy? In the official labor market, the costs firms (and individuals) have to pay when “officially” hiring someone are increased tremendously by the burden of tax and social contributions on wages, as well as by the legal administrative regulation to control economic activity.<sup>10)</sup> 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. More detailed theoretical information on the labor supply decision in the underground economy is given by Lemieux, Fortin, and Fréchet (1994) who use micro data from a survey conducted in Quebec City (Canada). In particular, their study provides some economic insight into the size of the distortion caused by income taxation and the welfare system. The results of this study suggest that hours worked in the shadow economy are quite responsive to changes in the net wage in the regular (official) sector. Their empirical results attribute this to a (miss-)allocation of work from the official to the informal sector, where it is not taxed. In this case, the substitution between labor-market activities in the two sectors is quite high. These 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 Fréchet 1994 p. 235). These findings demonstrate a large negative elasticity of hours

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<sup>9)</sup>Pioneering work in this area has been done by L. Frey (1972, 1975, 1978, 1980), Cappiello (1986), Lubell (1991), Pozo (1996), Bartlett (1998) and Tanzi (1999).

<sup>10)</sup>This is especially true in Europe (e.g. in Germany and Austria), where the total tax and social security burden

worked in the shadow economy with respect both to the wage rate in the regular sector as well as to a high mobility between the sectors.

Illicit work can take many shapes. 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 or illegal immigrants), who are not allowed to work in the official economy. Empirical research on the shadow economy labor market is even more difficult than of the shadow economy on the value added, since we have very little knowledge about how many hours an average “shadow economy worker” is actually working (from full time to a few hours, only); hence, it is not easy to provide empirical facts.<sup>11)</sup>

The following results of portraying the shadow economy labor force are based on the Worldbank database on informal employment in major cities all over the world as well as on other sources (see footnote 11). The values of the shadow economy labor force are calculated in absolute terms and in percent of the official labor force under the assumption, that in rural areas the shadow economy is at least as high as in the cities. This is a conservative assumption, as in reality the shadow economy will most likely be even larger in rural areas.<sup>12)</sup> The estimation methods employed are the survey technique and for some countries the MIMIC-method and the method of the discrepancy between the official and actual labor force. The following results are preliminary and should be treated as a first attempt to calculate the shadow economy labor force.

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adds up to 100% on top of the wage effectively earned; see also section 5.1.

<sup>11)</sup>For developing countries some literature about the shadow labour market exists, e.g. the latest works by Dallago (1990), Pozo (1996), Loayza (1996), especially Chickering and Salahdine (1991).

<sup>12)</sup> This assumption, that the shadow economy labor force is at least as high as the country side than in major cities, is a very modest one and is supported by Lubell (1991) and Bartlett (1998). Some authors (e.g. Lubell (1991), Pozo (1996) and Chickering and Slahdine (1991)) argue that the shadow economy labor force is up to twice as high on the country side compared to the one of the major cities. But as there exists no (precise) figures about this ratio the assumption of equal size may be justified arguing that such a calculation provides at least minimal figures.

## 4.1 *Developing Countries*

As has already been stated, to calculate the shadow economy labor force, the model approach, the method of the discrepancy between official and actual labor force and the survey technique are used. The results are comprised in tables 6 to 10. In table 6 the results of countries in Africa are shown. Both the Republic of Congo and Gambia have the largest shadow economy labour force with 80% of the official labor force, followed by Guinea with 79%, Benin with 76,9% and Rwanda with 75%.<sup>13)</sup> Zimbabwe has the lowest value of a shadow economy labor force with 33,9% of the official labor force. For African countries the figures show considerable variation and should really be seen as first and preliminary results. On average the shadow economy labor force in these 33 African countries is 54,2% (of the official labor force) and 24,6% of the population and Rwanda with 38.7%. The three countries with the lowest shadow economy (in % of official GNP) are Lesotho with 15.4%, Zimbabwe with 15.7% and Angola with 16.2%. The average size of the shadow economy in these 30 African countries is 25.7% (of official GNP). If one makes the assumption that this informal or shadow economy labor force is as productive as in the official economy and contributes per capita a similar value added as if they work in the official economy, the shadow economy GNP can be calculated from this shadow economy labor force, which is also shown in table 6. To stress once again, the following values have been calculated under the (extreme?) assumption, that a fulltime shadow economy worker is as productive as his colleague in the official economy. The largest shadow economy in percent of official GNP has Gambia with 41,2%, followed by Guinea with 36,9% and Rwanda with 38,7%.

In table 7 some Asian countries are shown. Here, China, India and Indonesia are worth taking a closer look, as they are the three largest countries in Asia (from the point of view of population). In China, it is estimated that 160 million people work in the shadow economy - 21,9% of the official labor force.<sup>14)</sup> In India 217 million people work in the shadow economy - 50% of the official labor force. In Indonesia 36,7 million people work in the shadow

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<sup>13)</sup> These high values strongly indicate that a considerable part of these shadow economy workers have at least also a (part-time) job in the official economy. As the number of these "double-job-holders" (official and unofficial one) is unknown and may be different from country to country. Hence the ratio shadow economy labor force in percent of official labor force should to be interpreted with great care (or very cautiously!) because it is unclear what this ratio actually means, an interpretation is very difficult. Also to undertake comparisons between different countries is very difficult and such comparisons provide only a very crude picture. Maybe the ratio shadow economy labor force in percent of population is a somewhat better measure.

