THE VALUE ADDED OF UNDERGROUND ACTIVITIES:

SIZE AND MEASUREMENT OF THE SHADOW ECONOMIES OF 110 COUNTRIES ALL OVER THE WORLD*[)]

by

Friedrich Schneider[**)]

Abstract:

Using various methods estimates about the size of the shadow economy in 110 developing, transition and OECD countries are presented. The average size of the shadow economy (in percent of official GDP) over 1999-2000 in developing countries is 41%, in transition countries 38% and in OECD countries 18.0%. An increasing burden of taxation and social security contributions combined with rising state regulatory activities are the driving forces for the growth and size of the shadow economy (labor force).
JEL-class.: O17, O5, D78, H2, H26.

---

*) A first version of this paper will be presented at an Workshop of Australian National Tax Centre, ANU, Canberra, Australia, July 17, 2002.

**) Professor of Economics, Dr. Friedrich Schneider, Department of Economics, Johannes Kepler University of Linz, A-4040 Linz-Auhof, Austria. Phone: 0043-732-2468-8210, Fax: 0043-732-2468-8209. E-mail: friedrich.schneider@jku.at, http://www.economics.uni-linz.ac.at.

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 on the goods and labor market, because all individuals engaged in these activities wish not to be identified. Hence, the estimation of the shadow economy activities can be considered as a scientific passion for knowing the unknown.

Although quite a large literature[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 concentrating on the size of the shadow economy in terms of value added. 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 and little is known about the size of the shadow economies in transition, development and developed countries for the year 2000. 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.

---

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

[2] Compare e.g. in the Economic Journal, vol. 109, no. 456, June 1999 the feature "controversy: on the hidden economy".

The scientific fascination of the underground economy has inspired me to tackle this difficult question and undertake the challenging task of collecting all available data on the shadow economy for 110 countries, 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 110 countries all over the world. Section 4 examines the main causes of the shadow economy. In section 5 the various methods to estimate the size of the shadow economy are shortly presented, and in section 6 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.[4] Smith (1994, p. 18) defines it as „market-based production of goods and services, whether legal or illegal that escapes detection in the official estimates of GDP." As these definitions still leave open a lot of questions, table 1 may be helpful for developing a better feeling for what could be a reasonable consensus definition of the legal and illegal underground or shadow economy.

From table 1 it becomes clear that the shadow economy includes unreported income from the production of legal goods and services, either from monetary or barter transactions - hence all economic activities which would generally be taxable were they reported to the state (tax) authorities. In general, a precise definition seems quite difficult, if not impossible as „the shadow economy develops all the time according to the 'principle of running water': it adjusts to changes in taxes, to sanctions from the tax authorities and to general moral attitudes, etc." (Mogensen, et. al. 1995 p. 5). This paper does not focus on tax evasion or tax compliance, because it would get to long, and moreover tax evasion is a different subject, where already a lot of research has been underway.[5]

---

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

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

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

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.

3 The Size of the Shadow Economies all over the World – Findings for 110 Countries

For single countries and sometimes for a group of countries (like the OECD or transition countries) research has been undertaken to estimate the size of the shadow economy using various methods and different time periods. In tables 2 to 8, 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, by reporting the results for the shadow economy for 110 countries all over the world for the periods 1999/2000.[6]

---

[6] One should be aware that such country comparisons give only a very rough picture of the ranking of the size of the shadow economy over the countries, because each method has shortcomings, which are discussed in chapter 6. See, e.g., Thomas (1992, 1999) and Tanzi (1999). A least in this comparison the same time period (1999/2000) is used for all countries. If possible, the values were calculated as averages over the period 1999/2000, respectively.

3.1 Developing Countries

The physical input (electricity) method, the currency demand and the model (DYMIMIC) approach are used for the developing countries. The results are grouped from Africa, Asia, South America. They are shown in tables 2, 3, 4 and figures 1, 2, 3.

The results for 24 South African countries are shown in table 2 and figure 1.

Table 2 – Figure 1

On average the size of the shadow economy in Africa (in percent of GDP) was 41% for the years 1999/2000. Zimbabwe, Tanzania and Nigeria have with 59.4, 58.3 and 57.9% by far the largest shadow economy. In the middle field are Mozambique, Cote d'Ivoire and Madagascar with 40.3, 39.9 and 39.6%. At the lower end are Botswana with 33.4, Cameroon with 32.8 and South Africa with 28.4%. In sum one realizes that the size of the shadow economy which is more like a parallel economy in Africa is quite large.

In table 3 and figure 2the results for Asia are shown and here it is somewhat difficult to treat all Asian countries equally because Japan, Singapore and Hongkong are highly developed states and the others more or less developing countries. But as I decided to group according to continents so I leave these countries series as it stands now, realizing that not all are developing countries.

Table 3 – Figure 2

If we consider the 26 Asian countries, where the results are shown in table 3, Thailand has by far the largest shadow economy in the year 1999/2000 with the size of 52.6% of official GDP. Followed by Sri Lanka with 44.6% and Philippines with 43.4%. In the middle are India with 23.1%, Israel with 21.9% and Taiwan and China with 19.6%. At the lower end are Singapore with 13.1% and Japan with 11.3%. On average the Asian developing countries have a size of the shadow economy of 26% of official GDP for the years 1999/2000. One realizes that the average size of the shadow economy is considerably lower compared with African and South and Latin American States.

Table 2: The size of the shadow (and official) economy of 23 African nations

	AFRICA	GNP at market prices (current US$, billion) 2000	Shadow Economy in % of GNP 1999/2000	Shadow Economy (current USD in billion) 2000	Shadow Economy GNP per capita	GNP per capita 2000, Atlas method (current US$)	Private consumption per capita 2000 (current US$)	Population aged 15-64, total (thousand) 2000	Population, total (thousand) 2000
1	Algeria	506,1	34,1	172,6	538,8	1580	731	18555	30399
2	Benin	21,5	45,2	9,7	167,2	370	283	3192	6272
3	Botswana	52,8	33,4	17,6	1102,2	3300	1835	882	1602
4	Burkina Faso	21,7	38,4	8,3	80,6	210	148	5418	11274
5	Cameroon	82,8	32,8	27,2	190,2	580	415	7921	14876
6	Cote d'Ivoire	86,1	39,9	34,4	239,4	600	418	8773	16013
7	Egypt, Arab Rep.	996,6	35,1	349,8	523,0	1490	1126	38708	63976
8	Ethiopia	63,3	40,3	25,5	40,3	100	77	33356	64298
9	Ghana	48,3	38,4	18,5	126,7	330	210	10778	19306
10	Kenya	102,2	34,3	35,1	120,1	350	272	16160	30092
11	Madagascar	38,0	39,6	15,1	99,0	250	216	8112	15523
12	Malawi	16,6	40,3	6,7	68,5	170	135	5232	10311
13	Mali	22,6	41,0	9,3	98,4	240	168	5407	10840
14	Morocco	324,6	36,4	118,1	429,5	1180	728	17567	28705
15	Mozambique [1]	35,8	40,3	14,4	84,6	210	170	9346	17691
16	Niger	18,1	41,9	7,6	75,4	180	142	5213	10832
17	Nigeria	367,3	57,9	212,6	150,5	260	147	65863	126910
18	Senegal	42,9	43,2	18,5	211,7	490	361	5067	9530
19	South Africa	1226,4	28,4	348,3	857,7	3020	1871	26713	42801
20	Tanzania	89,8	58,3	52,4	157,4	270	226	17714	33696
21	Tunisia	185,7	38,4	71,3	806,4	2100	1231	6163	9564
22	Uganda	61,6	43,1	26,5	129,3	300	243	10722	22210
23	Zambia	27,9	48,9	13,6	146,7	300	274	5097	10089
24	Zimbabwe [1]	71,4	59,4	42,4	273,2	460	357	6515	12627
	AVERAGE	188	41	69	280	764	491	14103	25624

1) Due to civil war and political unrest unreliable figures.

Source: own calculations based on Worldbank Data, Washington D.C., 2002.

