ILLEGAL ACTIVITIES, BUT STILL VALUE ADDED ONES (?): SIZE, CAUSES, AND MEASUREMENT OF THE SHADOW ECONOMIES 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 GDP) over 1989-93 in developing countries is 39 %, in transition countries 23 % and in OECD countries 12 %. 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. According to some findings, a growing shadow economy has a negative impact on official GDP growth, however, this result is not robust, other studies show the opposite effect.
JEL-class.: O17, O5, D78, H2, H26.

Contents

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, 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[1] on single aspects of the hidden economy exists a comprehensive survey has just been written by Schneider (the author of this paper) and Enste. Moreover, the subject is still quite controversial[2] 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.[3] 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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[1] The literature about the „shadow", „underground", „informal", „second", "cash-" or „parallel", economy is strongly increasing. Various topics, on how to measure it, its causes, its effect on the official economy are analyzed. See for example, the first publications by Tanzi (1982); Frey and Pommerehne (1984); and Feige (1989); survey type publications by 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 Schneider and Enste (2000).

[2] Compare e.g. in the Economic Journal, vol. 109, nr. 456, June 1999 the feature "controversy: on the hidden economy".

[3] Compare the different opinions of Tanzi (1999), Thomas (1999) and Giles (1999).

In spite of these difficulties, there is growing concern over the phenomenon of the shadow economy and there are several important reasons why politicians and public sector officials should be especially worried about the size and growth of the shadow economy. Among the most important of these are:

(1) If an increase of the shadow economy is caused mainly by a rise in the overall tax and social security burden, this may lead to an erosion of the tax and social security bases and finally to a decrease in tax receipts and thus to a further increase in the budget deficit or to a further increase of tax rates with the consequence of an additional increase in the shadow economy and so on. Therefore a growing shadow economy can be seen as a reaction by individuals who feel overburdened by state activities.

(2) 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 lead to severe difficulties for politicians because it „causes" or „provides" unreliable official indicators, and the direction of the intended policy measures may therefore be questionable.

(3) On the one hand, a growing shadow economy may provide strong incentives to attract (domestic and foreign) workers and other resources away from the official economy. On the other hand two-thirds of the income earned in the shadow economy is spent in the official economy[4] resulting in a considerable (positive) stimulating effect on the official economy.

These growing concerns and 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 presents the empirical results of the size of the shadow economy over 76 countries all over the world. In section 4 I examine the main

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[4] 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). Moreover the results of these polls show that two-thirds of the value added produced in the shadow economy would not be produced in the official economy if the shadow economy did not exist.

causes of the shadow economy and in section 5 I analyze the interactions of the official and unofficial economies. In section 6 the various methods to estimate the size of the shadow economy are presented, and in section 8 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.[5] 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.

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

Type of Activity	Monetary Transactions		Non Monetary Transactions	
Illegal Activities	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.	
	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] Structure of the table is taken from Lippert and Walker (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 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

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[5] This definition is used for example, by Feige (1989, 1994), Schneider (1994a), Frey and Pommerehne (1984), and Lubell (1991).

to changes in taxes, to sanctions from the tax authorities and to general moral attitudes, etc." (Mogensen, et. al. 1995 p. 5). [6] 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. [7]

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[8] 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[9], by reporting the results for the shadow economy for 76 countries all over the world for the periods 1989–90 and 90-93. [10]

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.

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[6] For a detailed discussion, see Frey and Pommerehne (1984); Feige (1989); Thomas (1992); and Schneider (1986, 1994a, and 1998a).

[7] Compare, e.g. the recent survey of Andreoni, Erard and Feinstein (1998).

[8] Recently, Pozo (1996), Loayza (1996), Lippert and Walker (1997), Schneider (1998a) and Lacko (1999).

[9] 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 (1996, 1997a, 1997b), Portes (1996), and Johnson, Kaufmann, and Zoido-Lobatón (1998a, 1998b), who even calculate one shadow economy series of these two methods for a cross-section country sample.

[10] 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. 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.

Table 2: The Size of the Shadow Economy in Developing Countries			
	Size of the Shadow Economy (in % of GDP)		
	Physical Input (Electricity) Method	**Currency Demand Approach**	**MIMIC-Approach**
Developing countries	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 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: Van der Berg (1990) and 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 Bhattagharyya (1999).