<sup>14)</sup> The figure for China should be interpreted with great care as this country has still a communist regime with some regions under a capitalist system.

economy, that is 37,4% of the official labor force. In Pakistan 29,4 million people or 60% of the official labor force work in the shadow economy. One realizes that in Asia the shadow economy labor force is quite high, but also these values are preliminary and have to be reexamined again. On average the shadow economy labor force in these Asian countries forms 46,5% (of the official labor force) and 19,6% of the population. Sri Lanka and the Philippines have the lowest values of the shadow economy labor force with 31.3% and 30.6% of the official labor force. In terms of value added Nepal has with 37.6% (of official GNP) the greatest shadow economy followed by Yemen with 22.5% and India with 22.4%. The average size of the shadow economy in these 7 Asian countries is 19.5% (of official GNP).

In table 8 some Latin and South American states are shown. In absolute terms, Brazil has the highest shadow economy labor force with 37,4 million (49,2% of the official labor force), followed by Columbia with 9,7 million or 53,8% of the official labor force. Also Ecuador with 58,8% and Peru with 54,6% have a quite high shadow economy labor force (in percent of the official labor force). Chile has the lowest shadow economy labor force with 40%, as well as Paraguay with 41% and El Salvador with 47,3% of the official labor force. On average the shadow economy labor force in these 9 countries is 49,6% (of the official labor force) and 20,3% of the population. In terms of value added Ecuador has with 24.1% (of official GNP) the greatest shadow economy followed by Columbia with 23.8% and El Salvador with 23.1%.

#### **4.2 Transition Countries**

For the transition countries results from 9 economies were derived; they are shown in table 9. Armenia has the highest values with a shadow economy labor force of 75,5% of the official labor force, followed by Croatia with 70% and Bulgaria with 63%. In absolute figures, Russia has by far the biggest shadow economy labor force among the transition countries with 32,9 million “shadow economy workers”, followed by Rumania with 4,7 million and Kazakhstan with 2,8 million. Slovenia has the lowest shadow economy labor force with 31% of the official labor force. On average the shadow economy labor force in these 9 countries is 49% (of the official labor force) and 23,9% of the population.

### 4.3 OECD-countries

In table 10 the estimates for the shadow economy labor force in 7 OECD-countries (Austria, Denmark, France, Germany, Italy, Spain and Sweden) are shown. In Austria the shadow economy labor force has reached in the years 1997-1998 500.000 to 750.000 or 16% of the official labor force (mean value). In Denmark the development of the 80s and 90s shows that the part of the Danish population engaged in the shadow economy ranged from 8,3% of the total labor force (in 1980) to 15,4% in 1994 – quite a remarkable increase of the shadow economy labor force it almost doubled over 15 years. In France (in the years 1997/98) the shadow economy labor force reached a size of between 6 and 12% of the official labor force or in absolute figures between 1,4 and 3,2 million. In Germany this figure rose from 8 to 12% in 1974 to 1982 and to 22% (18 millions) in the year 1997/98. For France and Germany this is again a very strong increase in the shadow economy labor force. In other countries the amount of the shadow economy labor force is quite large, too: in Italy 30-48% (1997-1998), Spain 11,5-32% (1997-1998) and Sweden 19,8 % (1997-1998). In the European Union about 20 million people are engaged in shadow economy activities in the year 1997-1998 and in all European OECD-countries 35 million work illicitly. These figures demonstrate that the shadow economy labor market is lively and may provide an explanation, why for example in Germany, one can observe such a high and persistent unemployment. In table 10 a first and preliminary calculation is done of the official GNP per capita and the shadow economy GDP per capita, shown in US-\$. Here one realizes immediately that in all countries investigated, the shadow economy GDP per capita is much higher - on average in all countries around 40%.<sup>15</sup> This clearly shows, that the productivity in the shadow economy is considerably higher than the official economy - a clear indication, that the work effort; i.e. the incentive to work effectively is stronger in the shadow economy. In general these very preliminary results clearly demonstrate that the shadow economy labor force has reached a remarkable size in the developed OECD-countries, too, even when the calculation still might have many errors, but again the picture shows, that the shadow economy labor market has reached a sizeable figure in most countries.

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<sup>15</sup>) This is an astonishing result, which has to be further checked, because in the official per capita GDP figures the whole economy is included with quite productive sectors (like electronics, steel, machinery, etc.) and the shadow economy figures traditionally contain mostly the service sectors (and the construction sector). Hence one could also expect exactly the opposite result, as the productivity in the service sector is usually much lower than in the above mentioned ones. Sources of error may be either an underestimation of the shadow economy labor force or an overestimation of the shadow economy in terms of value added.