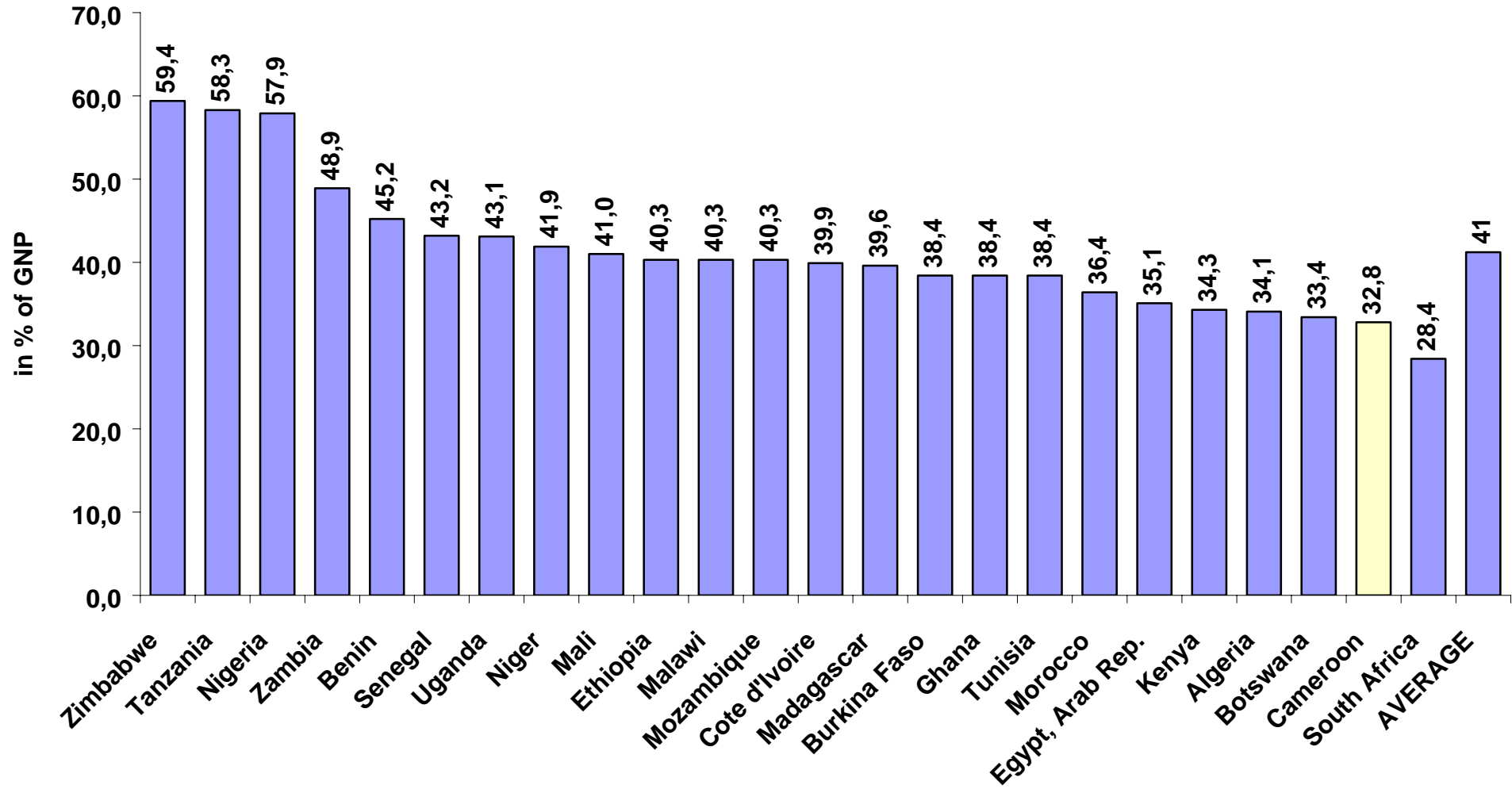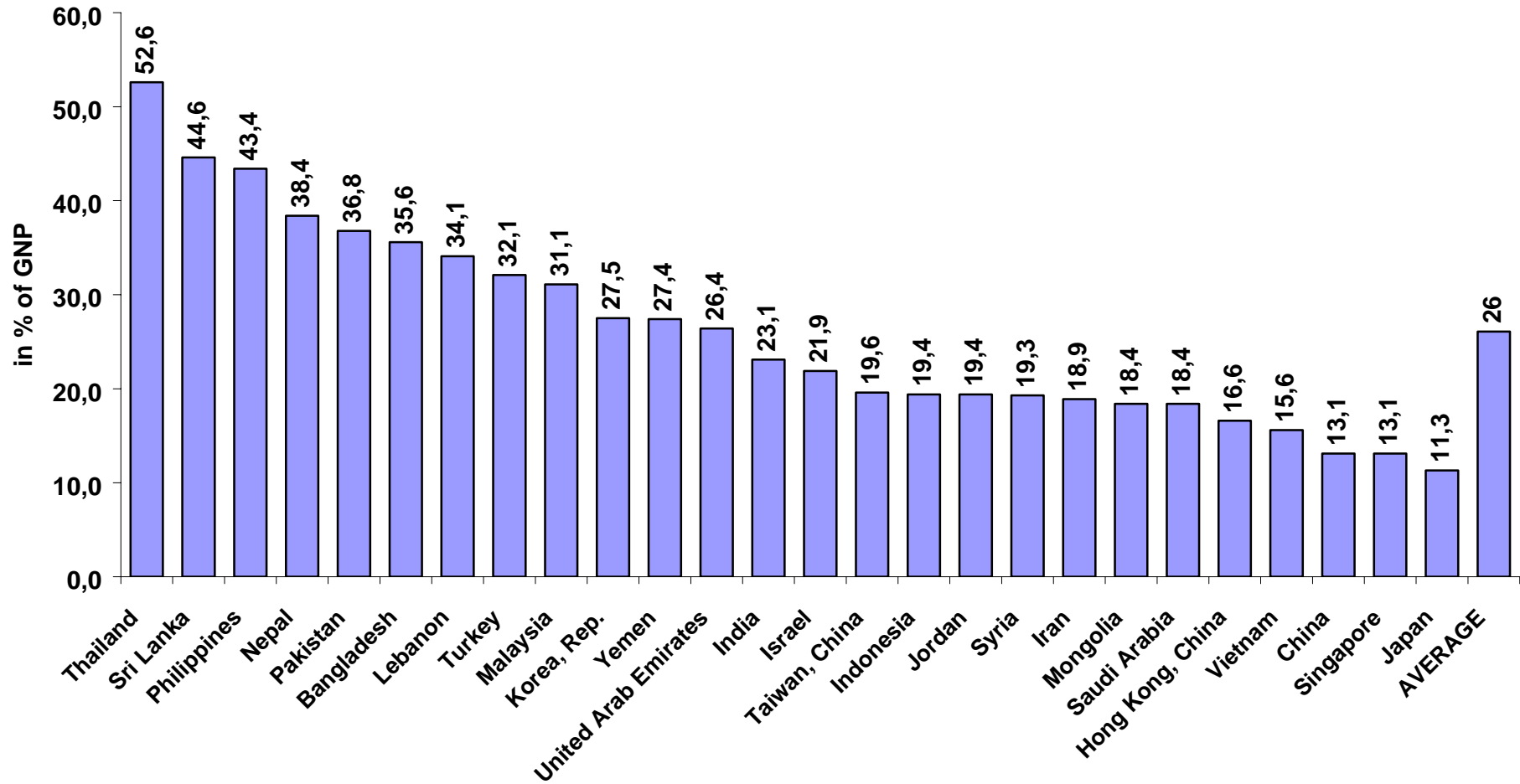**Figure 1: Africa: Shadow Economy in % of GNP 1999/2000**

	ASIA	GNP at market prices (current US$, billion) 2000	Shadow Economy in % of GNP 1999/2000	Shadow Economy (current USD in bill.) 2000	Shadow Economy GNP per capita	GNP per capita 2000, Atlas method (current US$)	Private consumption per capita 2000 (current US$)	Population aged 15-64, total (thousand) 2000	Population, total (thousand) 2000
1	Bangladesh	468,9	35,6	166,9	131,7	370	279	76241	131050
2	China [1]	10652,8	13,1	1395,5	110,0	840	413	862212	1262460
3	Hongkong, China	1654,7	16,6	274,7	4302,7	25920	13902	4966	6797
4	India	4531,8	23,1	1046,8	104,0	450	294	625220	1015923
5	Indonesia [2]	1426,6	19,4	276,8	110,6	570	490	135563	210421
6	Iran	937,7	18,9	177,2	304,3	1610	760	37715	63664
7	Israel	1060,1	21,9	232,2	3659,5	16710	10458	3857	6233
8	Japan	49011,6	11,3	5538,3	4025,1	35620	19966	86423	126870
9	Jordan	83,1	19,4	16,1	331,7	1710	1377	2794	4887
10	Korea, Rep.	4550,2	27,5	1251,3	2450,3	8910	5540	34081	47275
11	Lebanon [2]	174,2	34,1	59,4	1367,4	4010	3346	2718	4328
12	Malaysia	823,9	31,1	256,2	1051,2	3380	1642	14375	23270
13	Mongolia [1]	9,5	18,4	1,8	71,8	390	268	1463	2398
14	Nepal	56,9	38,4	21,8	92,2	240	178	12729	23043
15	Pakistan	596,0	36,8	219,3	161,9	440	343	75308	138080
16	Philippines	793,2	43,4	344,2	451,4	1040	648	44545	75580
17	Saudi Arabia	1736,6	18,4	319,5	1330,3	7230	2747	11214	20723
18	Singapore	983,7	13,1	128,9	3240,9	24740	9176	2849	4018
19	Sri Lanka	160,0	44,6	71,4	379,1	850	610	13055	19359
20	Syria	159,6	19,3	30,8	181,4	940	718	9070	16189
21	Taiwan, China	3144,0	19,6	616,2	2720,5	13880	8695	15521	22173
22	Thailand	1205,4	52,6	634,1	1052,0	2000	1179	41367	60728
23	Turkey	2009,2	32,1	644,9	995,1	3100	2183	41917	65293
24	Unit. Arab Emir.	0,0	26,4	0,0	7191,4	27240	N.A.	2070	2905
25	Vietnam [1]	313,5	15,6	48,9	60,8	390	266	48125	78523
26	Yemen	73,9	27,4	20,2	101,4	370	282	8337	17507
	AVERAGE	3331	26	531	1384	7037	3298	85144	132681

Table 3: The size of the shadow (and official) economy of 26 Asian countries

1) Still a mostly communist dominated country. 2) Due to civil war and political unrest unreliable figures.
Source: own calculations based on Worldbank data, Washington D.C., 2002.

Figure 2: Asia - Shadow Economy in % of GNP 1999/2000

Country	in % of GNP
Thailand	52,6
Sri Lanka	44,6
Philippines	43,4
Nepal	38,4
Pakistan	36,8
Bangladesh	35,6
Lebanon	34,1
Turkey	32,1
Malaysia	31,1
Korea, Rep.	27,5
Yemen	27,4
United Arab Emirates	26,4
India	23,1
Israel	21,9
Taiwan, China	19,6
Indonesia	19,4
Jordan	19,4
Syria	19,3
Iran	18,9
Mongolia	18,4
Saudi Arabia	18,4
Hong Kong, China	16,6
Vietnam	15,6
China	13,1
Singapore	13,1
Japan	11,3
AVERAGE	26

In table 4 and figure 3 the size of the shadow economy for the year 1999/2000 for 17 South and Latin American states is shown. The average size of shadow economy of these 17 states is 41%.