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

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.

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 1989-90, 1990-93 and 1994-95.[11] 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

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[11] 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, due to this they are not discussed in detail here.

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 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).[12] Considering the period 1990–93 and using the series by Johnson et al., 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 by using figures of Schneider, and to a much lesser some extent the ones achieved by the physical input (electricity) method by Lackó (1997b). At the lower end, Johnson et al. 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.[13]

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[12]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.

[13]See Frey and Pommerehne (1984), Frey and Weck-Hannemann (1984), Williams and Windebank (1995), Thomas (1992), and Lippert and Walker (1997) who reach quite similar rankings.

Table 3: The Size of the Shadow Economy in Transition Countries					
	Size of the Shadow Economy (in % of GDP)				
	Physical Input (Electricity) Method using values from Johnson et. al. (1997) and values in "( )" from Lacko (1999)				
Transition countries	**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. Slovenia	-	(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 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.

Table 4: 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 Zoida-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 Mauleon (1998).

In table 5, 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 4. 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.

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

Table 5: Size of the Shadow Economy of OECD countries 1994-1997

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

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 6:

Table 6: Average Size of the Shadow Economy for Developing, Transition and OECD Countries

Countries (Estimation method)	Average Size of the Shadow Economy (in % of GDP) 1989-93	
Developing countries **(Electricity method)**		
Africa	43.9	(39.4)[1]
Central and South America	38.9	
Asia	35.0	
Transition countries **(Electricity method)**		
Former Soviet Union	25.7	34.9[2]
Eastern Europe	20.7	32.4[2]
OECD countries		
Electricity Method	15.1	
Currency Demand Method	11.9	

Source: own calculations using tables 2-4.
1) Including 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 11.9 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.

3.5 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, as within the official labor market there is a particularly close contact among those people who are active in the shadow economy.[14] Moreover, by definition every shadow economic activity 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 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 by the legal administrative regulation to control economic activity.[15] 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. 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.

The research of the shadow economy labor market is even more difficult as the one of the shadow economy of the value added, because we have very little knowledge 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 some empirical facts. The few existing results are shown in table 7 for western-type OECD countries.[16] The figures in table 7 give a rough idea of the size of the shadow labor market, for example the results for Denmark show that the population of adult Danes engaged in the shadow economy ranged from 8.3 percent (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 1997/98.

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[14] 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).

[15] 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 also section 4.1.

[16] 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).

Table 7: 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	90-91	300	9.6	5.47	Schneider (1998)
	97-98	500	16.0	8.93	
Denmark	1980	-	8.3	8.6	Mogensen, et. al. (1995)
	1986	-	13.0	-	
	1991	-	14.3	11.2	
	1994	-	15.4	17.6	
France	1975-82	800-1500	3.0-6.0	6.9	De Grazia (1983) and own calculations
	1997-98	1400-3200	6.0-12.0	14.7	
Germany	1974-82	2000-3000	8.0-12.0	10.6	De Grazia (1983) F. Schneider (1998b)
	1997-98	5000	22.0	14.7	
Italy	1979	4000-7000	20.0-35.0	16.7	Gaetani and d'Aragona (1979) own calculations
	1997	6600-11400	30.0-48.0	27.3	
Spain	1979-80	1250-3500	9.6-26.5	19.0	Ruesga (1984)
	1997-98	1500-4200	11.5-32.3	23.1	own calculations
Sweden	1978	750	13.0-14.0	13.0	De Grazia (1983) and own calculations
	1997	1150	19.8	19.8	
European Union	*1978*	*10 000*	-	*14.5*	*De Grazia (1983) and own calculations*
	1997-98	*20 000*			
OECD	*1978*	*16 000*	-	*15.0*	*De Grazia (1983) and own calculations*
	1997-98	*35 000*			

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).

This is for both countries a very strong increase. 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 (1997-98) and France 6.0-12.0 percent (1997-98). In the European Union 10 million are at least engaged in shadow economy activities and in all OECD countries about 16 million work "black" (illicit/ irregular/ unofficial). These figures demonstrate that the shadow economy labor market is lively and may provide an explanation, why for example in Germany, we observe such high and persistent unemployment.