**Table 6: Africa – Shadow Economy Labor Force (Informal employment), Population, „official“ Labour Force, and Shadow Economy GNP**

Country	Informal employment (1998)			Population (97) (millions)	Labour Force (1997)		Shad. Ec. GNP in billion \$, 1998	Official GNP in billion \$, 1998	Shad. Ec. GNP in % of Official GNP
	millions	in % of official LF	in % of Pop.		millions	in % of Population			
1 Angola	1.90	35.7	16.3	11.66	5.3	45.45	0.646	4.000	16.2
2 Benin	2.00	76.9	34.5	5.80	2.6	44.83	0.758	2.200	34.5
3 Botswana	0.30	45.0	19.6	1.53	0.7	45.75	1.080	5.600	19.3
4 Burkina Faso	3.40	65.0	32.5	10.47	5.2	49.67	0.816	2.600	31.4
5 Cameroun	3.50	61.7	25.1	13.94	5.7	40.89	2.135	8.700	24.5
6 Chad	1.30	38.0	18.2	7.15	3.4	47.55	0.299	/	/
7 Congo	0.60	50.3	22.1	2.71	1.1	40.59	0.414	1.900	21.8
8 Cote d'Ivoire	3.40	60.3	23.9	14.21	5.7	40.11	2.380	10.100	23.6
9 Dem. Rep. of Congo	15.70	80.0	33.6	46.71	19.6	41.96	1.727	5.400	32.0
10 Ethiopia	15.70	61.0	26.3	59.75	25.7	43.01	1.570	6.200	25.3
11 Gabon	0.30	58.0	26.1	1.15	0.5	43.48	1.251	/	/
12 Gambia	0.50	80.0	42.4	1.18	0.6	50.85	0.170	0.413	41.2
13 Ghana	6.10	72.3	33.9	17.98	8.5	47.27	2.379	7.200	33.0
14 Guinee	2.60	79.0	37.6	6.92	3.3	47.69	1.404	3.800	36.9
15 Kenya	6.00	40.8	21.0	28.61	14.6	51.03	2.100	9.800	21.4
16 Lesotho	0.31	38.8	15.4	2.01	0.8	39.80	0.185	1.200	15.4
17 Liberia	0.40	35.0	13.8	2.89	1.2	41.52	/	/	/
18 Madagascar	3.90	57.5	27.6	14.15	6.7	47.35	1.014	3.700	27.4
19 Malawi	2.50	51.7	24.3	10.28	4.9	47.67	0.500	2.100	23.8
20 Mali	1.80	36.0	17.5	10.29	5.0	48.59	0.450	2.600	17.3
21 Mauritania	0.50	41.0	20.3	2.46	1.1	44.72	0.205	1.000	20.5
22 Namibia	0.33	47.1	20.4	1.62	0.7	43.21	0.652	3.200	20.4
23 Niger	2.30	51.0	23.5	9.80	4.6	46.94	0.437	/	/
24 Nigeria	23.40	48.9	19.8	117.90	47.9	40.63	17.780	36.400	48.8
25 Rwanda	3.20	75.0	40.5	7.90	4.2	53.16	0.736	1.900	38.7
26 Senegal	2.50	62.4	28.4	8.79	4.0	45.51	1.325	4.800	27.6
27 Sierra Leone	1.30	70.0	27.4	4.75	1.8	37.89	0.182	0.702	25.9
28 Sudan	4.60	42.6	16.3	28.30	10.8	38.16	1.333	8.200	16.3
29 Tanzania	6.80	42.2	21.7	31.32	16.1	51.40	1.476	6.800	21.7
30 Togo	0.70	38.9	16.1	4.34	1.8	41.47	0.226	1.400	16.1
31 Tunisia	2.00	57.1	21.5	9.30	3.5	37.63	4.272	19.400	21.5
32 Uganda	5.80	56.4	28.5	20.32	10.2	50.20	1.798	/	/
33 Zimbabwe	1.80	33.9	15.7	11.47	5.3	46.21	1.082	6.900	15.7
<b>Average over 33 countries</b>	<b>3.9</b>	<b>54.2</b>	<b>24.6</b>			<b>44.9</b>		<b>6.900</b>	<b>25.7</b>

Data Source: Own calculations based on World Bank, Africa Region Live Database, <http://www.worldbank.org/html/extdr/regions.htm>

**Table 7: Asia - Shadow Economy Labor Force (Informal employment), Population, „official“ Labour Force, and Shadow Economy GNP**