Table 4 – Figure 3

The largest shadow economy has Bolivia with 67.1%, followed by Panama with 64.1% and Peru with 59.9%. The lowest shadow economy has Chile with 19.8% and before is Argentina with 25.4%. If one compares the results of tables 2-4 one see that the size of the shadow economy of South America and Africa is somewhat similar and the size of the shadow economy in Asia is somewhat lower.

3.2   Transition Countries

The sizes of the shadow economies of the transition countries which have been again estimated using the currency demand, the physical input and DYMIMIC approach are presented in table 5 and figure 4.

Table 5 – Figure 4

23 transition countries have been investigated and the average size of the shadow economy in percent of official GDP is 38% for the year 1999/2000. The by far largest shadow economy has Georgia with 67.3%, followed by Azerbaijan with 60.6% and Ukraine with 52.2%. In the middle field are Bulgaria and Romania with 36.9 and 34.4% and at the lower end are Hungary with 25.1, the Czech Republic with 19.1 and the Slowak. Republic with 18.9%.

Table 4: The size of the shadow (and official) economy of 17 Latin and South American Countries

	SOUTH AMERICA	GNP at market prices (current US$, billion) 2000	Shadow Economy in % of GNP 1999/2000	Shadow Economy (current USD in billion) 2000	Shadow Economy GNP per capita	GNP per capita 2000, Atlas method (current US$)	Private consumption per capita 2000 (current US$)	Population aged 15-64, total (thousand) 2000	Population, total (thousand) 2000
1	Argentina	2774,4	25,4	704,7	1894,8	7460	5457	23175	37032
2	Bolivia	80,6	67,1	54,1	664,3	990	732	4695	8329
3	Brazil	5697,7	39,8	2267,7	1424,8	3580	2186	112569	170406
4	Chile	681,4	19,8	134,9	908,8	4590	2937	9793	15211
5	Colombia	788,5	39,1	308,3	789,8	2020	1294	26427	42299
6	Costa Rica	146,2	26,2	38,3	998,2	3810	2802	2383	3811
7	Dominican Republic	186,3	32,1	59,8	683,7	2130	1824	5208	8373
8	Ecuador	123,8	34,4	42,6	416,2	1210	668	7774	12646
9	Guatemala	187,4	51,5	96,5	865,2	1680	1409	6016	11385
10	Honduras	57,9	49,6	28,7	426,6	860	612	3519	6417
11	Jamaica	69,9	36,4	25,5	950,0	2610	1910	1615	2633
12	Mexico	5597,7	30,1	1684,9	1526,1	5070	3961	60868	97966
13	Nicaragua	21,1	45,2	9,5	180,8	400	415	2755	5071
14	Panama	93,7	64,1	60,1	2089,7	3260	2107	1804	2856
15	Peru	519,2	59,9	311,0	1245,9	2080	1471	15856	25661
16	Uruguay	193,8	51,1	99,0	3066,0	6000	4403	2079	3337
17	Venezuela, RB	1193,2	33,6	400,9	1448,2	4310	3144	14868	24170
	AVERAGE	1083	41	372	1152	3062	2196	17730	28205

Source: own calculations based on Worldbank data, Washington D.C., 2002.

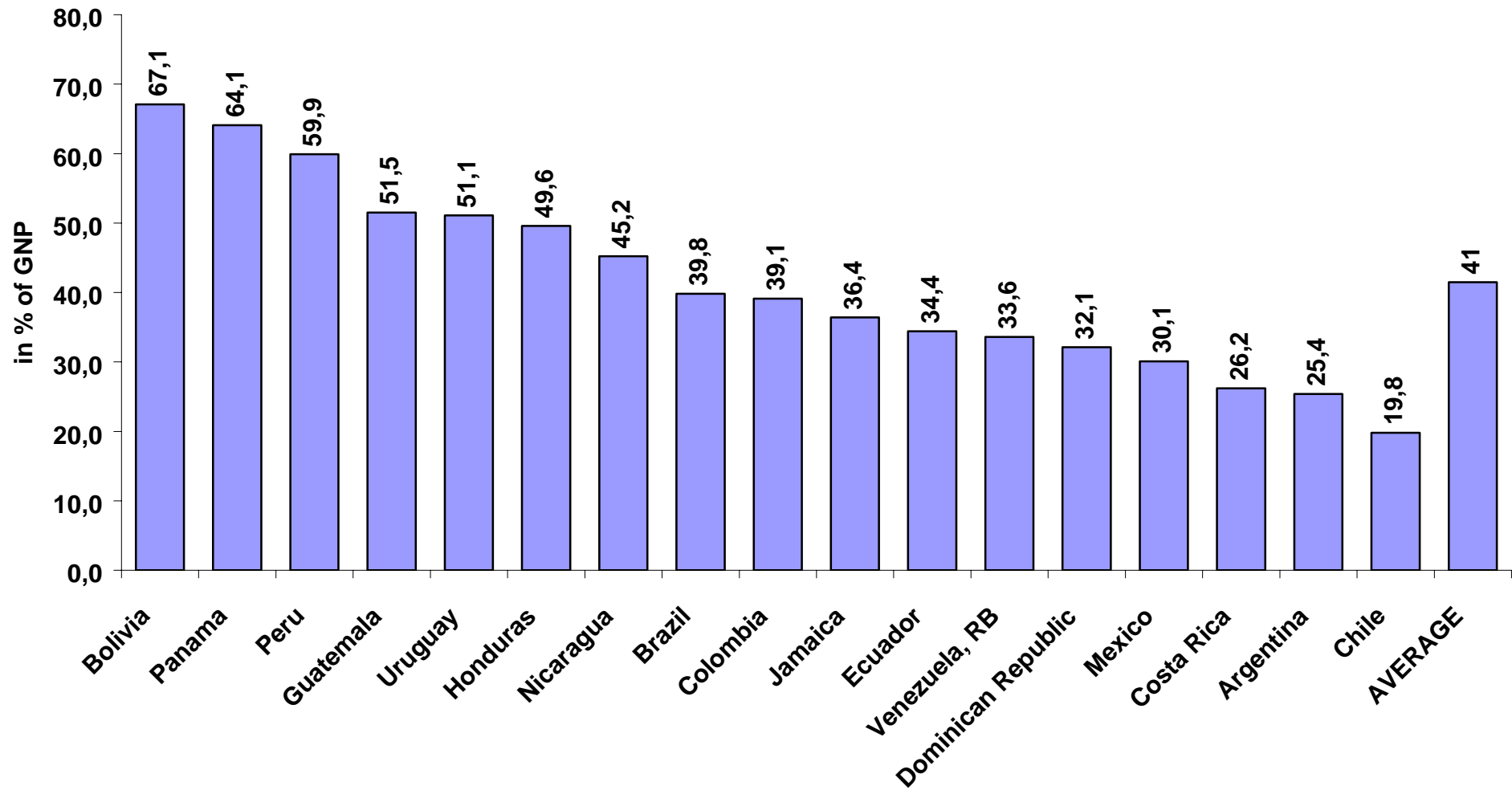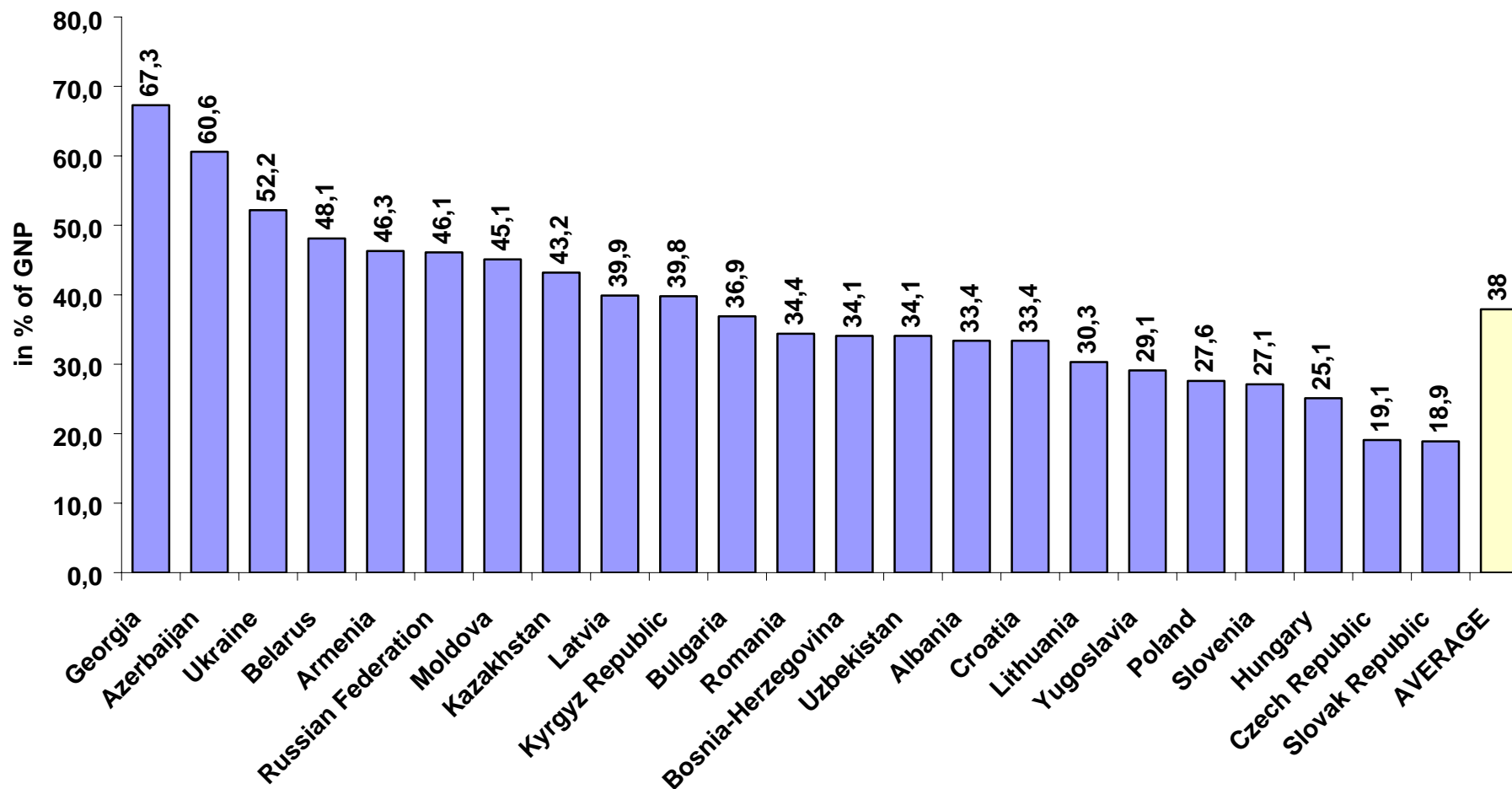Figure 3: South America: Shadow Economy in % of GNP 1999/2000