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). 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. It also provides some support for the existence of a Laffer curve. The Laffer curve suggests, that an increase of the (marginal) tax rate leads to a decrease of tax revenue when the tax rate is too high. 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 Fréchette 1994 p. 235). The findings demonstrate a large negative elasticity of hours worked in the shadow economy with respect to the wage rate in the regular sector and also to a high mobility between the sectors.

4   The Main Causes of the Increase of the Shadow Economy

4.1   Increase of the Tax and Social Security Contribution Burdens

In almost all studies[17] 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 working in the shadow 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 - ,

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[17] See Thomas (1992); Lippert and Walker (1997); Schneider (1994, 1997, 1998, 2000); Johnson, Kaufmann, and Zoido-Lobatón (1998a,1998b); Tanzi (1999) and Giles (1999a) just to quote a few recent ones.

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.[18]

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 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[19] 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.[20]

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-Lobatón (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 showing 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:

1. The burden of total direct taxation,
2. the burden of indirect taxation,
3. the complexity of the tax system and
4. the intensity of government regulations.

The estimation results of the currency demand function are shown in table 8:

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[18] 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.

[19] If leisure is assumed to be a normal good.

[20] See Thomas (1992) p. 134-7.

Table 8: Estimation Results of the Currency Demand Function for Austria [1]

Independent Variables	Dependent Variable: Real Currency per Capita, In (CUR_t/POP_t) Estimation Period	
	1956-1991	1956-1985
Lagged Dependent Variable ln (CUR_{t-1}/POP_{t-1})	0.534** (8.91)	0.551** (9.43)
Real Consumption per capita ln (C_t/POP_t)	0.703** (5.49)	0.724** (5.99)
Number of Eurocheque Systems per capita ln (ES_{t-1}/POP_{t-1})	-0.213* (-2.51)	-0.174* (-2.09)
Real Interest Rate on Bonds ln (IR_t)	-0.123* (-2.51)	-0.139* (-2.65)
Direct Tax Burden (*including* social security payments) ln ($DIRT_t$)	0.173** (3.09)	0.182* (2.86)
Indirect Tax Burden ln ($INDT_t$)	0.117(*) (1.88)	0.123(*) (1.92)
Complexity of the Tax System ln ($VIST_t$)	0.154** (2.77)	0.147** (2.86)
Intensity of Regulation ln (REG_t)	0.166** (2.94)	0.159** (2.72)
Constant Term	-2.24(*) (-1.80)	-2.39(*) (-1.74)
Test Statistics		
R²	0.992	0.990
S.E.	0.014	0.015
Durbin's h	1.06	1.16
rho (1)	0.18	0.20
D.F.	27	21
Ex-post Forecast 1985-1991		
RMSE	-	1.51
Theil's U 1	-	0.42

1) All equations are estimated by an ordinary least-squares procedure using annual data. R² is the coefficient of determination (corrected for the degrees of freedom); S.E. shows the standard error of the estimation. Durbin's h is Durbin's h-test against auto-correlation when lagged dependent variables are used as regressors. Rho (1) is the auto-correlation coefficient of first order. D.F. stands for the "degrees of freedom". RMSE is the root mean squared error and Theil's U 1 stands for Theil's inequality coefficient. The term "ln" indicates that these variables have been transformed to natural logarithms. Numbers in parentheses below coefficient estimates are t-values. (*), *, and ** indicate significance at the 90 %, 95 % and 99 %-confidence level, respectively.

All coefficients of the independent variables have the theoretically expected sign and, with the exception of the indirect tax burden, are statistically significant at the 95 % confidence level. Also the other test statistic show satisfactory results; especially the "true ex-post" forecast of the currency demand for the period 1985-91 indicates that the major independent factors in the currency demand functions are included. 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 Cloveland (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 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-Lobatón (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[21] 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.[22] On the other side Johnson, Kaufmann and Zoido-Lobatón (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

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[21] The higher the top marginal tax rate, the lower the size of the shadow economy.

[22] Friedman, Johnson, Kaufmann and Zoido-Lobatón (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.

bureaucrats, and the amount of bribery and especially corruption, therefore, play a major role in this "bargaining game" between the government and the taxpayers.

4.2 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.[23] One can think of labor market regulations, trade barriers, and labor restrictions for foreigners. Johnson, Kaufmann, and Zoido-Lobatón (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 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

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[23] See for a (social) psychological, theoretical foundation of this feature, Brehm (1966, 1972), and for a (first) application to the shadow economy, Pelzmann (1988).