	Country	Informal employment (1998)			Population (98) (millions)	Labour Force (1998)		Informal GNP in billion \$, 1998	Official GNP in billion \$, 1998	Informal GNP in % of Official GNP
		millions	in % of LF	in % of Pop.		millions	in % of Population			
1	China	162.40	21.9	13.1	1238.60	743.0	59.99	138.327	1055.000	13.1
2	India	217.20	50.4	22.2	979.70	431.0	43.99	95.568	427.400	22.4
3	Indonesia	36.70	37.4	18.0	203.70	98.0	48.11	24.956	221.500	11.3
4	Mongolia	0.42	44.0	16.2	2.60	1.0	38.46	0.169	1.000	16.9
5	Nepal	8.60	78.1	37.6	22.90	11.0	48.03	1.803	4.800	37.6
6	Pakistan	29.40	60.0	22.3	131.60	49.0	37.23	/	/	/
7	Philippines	9.80	30.6	13.0	75.20	32.0	42.55	11.520	88.400	13.1
8	Sri Lanka	2.50	31.3	13.3	18.80	8.0	42.55	/	/	/
9	Yemen	3.30	65.0	19.9	16.60	5.0	30.12	0.990	4.400	22.5
	<b>Average of 9 countries</b>	<b>52.3</b>	<b>46.5</b>	<b>19.5</b>			<b>43.4</b>			<b>19.5</b>
Data Source: Own calculations based on World Bank, World Development Indicators, <a href="http://www.worldbank.org/html/extdr/regions.htm">http://www.worldbank.org/html/extdr/regions.htm</a>										

**Table 8: Latin America & Caribbean - Shadow Economy Labor Force (Informal employment), Population, „official“ Labour Force, and Shadow Economy GNP**

	Country	Informal employment (1998)			Population (98) (millions)	Labour Force (1998)		Informal GNP in billion \$, 1998	Official GNP in billion \$, 1998	Informal GNP in % of Official GNP
		millions	in % of LF	in % of Pop.		millions	in % of Population			
1	Bolivia	1.54	51.3	19.5	7.90	3.0	37.97	1.540	7.400	20.8
2	Brazil	37.40	49.2	22.5	165.90	76.0	45.81	/	/	/
3	Chile	2.40	40.0	16.2	14.80	6.0	40.54	11.544	73.400	15.7
4	Columbia	9.70	53.8	23.8	40.80	18.0	44.12	25.220	106.100	23.8
5	Ecuador	2.94	58.8	24.1	12.20	5.0	40.98	4.482	18.600	24.1
6	El Salvador	1.40	47.3	23.0	6.10	3.0	49.18	2.590	11.200	23.1
7	Guatemala	2.01	50.3	18.6	10.80	4.0	37.04	3.296	16.800	19.6
8	Paraguay	0.80	41.0	15.4	5.20	2.0	38.46	1.408	9.200	15.3
9	Peru	4.91	54.6	19.8	24.80	9.0	36.29	12.079	61.100	19.8
	<b>Average of 9 countries</b>	<b>7.0</b>	<b>49.6</b>	<b>20.3</b>			<b>41.2</b>			<b>20.3</b>

Data Source: Own calculations based on World Bank, World Development Indicators, <http://www.worldbank.org/html/extdr/regions.htm>

**Table 9: Transition Countries - Shadow Economy Labor Force (Informal employment), Population, „official“ Labour Force, and Shadow Economy GNP**

	Country	Informal employment (1998)			Population (98) (millions)	Labour Force (1998)		Informal GNP in billion \$, 1998	Official GNP in billion \$, 1998	Informal GNP in % of Official GNP
		millions	in % of LF	in % of Pop.		millions	in % of Population			
1	Armenia	1.51	75.5	39.7	3.80	2.0	52.63	0.725	1.800	40.3
2	Bulgaria	2.52	63.0	30.4	8.30	4.0	48.19	3.100	10.100	30.7
3	Croatia	1.40	70.0	31.1	4.50	2.0	44.44	6.328	20.700	30.6
4	Georgia	1.10	36.7	20.4	5.40	3.0	55.56	1.023	5.100	20.1
5	Kazakhstan	2.80	40.0	17.9	15.60	7.0	44.87	3.668	19.400	18.9
6	Kyrgyzstan	0.80	40.0	17.0	4.70	2.0	42.55	0.280	1.600	17.5
7	Romania	4.70	42.7	20.9	22.50	11.0	48.89	6.533	31.300	20.9
8	Russian Federation	32.90	42.2	22.4	146.90	78.0	53.10	75.670	337.900	22.4
9	Slovenia	0.31	31.0	15.5	2.00	1.0	50.00	3.026	19.400	15.6
	<b>Average of 9 countries</b>	<b>5.3</b>	<b>49.0</b>	<b>23.9</b>			<b>48.9</b>			<b>24.1</b>

Data Source: Own calculations based on World Bank, World Development Indicators, <http://www.worldbank.org/html/extdr/regions.htm>

**Table 10: Estimates of the Size of the “Shadow Economy Labor Force” and of the Official and Shadow Economy Productivity in Some OECD Countries 1974-1998**