Table 5: The size of the shadow (and official) economy of 23 European Transformation Countries

	EUROPE - TRANSFORMATION COUNTRIES	GNP at market prices (current US$, billion) 2000	Shadow Economy in % of GNP 1999/2000	Shadow Economy (current USD in billion) 2000	Shadow Economy GNP per capita	GNP per capita 2000, Atlas method (current US$)	Private consumption per capita 2000 (current US$)	Population aged 15-64, total (thousand) 2000	Population, total (thousand) 2000
1	Albania [2]	38,6	33,4	12,9	374,1	1120	1012	2188	3411
2	Armenia	19,3	46,3	8,9	240,8	520	479	2572	3803
3	Azerbaijan [1] [2]	49,2	60,6	29,8	363,6	600	389	5170	8049
4	Belarus [1]	299,6	48,1	144,1	1380,5	2870	1707	6803	10005
5	Bosnia-Herzegovina [2]	46,2	34,1	15,8	419,4	1230	N.A.	2830	3977
6	Bulgaria	116,7	36,9	43,1	560,9	1520	1060	5563	8167
7	Croatia	187,2	33,4	62,5	1543,1	4620	2483	2970	4380
8	Czech Republic	500,1	19,1	95,5	1002,8	5250	2690	7165	10273
9	Georgia	30,5	67,3	20,5	424,0	630	514	3347	5024
10	Hungary	440,6	25,1	110,6	1182,2	4710	2903	6856	10022
11	Kazakhstan [1]	170,5	43,2	73,7	544,3	1260	785	9838	14869
12	Kyrgyz Republic	12,2	39,8	4,9	107,5	270	207	2950	4915
13	Latvia	71,8	39,9	28,6	1165,1	2920	1885	1609	2372
14	Lithuania	111,2	30,3	33,7	887,8	2930	1970	2482	3695
15	Moldova [1] [2]	13,6	45,1	6,1	180,4	400	323	2893	3550
16	Poland	1568,2	27,6	432,8	1156,4	4190	2614	26555	38650
17	Romania	363,8	34,4	125,2	574,5	1670	1209	15355	22435
18	Russian Federation [1]	2484,4	46,1	1145,3	779,1	1690	825	101243	145555
19	Slovak Republic	187,7	18,9	35,5	699,3	3700	1890	3732	5402
20	Slovenia	180,7	27,1	49,0	2723,6	10050	5008	1396	1988
21	Ukraine	308,5	52,2	161,0	365,4	700	374	33833	49501
22	Uzbekistan [1]	74,2	34,1	25,3	122,8	360	197	14620	24752
23	Yugoslavia [2]	84,5	29,1	24,6	273,5	940	629	7115	10637
	AVERAGE	320	38	117	742	2354	1354	11699	17193

1) Still a mostly communist dominated country. 2) Due to civil war and political unrest unreliable figures.
Source: own calculations based on Worldbank data, Washington D.C., 2002.

Figure 4: Europe - Transformation Countries: Shadow Economy in % of GNP 1999/2000

Country	in % of GNP
Georgia	67,3
Azerbaijan	60,6
Ukraine	52,2
Belarus	48,1
Armenia	46,3
Russian Federation	46,1
Moldova	45,1
Kazakhstan	43,2
Latvia	39,9
Kyrgyz Republic	39,8
Bulgaria	36,9
Romania	34,4
Bosnia-Herzegovina	34,1
Uzbekistan	34,1
Albania	33,4
Croatia	33,4
Lithuania	30,3
Yugoslavia	29,1
Poland	27,6
Slovenia	27,1
Hungary	25,1
Czech Republic	19,1
Slovak Republic	18,9
AVERAGE	38

3.3 OECD-Countries

3.3.1 West-European OECD-Countries

For 16 West-European-OECD-Countries the size of the shadow economy in percent of official GDP for the year 1999/2000 has been calculated. The results are presented in table 6 and in figure 5.

Table 6 – Figure 5

Greece and Italy have by far the largest shadow economy with 28.6 and 27.0%. In the middle field are Denmark with 18.2 and Germany with 16.3% and at the lower end are Austria with 10.2 and Switzerland with 8.8%. The average size of these 16 OECD-Countries of the shadow economy is 18% for the year 1999/2000.

3.3.2 North-American and Pacific OECD-Countries

In table 7 and figure 6 the size of the shadow economy in % of official GDP for the year 1999/2000 for four OECD-Countries (Australia, Canada, New Zealand and United States,) is shown.

Table 7 – Figure 6

Among these countries Canada has the largest shadow economy with 16.3%, followed by Australia with 15.3%, the New Zealand with 12.7% and finally the United States with 8.8%. On average the size of the shadow economy of these four countries is 13.5%.

3.3.3 Shadow economy and shadow economy labor force of 21 OECD countries

Finally some additional results of the shadow economy over an extended time period, i.e. from 1989 to 2002; and shadow economy labor force of 21 OECD countries are shown. The size and development of the shadow economy of 21 OECD countries over the time period 1989/90-2001/02 is presented in table 8.

Table 8

Table 6: The size of the shadow (and official) economy of 16 OECD – West European Countries								
	EUROPE - OECD-WEST EUROPEAN COUNTRIES	GNP at market prices (current US$, billion) 2000	*Shadow Economy in % of GNP 1999/2000*	*Shadow Economy (current USD in billion) 2000*	*Shadow Economy GNP per capita*	GNP per capita 2000, Atlas method (current US$)	Private consumption per capita 2000 (current US$)	Population aged 15-64, total (thousand) 2000	Population, total (thousand) 2000
1	Austria	1859,8	10,2	189,7	2572,4	25220	14659	5501	8110
2	Belgium	2290,6	23,2	531,4	5693,3	24540	11899	6736	10252
3	Denmark	1601,1	18,2	291,4	5875,0	32280	14546	3562	5336
4	Finland	1194,0	18,3	218,5	4598,8	25130	11542	3469	5177
5	France	13046,5	15,3	1996,1	3736,3	24420	12033	38453	58892
6	Germany	18592,5	16,3	3030,6	4094,6	25120	13241	55915	82150
7	Greece	1151,1	28,6	329,2	3420,6	11960	8404	7116	10560
8	Ireland	802,1	15,8	126,7	3580,3	22660	12073	2546	3794
9	Italy	10667,2	27,0	2880,1	5443,2	20160	11253	39026	57690
10	Netherlands	3675,4	13,0	477,8	3246,1	24970	12395	10835	15919
11	Norway	1602,3	19,1	306,0	6595,2	34530	15382	2913	4491
12	Portugal	1032,4	22,6	233,3	2513,1	11120	6643	6776	10008
13	Spain	5524,0	22,6	1248,4	3408,1	15080	8403	26965	39465
14	Sweden	2244,8	19,1	428,7	5183,7	27140	12931	5710	8869
15	Switzerland	2537,7	8,8	223,3	3356,3	38140	22057	4836	7180
16	United Kingdom	14170,7	12,6	1785,5	3078,2	24430	15492	38996	59739
	AVERAGE	*5125*	*18*	*894*	*4150*	*24181*	*12685*	*16210*	*24227*
Source: own calculations based on Worldbank data, Washington D.C., 2002.								