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.[24]

4.3 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 either from the neoclassical leisure-income model or from empirical results.[25]. 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.

4.4 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. 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

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[24]See for example Frey (1989) for a first application of the Public Choice Theory to the shadow economy.
[25]See for example Lemieux, Fortin, and Frechette (1994).

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).

5   The Effects of the Shadow Economy on the Official Economy

In order to study the effects of the shadow economy on the official one, several studies integrate underground economies into macroeconomic models.[26] Houston (1987) develops a theoretical macro model of business cycle as well as tax and monetary policy 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. Adam and 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 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.[27]

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

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

[27] Compare also the findings of Pommerehne and Schneider (1985), who come to similar conclusions.

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.[28] For example, the key feature of the model has been criticized, because the model is based on the assumption that the production technology essentially depends on tax-financed public services, which are subject to congestion. 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.

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 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 hypotheses is also not clear. On the one side 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 official GDP 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

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[28] See Asea (1996) for a more detailed criticism of the Loayza model.

at all. On the other side, the positive „effects" of shadow economy activities should 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. The positive effects of this expenditure for economic growth and for the (indirect) tax revenues must be taken into account as well. Bhattacharyya (1993, 1999) found clear evidence for the United Kingdom (1960-1984) that the hidden economy has a significant positive effect on consumer expenditures in the official economy. He points out 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.[29]

6 Methods to Estimate the Size of the Shadow Economy

As has already been mentioned in chapter 2 to undertake attempts to measure the size of a shadow economy is a very 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.[30] 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[31] 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 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

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[29] A close interaction between official and unofficial economies is also emphasized in Giles (1999a) and in Tanzi (1999).

[30] This chapter closely follows Schneider and Enste (2000); For a further discussion see Frey and Pommerehne (1984), Feige (1989), Thomas (1992, 1999) and Schneider (1986, 1994a and 1998a).

[31] 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 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.

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[32].

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.[33] A number of difficulties beset this approach. Firstly, using tax compliance data is equivalent to using a (possibly based) 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:

6.2.1 The Discrepancy between National Expenditure and Income Statistics

This approach is based on discrepancies between income and expenditure statistics. In

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[32] The advantages and disadvantages of this method are extensively dealt by Mogensen et. al (1995) in their excellent and very carefully done investigation.

[33] 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).

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.[34] 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 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.[35]

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.[36] 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.[37] 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, $M*V = p*T$ (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

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[34] 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).

[35] 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.

[36] Such studies have been made for Italy, see e.g., Contini (1981, 1982) and Del Boca (1981); for the United States, see O'Neill (1983), for a survey and critical remarks, see Thomas (1992).

[37] For an extended description of this approach, see Feige (1979, 1989 and 1996); for a further application for the Netherlands, Boeschoten and Fase (1984), and for Germany, Langfeldt (1984).

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 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.[38] 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 „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

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[38]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).

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:

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

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.[39]

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 currency demand approach is one of the most commonly used approaches. It has been applied to many OECD countries,[40] but has nevertheless been criticized on various grounds.[41] The most commonly raised objections to this method are:

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[39] In chapter 4, in table 8 the econometric estimation of such a currency demand function for Austria is shown. There more causes for the shadow economy (regulation, different tax rates, complexity of the tax system) are included. 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 use the latest econometric technics.

[40] See Schneider (1997, 1998a), Johnson, Kaufmann and Zoido-Lobatón (1998a), and Williams and Windebank (1995).

[41] See Thomas (1986, 1992, 1999), Feige (1986), and Pozo (1996).

(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.[42]

(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.

(iv)   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.[43] Moreover, Frey and Pommerehne (1984) and Thomas (1986, 1992, 1999) claim that Tanzi's parameter estimates are not very stable.[44]

(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

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

[43] 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.

[44] 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 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]).

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[45]

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 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.[46]

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[45] 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 (1996, 1997a, 1997b, 1998).

[46] 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:

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

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

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

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

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[47]

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

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[47] 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.