Countries	Year	Official GDP per capita in US-\$ <sup>1)</sup>	Shadow Economy GDP in US-\$ per capita	Size of the Shadow Economy (in % of official GDP) Currency Demand Approach <sup>2)</sup>	Shadow Economy Labour Force in 1000 people <sup>3)</sup>	Shadow Economy Participants in % of official Labour Force <sup>4)</sup>	Sources of Shadow Economy Labour Force
Austria	90-91	20,636	25,382	5.47	300-380	9.6	Schneider (1998) and own calculations
	97-98	25,874	29,630	8.93	500-750	16.0	
Denmark	1980	13,233	18,658	8.6	250	8.3	Mogensen, et. al. (1995) and own calculations
	1986	18,496	26,356	9.8	390	13.0	
	1991	25,946	36,558	11.2	410	14.3	
	1994	34,441	48,562	17.6	420	15.4	
France	1975-82	12,539	17,542	6.9	800-1500	3.0-6.0	De Grazia (1983) and own calculations
	1997-98	24,363	34,379	14.9	1400-3200	6.0-12.0	
Germany	1974-82	11,940	17,911	10.6	3000-4000	8.0-12.0	De Grazia (1983), F. Schneider (1998b) and own calculations
	1997-98	26,080	39,634	14.7	7000-9000	22.0	
Italy	1979	8,040	11,736	16.7	4000-7000	20.0-35.0	Gaetani and d’Aragona (1979) and own calculations
	1997-98	20,361	29,425	27.3	6600-11400	30.0-48.0	
Spain	1979-80	5,640	7,868	19.0	1250-3500	9.6-26.5	Ruesga (1984) and own calculations
	1997-98	13,791	19,927	23.1	1500-4200	11.5-32.3	
Sweden	1978	15,107	21,981	13.0	750	13.0-14.0	De Grazia (1983) and own calculations
	1997-98	25,685	37,331	19.8	1150	19.8	
European Union	1978	9,930	14,458	14.5	10 000	-	De Grazia (1983) and own calculations
	1997-98	22,179	32,226	19.6	20 000	11.9	
OECD (Europe)	1978	9,576	14,162	15.0	16 000	-	De Grazia (1983) and own calculations
	1997-98	22,880	33,176	20.2	35 000		

1) Source: OECD, Paris, various years

2) Source: Own calculations.

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

4) In percent of the population aged 20-69, survey method.

## 5 The Main Causes of the Increase of the Shadow Economy

### 5.1 Increase of the Tax and Social Security Contribution Burdens

In almost all studies<sup>16)</sup> it has been found out, that the increase of the tax and social security contribution burdens is one of the main causes for the increase of the shadow economy. 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. But even major tax reforms with major tax rate deductions will not lead to a substantial decrease of the shadow economy. They will only be able to stabilize the size of the shadow economy and avoid a further increase. Social networks and personal relationships, the high profit from irregular activities and associated investments in real and human capital are strong ties which prevent people from transferring to the official economy. For Canada, Spiro (1993) expected similar reactions of people facing an increase in indirect taxes (VAT, GST). After the introduction of the GST in 1991 - in the midst of a recession - , the individuals, suffering economic hardship because of the recession, turned to the shadow economy, which led to a substantial loss in tax revenue. "Unfortunately, once this habit is developed, it is unlikely that it will be abandoned merely because economic growth resumes." (Spiro 1993 p. 255). They may not return to the formal sector, even in the long run. This fact makes it even more difficult for politicians to carry out major reforms because they may not gain a lot from them.<sup>17)</sup>

The most important factor in neoclassical models is the marginal tax rate. The higher the marginal tax rate, the greater is the substitution effect and the bigger the distortion of the

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<sup>16)</sup> See Thomas (1992); Lippert and Walker (1997); Schneider (1994, 1997, 1998, 2000); Johnson, Kaufmann, and Zoido-Lobaton (1998a,1998b); Tanzi (1999) and Giles (1999a) just to quote a few recent ones.

<sup>17)</sup> See Schneider (1994b, 1998b) for a similar result of the effects of a major tax reform in Austria on the shadow economy. Schneider shows that a major reduction in the direct tax burden did not lead to a major reduction in the shadow economy. Because legal tax avoidance was abolished and other factors, like regulations, were not changed; hence for a considerable part of the tax payers the actual tax and regulation burden remained unchanged.

labor-leisure decision. Especially when taking into account that the individual can also receive income in the shadow economy, the substitution effect is definitely larger than the income effect<sup>18)</sup> and, hence, the individual works less in the official sector. The overall efficiency of the economy is, therefore (*ceteris paribus*), lower and the distortion leads to a welfare loss (according to official GNP and taxation.) But the welfare might also be viewed as increasing, if the welfare of those, who are working in the shadow economy, were taken into account, too.<sup>19)</sup>

Empirical results of the influence of the tax burden on the shadow economy is provided in the studies of Schneider (1994b, 2000) and Johnson, Kaufmann and Zoido-Lobato (1998a, 1998b); they all found strong evidence for the general influence of taxation on the shadow economy. This strong influence of indirect and direct taxation on the shadow economy will be further demonstrated by discussing empirical results in the case of Austria and the Scandinavian countries. For Austria the driving force for the shadow economy activities is the direct tax burden (including social security payments), it has the biggest influence, followed by the intensity of regulation and complexity of the tax system. A similar result has been achieved by Schneider (1986) for the Scandinavian countries (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 sign (on currency demand) and are highly statistically significant. Similar results are reached by Kirchgaessner (1983, 1984) for Germany and by Klovland (1984) for Norway and Sweden.