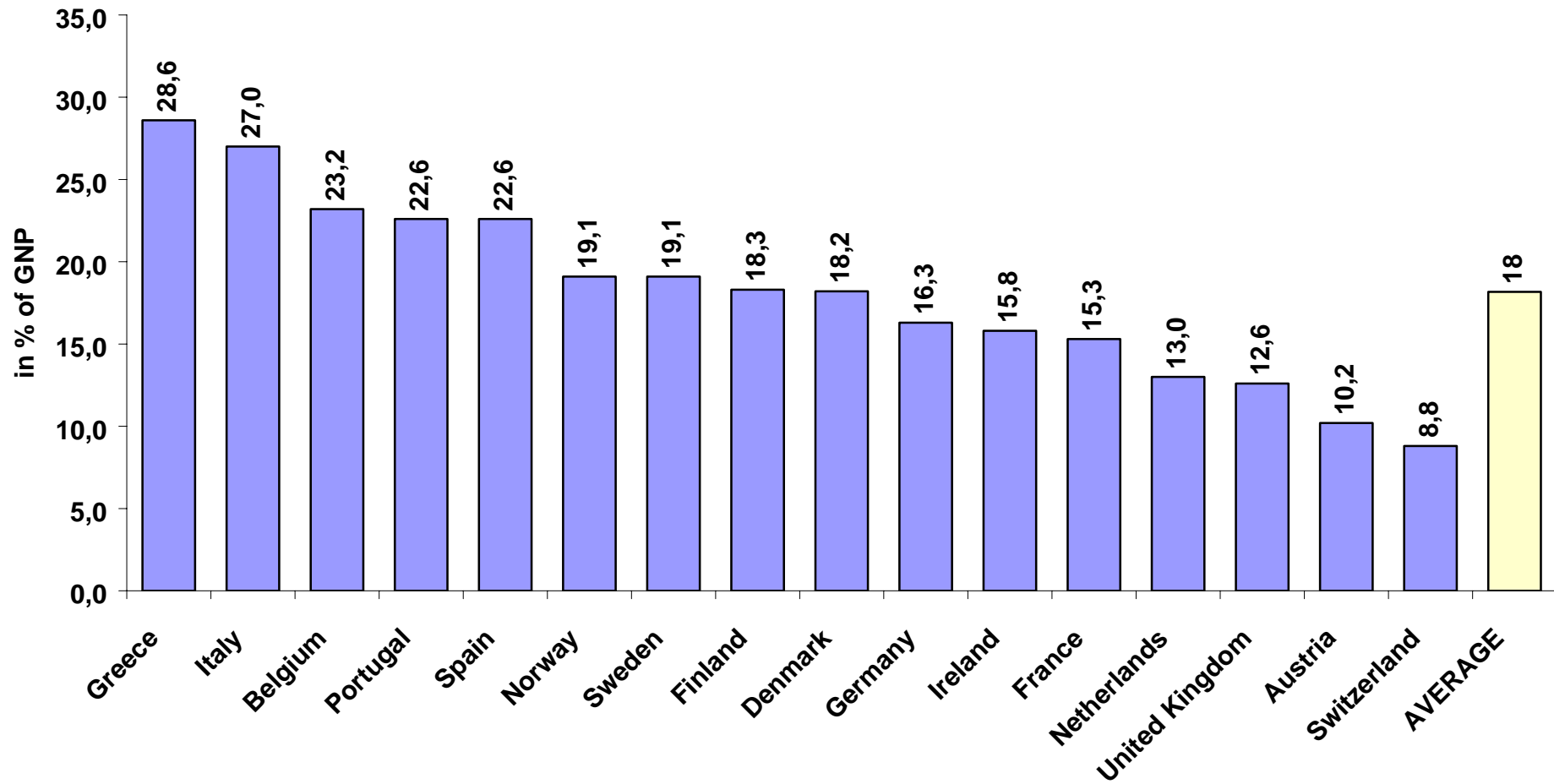# Figure 5: Europe - OECD-West European Countries: Shadow Economy in % of GNP 1999/2000

Country	in % of GNP
Greece	28,6
Italy	27,0
Belgium	23,2
Portugal	22,6
Spain	22,6
Norway	19,1
Sweden	19,1
Finland	18,3
Denmark	18,2
Germany	16,3
Ireland	15,8
France	15,3
Netherlands	13,0
United Kingdom	12,6
Austria	10,2
Switzerland	8,8
AVERAGE	18

Table 7: The size of the shadow (and official) economy of 4 OECD Countries

		GNP at market prices (current US$, billion) 2000	Shadow Economy in % of GNP 1999/2000	Shadow Economy (current USD in billion) 2000	Shadow Economy GNP per capita	GNP per capita 2000, Atlas method (current US$)	Private consumption per capita 2000 (current US$)	Population aged 15-64, total (thousand) 2000	Population, total (thousand) 2000
1	Canada	6713,5	16,4	1101,0	3465,3	21130	11933	20995	30750
2	United States	98253,0	8,8	8646,3	3000,8	34100	22265	185783	281550
	AVERAGE	52483	13	4874	3233	27615	17099	103389	156150

		GNP at market prices (current US$, billion) 2000	Shadow Economy in % of GNP 1999/2000	Shadow Economy (current USD in billion) 2000	Shadow Economy GNP per capita	GNP per capita 2000, Atlas method (current US$)	Private consumption per capita 2000 (current US$)	Population aged 15-64, total (thousand) 2000	Population, total (thousand) 2000
1	Australia	3791,5	15,3	580,1	3096,7	20240	12556	12895	19182
2	New Zealand	460,7	12,7	58,5	1649,7	12990	9204	2504	3831
	AVERAGE	2126	14	319	2373	16615	10880	7700	11506

Source: own calculations based on Worldbank data, Washington D.C., 2002.

Figure 6: Shadow Economy in % of GNP 1999/2000 - Canada, Australia, New Zealand and United States
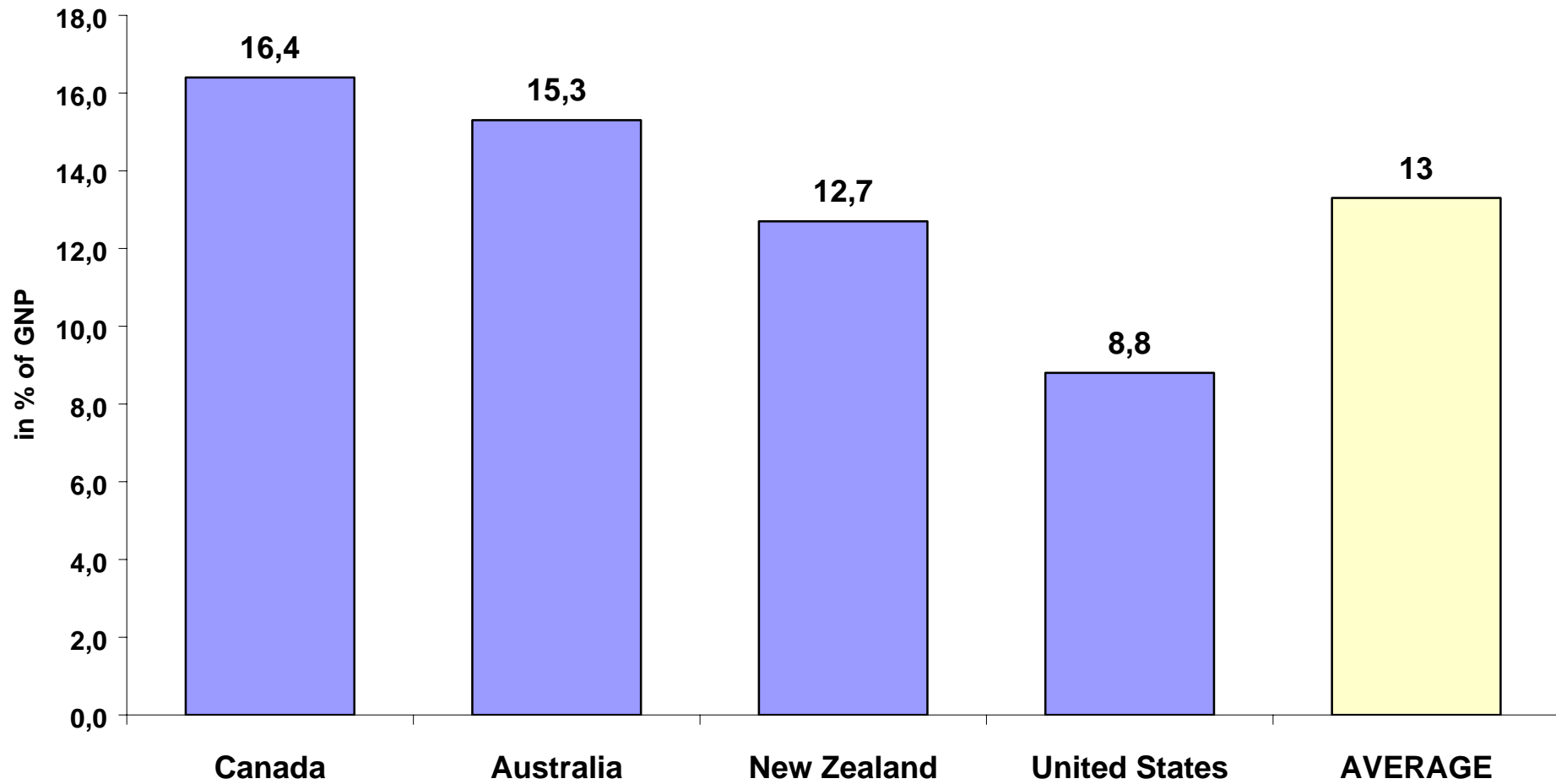
OECD-Countries	Table 8: The Size of the Shadow Economy in OECD Countries					
	Size of the Shadow Economy (in % of GDP) using the Currency Demand Method					
	Average 1989/90	Average 1991/92	Average 1994/95	Average 1997/98	Average 1999/2000	Average 2001/2002[1]
1. Australia	10.1	13.0	13.5	14.0	14.3	14.1
2. Belgium	19.3	20.8	21.5	22.5	22.2	22.0
3. Canada	12.8	13.5	14.8	16.2	16.0	15.8
4. Denmark	10.8	15.0	17.8	18.3	18.0	17.9
5. Germany	11.8	12.5	13.5	14.9	16.0	16.3
6. Finland	13.4	16.1	18.2	18.9	18.1	18.0
7. France	9.0	13.8	14.5	14.9	15.2	15.0
8. Greece	22.6	24.9	28.6	29.0	28.7	28.5
9. Great Britain	9.6	11.2	12.5	13.0	12.7	12.5
10. Ireland	11.0	14.2	15.4	16.2	15.9	15.7
11. Italy	22.8	24.0	26.0	27.3	27.1	27.0
12. Japan	8.8	9.5	10.6	11.1	11.2	11.1
13. Netherlands	11.9	12.7	13.7	13.5	13.1	13.0
14. New Zealand[2]	9.2	9.0	11.3	11.9	12.8	12.6
15. Norweay	14.8	16.7	18.2	19.6	19.1	19.0
16. Austria	6.9	7.1	8.6	9.0	9.8	10.6
17. Portugal	15.9	17.2	22.1	23.1	22.7	22.5
18. Sweden	15.8	17.0	19.5	19.9	19.2	19.1
19. Switzerland	6.7	6.9	7.8	8.1	8.6	9.4
20. Spain [3]	16.1	17.3	22.4	23.1	22.7	22.5
21. USA	6.7	8.2	8.8	8.9	8.7	8.7
Unweighted Average over 21 OECD countries	13.2	14.3	15.7	16.7	16.8	16.7

Sources: Currency demand approach, own calculations

1) Preliminary values.