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, ..., 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.
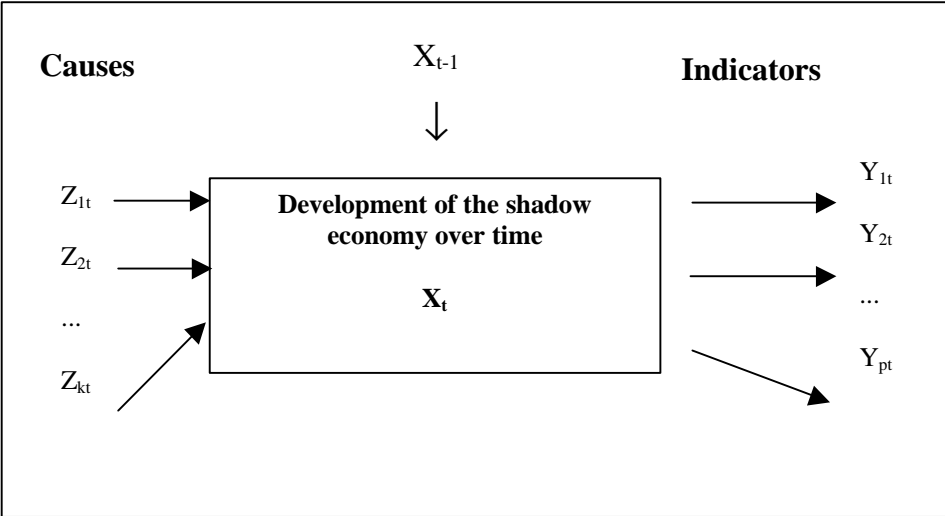
There is a large body of literature[48] on the possible causes and indicators of the shadow economy, in which the following three types of causes are distinguished:

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.

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[48]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.[49]

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

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[49] 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.

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.

6.4   A Comparison of the Results of the Estimations of the Shadow Economy Using Different Methods

As just discussed in chapter 6.1-6.3, there are nine different methods used to estimate the shadow economy. In table 9, 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 9: 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	Size of the Shadow Economy (in % of GDP) in																			
	CANADA Average over				GERMANY Average over				GREAT BRITIAN Average over				ITALY Average over				UNITED STATES Average over			
	70-75	76-80	81-85	86-90	70-75	76-80	81-85	86-90	70-75	76-80	81-85	86-90	70-75	76-80	81-85	86-90	70-75	76-80	81-85	86-90
Surveys of households	-	-	1.3	1.4	3.6	-	-	-	1.5	-	-	-	-	-	-	-	3.7	4.5	5.6	-
Tax auditing	-	-	2.9	-	-	-	-	-	-	-	-	-	3.0	3.9	-	10.0	4.9	6.3	8.2	10.0
Discrepancy between exp. and income	-	-	-	-	11.0	10.2	13.4	-	2.5	3.6	4.2	-	3.2	4.3	-	9.3	3.2	4.9	6.1	10.2
Discrepancy bet. off. and actual employment.	-	-	-	-	23.0	38.5	34.0	-	-	-	-	-	-	18.4	-	-	-	-	-	-
Physical input (el) method	-	-	-	11.2	-	-	-	14.5	-	-	-	13.2	-	-	-	19.3	-	-	7.8	9.9
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	11.3	13.2	17.5	21.3	3.5	4.6	5.3	6.2
Cash deposit ratio (Gutmann)	13.8	15.9	11.2	18.4	-	-	-	-	14.0	7.2	6.2	-	23.4	27.2	29.3	-	8.8	11.2	14.6	-
Transactions approach (Feige)	-	26.5	15.4	21.2	17.2	22.3	29.3	31.4	17.2	12.6	15.9	-	19.5	26.4	34.3	-	17.3	24.9	21.2	19.4
MIMIC-method (Frey /Weck-H.)	-	8.7	-	-	5.8	6.1	8.2	-	-	8.0	-	-	-	10.5	-	-	-	8.2	-	-
Number of used methods	2	4	5	5	6	5	5	3	5	5	4	2	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 Bendelac and 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 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 paper has been shown that though it is difficult to estimate the size of the shadow economy, it is not impossible. I 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. The general impression from the results of these methods is that for all countries investigated the shadow economy has reached a remarkably large size.

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 in this survey 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. According to some studies, a growing shadow economy has a negative impact on official GDP growth, but other studies show a positive impact – hence much more research is needed here. 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 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.

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