Several other recent studies provide further evidence of the influence of income tax rates on the shadow economy: 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, Hill and Kabir (1996) found empirical evidence that marginal tax rates are

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<sup>18)</sup> If leisure is assumed to be a normal good.

more relevant than average tax rates, and that a substitution of direct taxes by indirect taxes seems unlikely to improve tax compliance. Further evidence on the effect of taxation on the shadow economy is presented by Johnson, Kaufmann, and Zoido-Lobaton (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<sup>20)</sup> between the size of the unofficial economy and the *top* (marginal) tax rates, might be unexpected. But since other factors like tax deductibility, tax relives, 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.<sup>21)</sup> On the other side Johnson, Kaufmann and Zoido-Lobaton (1998b) find a *positive* correlation between the size of the shadow economy and the corporate tax burden. They come to the overall conclusion that there is a large difference between the impact of either direct taxes or the corporate tax burden. Institutional aspects, like the efficiency of the administration, the extent of control rights held by politicians and bureaucrats, and the amount of bribery and especially corruption, therefore, play a major role in this “bargaining game“ between the government and the taxpayers.

## **5.2 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.<sup>22)</sup> One can think of labor market regulations, trade barriers, and labor restrictions for foreigners. Johnson, Kaufmann, and Zoido-Lobaton (1998b) find an overall significant empirical evidence of the influence of (labor) regulations on the shadow economy, the impact is clearly described and theoretically derived in other studies, e.g. for Germany (Deregulation Commission 1990/91). 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

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<sup>19)</sup>See Thomas (1992) p. 134-7.

<sup>20)</sup>The higher the top marginal tax rate, the lower the size of the shadow economy.

<sup>21)</sup>Friedman, Johnson, Kaufmann and Zoido-Lobaton (1999) found a similar result in a cross country analysis that higher tax rates are associated with less official 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.

<sup>22)</sup>See for a (social) psychological, theoretical foundation of this feature, Brehm (1966, 1972), and for a (first) application to the shadow economy, Pelzmann (1988).

costs provide another incentive to work in the shadow economy, where they can be avoided. Empirical evidence supporting the model of Johnson, Kaufmann, and 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, is found in their empirical analysis. 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 et. al. (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-Lobaton (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 sign of the relationship 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 associated with a 10 % increase in the shadow economy for 76 developing, transition and developed countries.

These findings demonstrate that governments should put more emphasis on improving enforcement of laws and regulations, rather than increasing their number. 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.

### **5.3 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-Lobaton (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. The 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-Lobaton 1998a p. I).

## **6 Methods to Estimate the Size of the Shadow Economy <sup>23)</sup>**

As has already been mentioned in chapter 2 to undertake attempts to measure the size of a shadow economy is a difficult and challenging task. In this chapter a comprehensive overview is given about the current knowledge of the various procedures to estimate the shadow economy. To measure the size and development of the shadow economy three different types of methods are most widely used. They are briefly discussed in the following three subsections.

### **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<sup>24)</sup> to measure the shadow economy. 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 assess the rise of the undeclared work from a direct questionnaire. Most interviewed hesitate to confess a fraudulent

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<sup>23)</sup> This chapter closely follows Schneider and Enste (2000).

<sup>24)</sup> The direct method of voluntary sample surveys has been extensively used for Norway by Isachsen, Klovland and Strom (1982), and Isachsen and Strom (1985). For Denmark this method is used by Mogensen (et. al., 1995) in which they report „estimates“ of the shadow economy of 2.7 percent of GDP for

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<sup>25)</sup>.

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.<sup>26)</sup> 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

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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.

<sup>25)</sup>The advantages and disadvantages of this method are extensively dealt by Mogensen et. al (1995) in their excellent and very carefully done investigation.

<sup>26)</sup>In the United States, IRS (1979, 1983), Simon and Witte (1982), Witte (1987), Clotefelter (1983), and Feige (1986). For a more detailed discussion, see Dallago (1990) and Thomas (1992).

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:

### **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 side 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.<sup>27)</sup> However, 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 side were 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.<sup>28)</sup>

### **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*.<sup>29)</sup> 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.

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<sup>27)</sup> See, e.g., Franz (1983) for Austria; MacAfee (1980) O’Higgins (1989) and Smith (1985), for Great Britain; Petersen (1982) and Del Boca (1981) for Germany; Park (1979) for the United States. For a survey and critical remarks, see Thomas (1992).

<sup>28)</sup> A related approach is pursued by Pissarides and Weber (1988), who use micro data from household budget surveys to estimate the extend of income understatement by self-employed. Also in this micro approach more or less the same difficulties arise and the figures calculated for the shadow economies may be crude.

<sup>29)</sup> Such studies have been made for Italy, see e.g., Contini (1981) and Del Boca (1981); for the United States, see O’Neill (1983), for a survey and critical remarks, see Thomas (1992).