2) The figures are calculated using the MIMIC-method and Currency demand approach. Source: Giles (1999b).

3) The figures have been calculated for 1989/90, 1990/93 and 1994/95 from Mauleon (1998) and for 1997/98 and 1999 own calculations.

For the 21 OECD countries either the currency demand method or the DYMIMIC method are used. The results for these countries are shown in table 8 over the period 1989/90 to 2001/2002. Considering again the latest period 2001/2002, Greece has with 28.5% of official GDP the largest shadow economy, followed by Italy with 27.0% and Portugal with 22.5%. In the middle-field are Germany with a shadow economy of 16.3% of official GDP, followed by Ireland with 15.7% and France with 15.0% of official GDP. At the lower end are Austria with 10.6% of GDP and the United States with 8.7% of official GDP. In OECD countries one realizes over time quite an increase of the shadow economies during the 90s. On average the shadow economy was 13.2% in these 21 OECD states in the year 1989/90 and it rose to 16.7% in the year 2001/2002. If we consider the second half of the 90s, we realize that for some countries the shadow economy is not further increasing, even slightly decreasing, like for Belgium from 22.5% (1997/98) to 22.0% (2001/2002), for Denmark from 18.3% (1997/98) to 17.9% (2001/2002) or for Finland from 18.9% (1997/98) to 18.0% (2001/2002). For others, like New Zealand, it is still increasing from 11.9% (1997/98) to 12.6% (2001/2002), or Germany from 14.9% (1997/98) to 16.3 (2001/2002). Hence, one can't draw a general conclusion whether the shadow economy is further increasing or decreasing at the end of the 90s. It differs from country to country but in some countries some efforts have been made to stabilize the size of the shadow economy and in other countries (like Germany) these efforts were not successfully.

Having examined the size and rise of the shadow economy in terms of value added over time, the analysis now focuses on the „shadow" labor market, as within the official labor market there is a particularly tight relationship and "social network" between people who are active in the shadow economy.[7] Moreover, by definition every activity in the shadow economy involves a "shadow" labor market to some extent: Hence, the "shadow labor market" includes all cases, where the employees or the employers, or both, occupy a „shadow economy position". Why do people work in the shadow economy? In the official labor market, the costs firms (and individuals) have to pay when "officially" hiring someone are increased tremendously by the burden of tax and social contributions on wages, as well as by the legal administrative regulation to control economic activity.[8] In various OECD countries, these costs are greater than the wage effectively earned by the worker – providing a strong

---

[7] 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).
[8] This is especially true in Europe (e.g. in Germany and Austria), where the total tax and social security burden

incentive to work in the shadow economy. More detailed theoretical information on the labor supply decision in the underground economy is given by Lemieux, Fortin, and Fréchette (1994) who use micro data from a survey conducted in Quebec City (Canada). In particular, their study provides some economic insight into the size of the distortion caused by income taxation and the welfare system. The results of this study suggest that hours worked in the shadow economy are quite responsive to changes in the net wage in the regular (official) sector. Their empirical results attribute this to a (miss-)allocation of work from the official to the informal sector, where it is not taxed. In this case, the substitution between labor-market activities in the two sectors is quite high. These empirical findings clearly indicate, that "participation rates and hours worked in the underground sector also tend to be inversely related to the number of hours worked in the regular sector" (Lemieux, Fortin, and Fréchette 1994 p. 235). These findings demonstrate a large negative elasticity of hours worked in the shadow economy with respect both to the wage rate in the regular sector as well as to a high mobility between the sectors.

Illicit work can take many shapes. The underground use of labor may consist of a second job after (or even during) regular working hours. A second form is shadow economy work by individuals who do not participate in the official labor market. A third component is the employment of people (e.g. clandestine or illegal immigrants), who are not allowed to work in the official economy. Empirical research on the shadow economy labor market is even more difficult than of the shadow economy on the value added, since one has very little knowledge about how many hours an average "shadow economy worker" is actually working (from full time to a few hours, only); hence, it is not easy to provide empirical facts.[9]

Table 9

In table 9 the estimates for the shadow economy labor force in 7 OECD-countries (Austria, Denmark, France, Germany, Italy, Spain and Sweden) are shown. In Austria the shadow economy labor force has reached in the years 1997-1998 500.000 to 750.000 or 16% of the official labor force (mean value). In Denmark the development of the 80s and 90s shows that

---

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

[9] 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).

the part of the Danish population engaged in the shadow economy ranged from 8.3% of the total labor force (in 1980) to 15.4% in 1994 – quite a remarkable increase of the shadow economy labor force; it almost doubled over 15 years. In France (in the years 1997/98) the shadow economy labor force reached a size of between 6 and 12% of the official labor force or in absolute figures between 1.4 and 3.2 million. In Germany this figure rose from 8 to 12% in 1974 to 1982 and to 22% (18 millions) in the year 1997/98. For France and Germany this is again a very strong increase in the shadow economy labor force. In other countries the amount of the shadow economy labor force is quite large, too: in Italy 30-48% (1997-1998), Spain 11.5-32% (1997-1998) and Sweden 19.8 % (1997-1998). In the European Union about 30 million people are engaged in shadow economy activities in the year 1997-1998 and in all European OECD-countries 48 million work illicitly.

These figures demonstrate that the shadow economy labor market is lively and may provide an explanation, why for example in Germany, one can observe such a high and persistent unemployment. In table 9 a first and preliminary calculation is done of the official GNP per capita and the shadow economy GDP per capita, shown in US-$. Here one realizes immediately that in all countries investigated, the shadow economy GDP per capita is much higher - on average in all countries around 40%.[10] This clearly shows, that the productivity in the shadow economy quite likely is considerably higher then the official economy - a clear indication, that the work effort; i.e. the incentive to work effectively is stronger in the shadow economy. In general these very preliminary results clearly demonstrate that the shadow economy labor force has reached a remarkable size in the developed OECD-countries, too, even when the calculation still might have many errors, but again the picture shows, that the shadow economy labor market has reached a sizeable figure in most countries.

---

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

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

Countries	Year	Official GDP per capita in US-$[1]	Shadow Economy GDP in US-$ per capita	Size of the Shadow Economy (in % of official GDP) Currency Demand Approach[2]	Shadow Economy Labor Force in 1000 people[3]	Shadow Economy Participants in % of official Labor Force[4]	Sources of Shadow Economy Labour Force
Austria	**90-91**	**20,636**	**25,382**	**5.47**	**300-380**	**9.6**	**Schneider (1998) and**
	97-98	**25,874**	**29,630**	**8.93**	**500-750**	**16.0**	**own calculations**
Denmark	**1980**	**13,233**	**18,658**	**8.6**	**250**	**8.3**	**Mogensen, et. al.**
	1986	**18,496**	**26,356**	**9.8**	**390**	**13.0**	**(1995)**
	1991	**25,946**	**36,558**	**11.2**	**410**	**14.3**	**and own calculations**
	1994	**34,441**	**48,562**	**17.6**	**420**	**15.4**	
France	**1975-82**	**12,539**	**17,542**	**6.9**	**800-1500**	**3.0-6.0**	**De Grazia (1983) and**
	1997-98	**24,363**	**34,379**	**14.9**	**1400-3200**	**6.0-12.0**	**own calculations**
Germany	**1974-82**	**11,940**	**17,911**	**10.6**	**3000-4000**	**8.0-12.0**	**De Grazia (1983), F. Schneider (1998b)**
	1997-98	**26,080**	**39,634**	**14.7**	**7000-9000**	**19.0-23.0**	**and own calculations**
Italy	**1979**	**8,040**	**11,736**	**16.7**	**4000-7000**	**20.0-35.0**	**Gaetani and d'Aragona (1979) and**
	1997-98	**20,361**	**29,425**	**27.3**	**6600-11400**	**30.0-48.0**	**own calculations**
Spain	**1979-80**	**5,640**	**7,868**	**19.0**	**1250-3500**	**9.6-26.5**	**Ruesga (1984) and**
	1997-98	**13,791**	**19,927**	**23.1**	**1500-4200**	**11.5-32.3**	**own calculations**
Sweden	**1978**	**15,107**	**21,981**	**13.0**	**750**	**13.0-14.0**	**De Grazia (1983) and own calculations**
	1997-98	**25,685**	**37,331**	**19.8**	**1150**	**19.8**	
European Union	*1978*	*9,930*	*14,458*	*14.5*	*15 000*	*-*	*De Grazia (1983) and own calculations*
	1997-98	*22,179*	*32,226*	*19.6*	*30 000*		
OECD (Europe)	*1978*	*9,576*	*14,162*	*15.0*	*26 000*	*-*	*De Grazia (1983) and own calculations*
	1997-98	*22,880*	*33,176*	*20.2*	*48 000*		

1) Source: OECD, Paris, various years

2) Source: Own calculations.

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

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

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[11] it has been found out, that the increase of the tax and social security contribution burdens is one of the main causes for the increase of the shadow economy. Since taxes affect labor-leisure choices, and also stimulate labor supply in the shadow economy, or the untaxed sector of the economy, the distortion of this choice is a major concern of economists. The bigger the difference between the total cost of labor in the official economy and the after-tax earnings (from work), the greater is the incentive to avoid this difference and to work in the shadow economy. Since this difference depends broadly on the social security system and the overall tax burden, they are key features of the existence and the increase of the shadow economy. But even major tax reforms with major tax rate deductions will not lead to a substantial decrease of the shadow economy. They will only be able to stabilize the size of the shadow economy and avoid a further increase. Social networks and personal relationships, the high profit from irregular activities and associated investments in real and human capital are strong ties which prevent people from transferring to the official economy. For Canada, Spiro (1993) expected similar reactions of people facing an increase in indirect taxes (VAT, GST). After the introduction of the GST in 1991 - in the midst of a recession - , the individuals, suffering economic hardship because of the recession, turned to the shadow economy, which led to a substantial loss in tax revenue. "Unfortunately, once this habit is developed, it is unlikely that it will be abandoned merely because economic growth resumes." (Spiro 1993 p. 255). They may not return to the formal sector, even in the long run. This fact makes it even more difficult for politicians to carry out major reforms because they may not gain a lot from them.[12]

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

---

[11] 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.

[12] 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.

effect[13] 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.[14]

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 discussing empirical results in the case of Austria and the Scandinavian countries. For Austria the driving force for the shadow economy activities is the direct tax burden (including social security payments), it has the biggest influence, followed by the intensity of regulation and complexity of the tax system. A similar result has been achieved by Schneider (1986) for the Scandinavian countries (Denmark, Norway and Sweden). In all three countries various tax variables (average direct tax rate, average total tax rate (indirect and direct tax rate)) and marginal tax rates have the expected positive sign (on currency demand) and are highly statistically significant. Similar results are reached by Kirchgaessner (1983, 1984) for Germany and by Kloveland (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

---

[13] If leisure is assumed to be a normal good.
[14] See Thomas (1992) p. 134-7.

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[15] 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.[16] 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 bureaucrats, and the amount of bribery and especially corruption, therefore, play a major role in this "bargaining game" between the government and the taxpayers.

In table 10 it is tried to provide an explanation of the different sizes of the shadow economies of some of the 21 OECD countries by comparing the overall tax and social security contributions with the size of the shadow economy of the different countries for the year 1996.

Table 10

With the exception of Spain (shadow economy 22.9 %, tax and social security burden 67.2 %), Greece, Italy, Belgium and Sweden, who have the largest shadow economies in 1996 also have the highest tax and social security burden (72.3, 72.9, 76.0 and 78.6%), whereas the countries like Switzerland and U.S., who have the lowest overall tax and social security burden (39.7 and 41.4%) they have the lowest shadow economies with 7.5 and 8.8%, too! Of course, there are exceptions, like the United Kingdom and Austria with a quite high overall tax and social security burden (54.9 and 70.4%) and a quite low shadow economy (13.1 and

---

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

[16] 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

8.3%), but the overall pictures seems to fit, the higher the overall social security and tax burden, the higher the shadow economy, ceteris paribus. The strong positive relationship that a rising tax and social security contribution burdens cause a higher shadow economy, is also demonstrated in figures 7.1 and 7.2

Figures 7.1 and 7.2

If one calculates the correlation coefficient between the tax and social security contribution burden and the size of the shadow economy, the coefficient has a value of 0.61, which is clearly statistically significant from zero.

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.[17] 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.

---

find a statistically significant result.

[17] See for a (social) psychological, theoretical foundation of this feature, Brehm (1966, 1972), and for a (first)

Table 10: **The Size of the Shadow Economy and the Burden of Taxes and Social Security Contributions in OECD countries**

Country	Size of the shadow economy (in % of GDP) 1996 (1)	Value added tax rate (in %)[1] 1996 (2)	Average direct tax rate (in %)[2] 1996 (3)	Social security contributions by employees rate[3] (in %) 1996 (4)	Social security contributions by employers rate[3] (in %) 1996 (5)	Total social security contributions rate (in %) sum of (4)+(5) 1996 (6)	Total social security contributions + direct tax burden: sum (4)+(5)+(3) (in %) 1996 (7)	Total tax and social security burden: sum (2)+(3)+(4)+(5) 1996 (8)
Greece	28.5	18.0	11.0	15.8	27.5	43.3	54.3	72.3
Italy	27.0	19.0	12.0	9.9	32.0	41.9	53.9	72.9
Spain	22.9	16.0	13.0	6.6	31.6	38.2	51.2	67.2
Belgium	21.9	21.0	19.0	10.0	26.0	36.0	55.0	76.0
Sweden	19.2	25.0	20.0	4.0	29.6	33.6	53.6	78.6
Norway	18.9	23.0	19.0	7.0	12.8	19.8	38.8	61.8
Denmark	18.3	25.0	36.0	9.0	0.0	9.0	45.0	70.0
Ireland	15.9	21.0	20.0	7.2	12.3	19.5	39.5	60.5
Canada	14.6	7.0	21.0	7.0	8.0	15.0	36.0	43.0
Germany	14.5	15.0	18.0	16.1	16.1	32.2	50.2	65.2
France	14.3	20.6	6.0	13.0	31.0	44.0	50.0	70.6
Netherlands	14.0	17.5	10.0	31.0	8.8	39.8	49.8	67.3
U.K.	13.1	17.5	16.0	10.7	10.2	21.4	37.4	54.9
USA	8.8	3.0	17.0	7.6	13.8	21.4	38.4	41.4
Austria	8.3	20.0	8.0	18.2	24.2	42.4	50.4	70.4
Switzerland	7.5	6.5	10.0	11.6	11.6	23.2	33.2	39.7

1) Rates of the year 1996; USA: Average sales tax

2) Average direct tax rate is calculated as the sum of all income taxes (+ payroll and manpower taxes) paid on wages and salaries (including income of self-employed) divided by gross labor costs of an average income earner.

3) The rate is calculated on the basis of the annual gross earnings of an average income earner.

Source: Own calculations and OECD-working paper 176, 1997, Paris.

Figure 7.2: Size of the Shadow Economy vs Total Soc. Security Contributions + Direct Tax Burden*, Year 1996

(Correlation Coefficient with AT = 0,61, without AT = 0,72)

Y-axis: Shadow Economy in % of GDP (1996)

X-axis: Total Soc. Security Contributions + Direct Tax Burden in %

* Sum of all income taxes paid on wages and salaries (including income of self-employed) divided by gross labor costs of an average income earner

**Figure 7.2: Size of the Shadow Economy vs
Total Tax* and Soc. Security Burden, Year 1996**
(Correlation Coefficient with AT = 0,62, without AT = 0,74)

Shadow Economy in % of GDP (1996)

Total Tax and Soc. Security Burden in %

* Value added tax rate and average direct tax rate in %
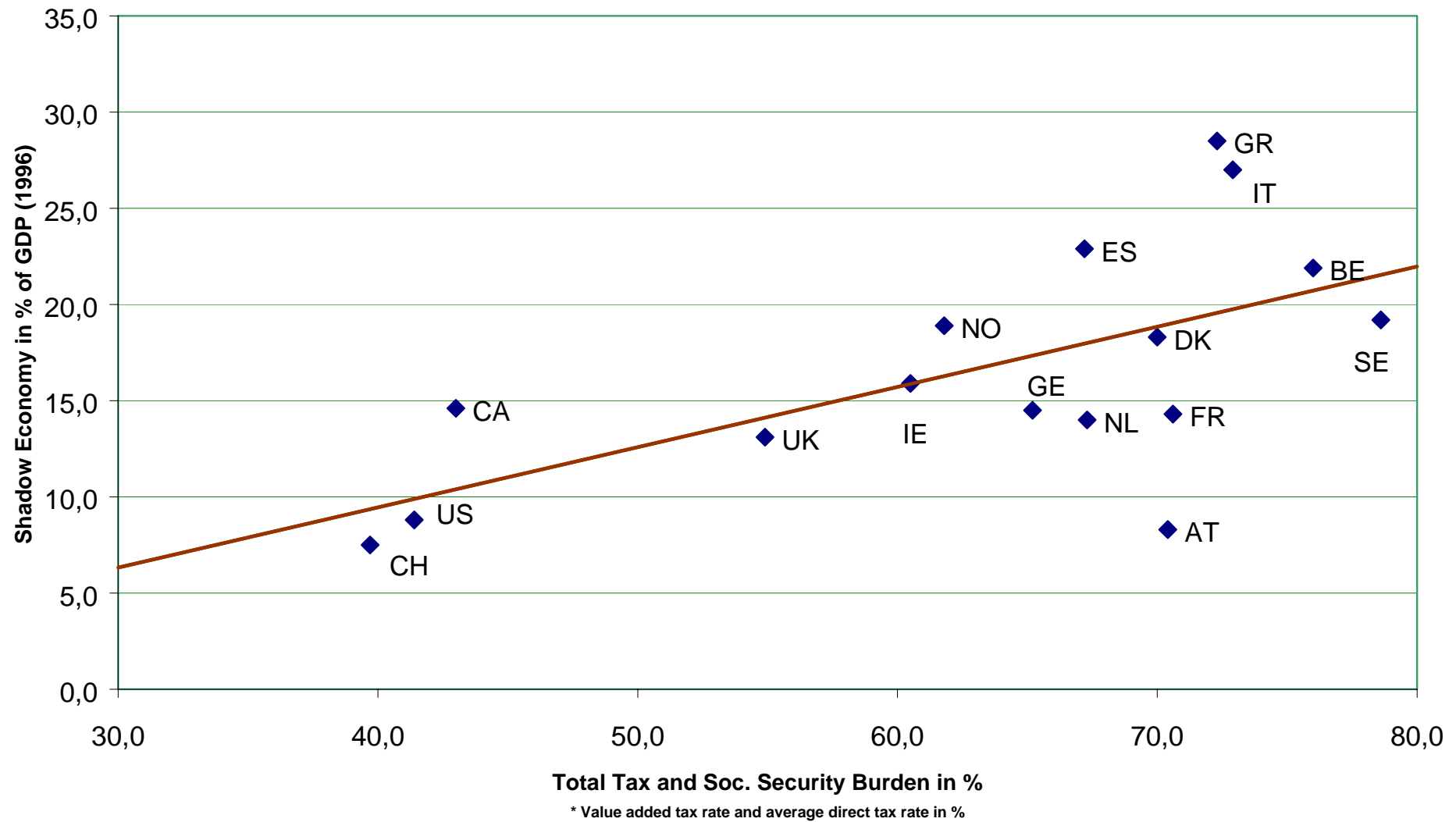
In their study every available measure of regulation is significantly correlated with the share of the unofficial economy and the sign of the relationship is unambiguous: more regulation is correlated with a larger shadow economy. A one point increase in an index of regulation (ranging from 1-5) is associated with a 10 % increase in the shadow economy for 76 developing, transition and developed countries.