### 6.2.3 The Transactions Approach

This approach has been developed by Feige.<sup>30)</sup> It assumes, that there is a constant relation over time between the volume of transaction and official GNP. Feige's approach therefore starts from Fisher's quantity equation,  $M \cdot V = p \cdot T$  (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 ( $p \cdot T$ ) 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  $p \cdot T$  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 shadow economy 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.<sup>31)</sup> Also, in this approach the 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. 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 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, Gutmann (1977) used the same approach, but did not use any statistical procedures; instead he

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<sup>30)</sup> For an extended description of this approach, see Feige (1996); for a further application for the Netherlands, Boeschoten and Fase (1984), and for Germany, Langfeldt (1984).

<sup>31)</sup> 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).

„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:

$$\ln (C / M_2)_t = \beta_0 + \beta_1 \ln (1 + TW)_t + \beta_2 \ln (WS / Y)_t + \beta_3 \ln R_t + \beta_4 \ln (Y / N)_t + u_t$$

with  $\beta_1 > 0$ ,  $\beta_2 > 0$ ,  $\beta_3 < 0$ ,  $\beta_4 > 0$

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.<sup>32)</sup>

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

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<sup>32)</sup> The estimation of such a currency demand equation has been criticized by Thomas (1999) but part of this criticism has been considered by the work of Giles (1999a, 1999b) and Bhattacharyya (1999), who both

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 currency demand approach is one of the most commonly used approaches. It has been applied to many OECD countries,<sup>33)</sup> but has nevertheless been criticized on various grounds.<sup>34)</sup> The most commonly raised objections<sup>34)</sup> to this method are:

- (i) Not all transactions in the shadow economy are paid in cash. Isachsen and Strom (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.<sup>35)</sup>
- (iii) A further weakness of this approach, at least when applied to the United States, is discussed by 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.

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use the latest econometric technics.

<sup>33)</sup>See Schneider (1997, 1998a), Johnson, Kaufmann and Zoido-Lobaton (1998a), and Williams and Windebank (1995).

<sup>34)</sup>See Thomas (1992, 1999), Feige (1986), and Pozo (1996).

<sup>35)</sup>One (weak) justification for the use of only the tax variable is that this variable has by far the strongest impact on the size of the shadow economy in the studies known to the authors. The only 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

- (iv) Blades (1982) and Feige (1986, 1996), 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.<sup>36)</sup> Moreover, Frey and Pommerehne (1984) and Thomas (1986, 1992, 1999) claim that Tanzi's parameter estimates are not very stable.<sup>37)</sup>
- (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<sup>38)</sup>

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

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roughly 60-70 percent to the size of the shadow economy. See also Zilberfarb (1986).

<sup>36)</sup> In another study by Tanzi (1982, esp. 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 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.

<sup>37)</sup> However in studies for European countries Kirchgassner (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 is used, this method estimates underground economic growth between 1964 and 1995 at between 3 and 11 percent of GDP.“ (Hill and Kabir [1996, p. 1553]).

<sup>38)</sup> This method was used earlier by Lizzeri (1979), Del Boca and Forte (1982), and then was used much later by Portes (1996), Kaufmann and Kaliberda (1996), Johnson, Kaufmann and Shleifer (1997). For a critique see Lackó (1998).

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 various grounds:

- (i) Not all shadow economy activities require a considerable amount of electricity (e.g. personal services), and other energy sources can be used (gas, oil, coal, etc.), so that only a part of the shadow economy will be captured.
- (ii) 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.<sup>39)</sup>

## **(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:

$$\ln E_i = \alpha_1 \ln C_i + \alpha_2 \ln PR_i + \alpha_3 G_i + \alpha_4 Q_i + \alpha_5 H_i + u_i \quad (1)$$

with  $\alpha_1 > 0, \alpha_2 < 0, \alpha_3 > 0, \alpha_4 < 0, \alpha_5 > 0$

$$H_i = \beta_1 T_i + \beta_2 (S_i - T_i) + \beta_3 D_i \quad (2)$$

with  $\beta_1 > 0, \beta_2 < 0, \beta_3 > 0$

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<sup>39)</sup>Johnson, Kaufmann and Shleifer (1997) make an attempt to adjust for changes in the elasticity of electricity/GDP.

where

$i$ : 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 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.

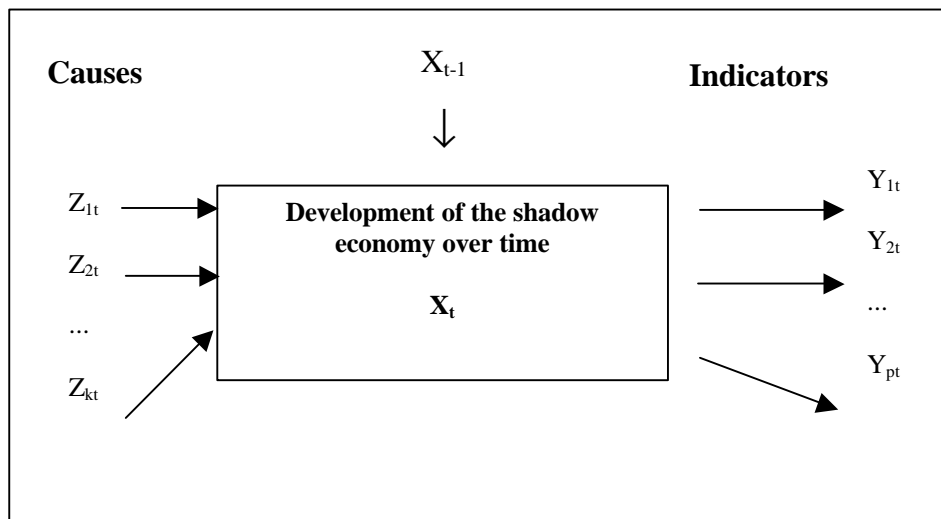
### **6.3 The model approach<sup>40</sup>**

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. 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  $Z_{it}$  ( $i = 1, 2, \dots, k$ ) the size of the shadow economy  $X_t$ , and the indicators  $Y_{jt}$  ( $j = 1, 2, \dots, p$ ) is shown in Figure 1.

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<sup>40)</sup> This part is a summarized version from a longer study by Aigner, Schneider, and Ghosh (1988, p. 303), applying this approach for the United States over time. The pioneers of this approach are Weck (1983), 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.

**Figure 1: Development of the shadow economy over time.**



There is a large body of literature<sup>41)</sup> 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.
- (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.<sup>42)</sup>

<sup>41)</sup>Thomas (1992); Schneider (1994a, 1997); Pozo (1996); Johnson, Kaufmann and Zoido-Lobatón (1998a, 1998b); and Giles (1999a, 1999b).

<sup>42)</sup> 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 Helberger and 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 and Gupsa (1999). They basically estimates a comprehensive (dynamic) MIMIC model to get a time serious index of the hidden/measured output of New Zealand or Canada, and then estimate a separate “cash-demand model” to obtain a benchmark for converting this index into percentage units. Unlike earlier empirical studies of the hidden economy, they paid proper attention to the non-stationary, and possible co-integration of time serious data in both models. Again this 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 Summary and Conclusions

There are many obstacles to be overcome to measure the size of the shadow economy (in value added and in the labor force) and to analyze its consequences on the official economy, although some progress has been made. In this paper has been shown that though it is difficult to estimate the size of the shadow economy (in value added and in the labor force), it is not impossible. I have demonstrated that with various methods, e.g. the currency demand, the physical input measure the discrepancy method and the model approach, some insights can be provided into the size and development of the shadow economy (labor force) of the developing, transition and the OECD countries. The general impression from the results of these methods is that for all countries investigated the shadow economy (labor force) has reached a remarkably large size. The results are shown in table 11.

To summarize: As it has already been argued, there is no „best“ or commonly accepted method; each approach has its specific strengths and weaknesses as well as specific insights and results. 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. Furthermore, the results of this study show that an increasing burden of taxation and social security payments, combined with rising state regulatory activities, are the major driving forces for the size and growth of the shadow economy. Finally, to conclude: Shadow economies are a complex phenomenon, present to an important extent even in the industrialized and developed economies. People engage in shadow economic activity for a variety of reasons, among most important, of which we can count are government actions, most notable taxation and regulation. With these two insights, goes a third, no less important one: a government aiming to decrease shadow economic activity has to first and foremost analyze the complex and frequently contradictory relationships among consequences of its own policy decisions.

**Table 11: Average Size of the Shadow Economy for Developing, Transition and OECD-Countries in Terms of Value-Added and of the Labor Force over two periods (1989/93 and 1997/98)**

Countries	Average Size of the Shadow Economy – Value added in % of official GDP 1989/93		Average Size of the Shadow Economy Labor Force in % of official Labor Force 1997/98	Average Size of Shadow Economy value added in % of official GNP 1997/98
	Physical Input Method (Number of Countries)	Currency Demand method (Number of Countries)	Survey and Discrepancy Methods (Number of Countries)	Calculated from Shadow Economy Labor Force (Number of Countries)
<b>Developing countries:</b>				
<b>Africa</b>	<b>43.9</b> (7)	<b>9.4<sup>1)</sup></b> (1)	-	<b>54.2</b> (33)
<b>Central and South America</b>	<b>38.9</b> (15)	-	<b>49.6</b> (9)	<b>20.3</b> (8)
<b>Asia</b>	<b>35.0</b> (11)	-	<b>46.5</b> (9)	<b>19.5</b> (7)
<b>Transition countries:</b>				
<b>Former Soviet Union</b>	<b>25.7</b> (12)	<b>34.9<sup>2)</sup></b> (12)	-	<b>49.0<sup>3)</sup></b> (9)
<b>Central and Eastern Europe</b>	<b>20.7</b> (9)	<b>32.4<sup>2)</sup></b> (9)	-	<b>24.1<sup>3)</sup></b> (9)
<b>OECD Countries</b>	<b>15.1</b> (21)	<b>14.2</b> (21)	<b>17.3</b> (7)	<b>16.8<sup>4)</sup></b> (21)

1) Value of South Africa.

2) Using the values from Lackó (1999) over 1990-93.

3) Average Size of “Former Soviet Union” and of Central and Eastern European Countries.

4) Own calculations using the Currency Demand Method and the Dymimic Approach.

Source: Own calculations using table 2 – 10.

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