These findings demonstrate that governments should put more emphasis on improving enforcement of laws and regulations, rather than increasing their number. Some governments, however, prefer this policy option (more regulations and laws), when trying to reduce the shadow economy, mostly because it leads to an increase in power of the bureaucrats and to a higher rate of employment in the public sector.

4.3   Public Sector Services

An increase of the shadow economy leads to reduced state revenues which in turn reduces the quality and quantity of publicly provided goods and services. Ultimately, this can lead to an increase in the tax rates for firms and individuals in the official sector, quite often combined with a deterioration in the quality of the public goods (such as the public infrastructure) and of the administration, with the consequence of even stronger incentives to participate in the shadow economy. Johnson, Kaufmann, and Zoido-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 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 Methods to Estimate the Size of the Shadow Economy [18)]

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

5.1 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[19)] 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 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[20)].

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.[21)] A number of difficulties beset this approach. Firstly, using tax compliance data is equivalent to using a (possibly biased) sample of the population. However, since in general a selection of

---

[18)] This chapter closely follows Schneider and Enste (2000).

[19)] 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.

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

[21)] In the United States, IRS (1979, 1983), Simon and Witte (1982), Witte (1987), Clotefelter (1983), and Feige

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.

5.2 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:

5.2.1 The Discrepancy between National Expenditure and Income Statistics

This approach is based on discrepancies between income and expenditure statistics. In national accounting the income measure of GNP should be equal to the expenditure measure of GNP. Thus, if an independent estimate of the expenditure site of the national accounts is available, the gap between the expenditure measure and the income measure can be used as an indicator of the extend of the black economy.[22] 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

---

(1986). For a more detailed discussion, see Dallago (1990) and Thomas (1992).

[22] 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).

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.[23]

5.2.2 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.[24] 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.

5.2.3 The Transactions Approach

This approach has been developed by Feige.[25] 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 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

---

[23] 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.

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

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

durability of bank notes, in terms of the quality of the papers on which they are printed.[26] 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.

5.2.4 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 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

---

[26] 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).

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.[27]

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,[28] but has nevertheless been criticized on various grounds.[29] The most commonly raised objections to this method are:

(i)   Not all transactions in the shadow economy are paid in cash. Isachsen and Strom (1985) used the survey method to find out that in Norway, in 1980, roughly 80 percent of all transactions in the hidden sector were paid in cash. The size of the total shadow economy (including barter) may thus be even larger than previously estimated.

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

---

[27] 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.

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

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

impact on the extent of the hidden economy, it might again be higher than reported in most studies.[30]

(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, 1996), criticize Tanzi's studies on the grounds that the US dollar is used as an international currency. Tanzi should have considered (and controlled for) the US dollars, which are used as an international currency and held in cash abroad.[31] Moreover, Frey and Pommerehne (1984) and Thomas (1986, 1992, 1999) claim that Tanzi's parameter estimates are not very stable.[32]

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

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

---

[30]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).

[31] 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.

[32] 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]).

5.2.5 The Physical Input (Electricity Consumption) Method

(1) The Kaufmann - Kaliberda Method[33]

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.[34]

(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,

---

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

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

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

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

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.

5.3   The model approach[35]

All methods described so far that are designed to estimate the size and development of the shadow economy consider just one indicator that "must" capture all effects of the shadow economy. However, it is obvious that its effects show up simultaneously in the production, labor, and money markets. An even more important critique is that the causes which determine the size of the hidden economy are taken into account only in some of the monetary approach studies which usually consider one cause, the burden of taxation. The model approach explicitly considers multiple causes leading to the existence and growth as well as the multiple effects of the shadow economy over time. The empirical method used is quite different from those used so far. It is based on the statistical theory of unobserved variables, which considers multiple causes and multiple indicators of the phenomenon to be measured. For the estimation, a factor-analytic approach is used to measure the hidden economy as an unobserved variable over time. The unknown coefficients are estimated in a set of structural equations within which the "unobserved" variable cannot be measured directly. The DYMIMIC (dynamic multiple-indicators multiple-causes) model consists in general of two parts, the measurement model links the unobserved variables to observed indicators. The

---

[35] 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.

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 8.

Figure 8: Development of the shadow economy over time.
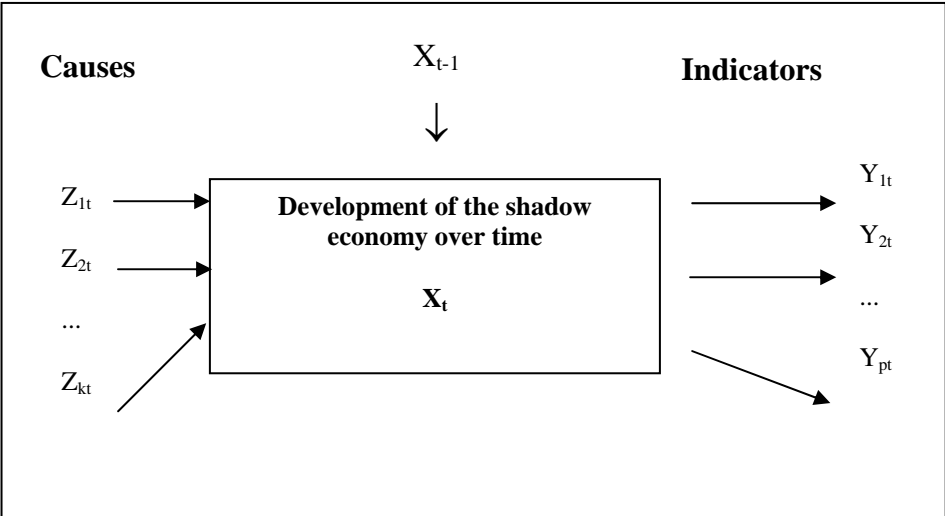
There is a large body of literature[36)] on the possible causes and indicators of the shadow economy, in which the following three types of causes are distinguished:

Causes

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

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

(iii)   The „tax morality" (citizens' attitudes toward the state), which describes the readiness of individuals (at least partly) to leave their official occupations and enter the shadow

---

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

economy: it is assumed that a declining tax morality tends to increase the size of the shadow economy.[37]

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), and Giles and Tedd (2002). 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 DYMIMIC model treats hidden output as a latent variable, and uses several (measurable) causal variables and indicator variables. The former include measures of the average and marginal tax rates, inflation, real income and the degree of regulation in the economy. The latter include changes in the (male) labor force participation rate and in the cash/money supply ratio. In their cash-demand equation they allow for different velocities of currency circulation in the hidden and recorded economies. Their cash-demand equation is not used as an input to determine the variation in the hidden economy over time – it is used only to obtain the long-run average value of hidden/measured output, so that the index for this ratio predicted by the DYMIMIC model can be used to calculate a level and the percentage units of the shadow economy. Giles latest

---

[37] 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

combination of the currency demand and DYMIMIC approach clearly shows that some progress in the estimation technique of the shadow economy has been achieved and a number of critical points have been overcome.

6   Summary and Conclusions

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

Table 11

To summarize: As it has already been argued, there is no „best" or commonly accepted method; each approach has its specific strengths and weaknesses as well as specific insights and results. Although the different methods provide a rather wide range of estimates, there is a common finding that the size of the shadow economies for most transition and all investigated OECD countries has been growing over the recent decade. A similar finding can be made for the „shadow labor market" which is attracting a growing attention due to high unemployment in European OECD countries. Furthermore, the results of this study show that an increasing burden of taxation and social security payments, combined with rising state regulatory activities, are the major driving forces for the size and growth of the shadow economy. Finally, to conclude: Shadow economies are a complex phenomenon, present to an important extent even in the industrialized and developed economies. People engage in shadow economic activity for a variety of reasons, among most important, of which we can count are government actions, most notable taxation and regulation. With these two insights, goes a third, no less important one: a government aiming to decrease shadow economic activity has to first and foremost analyze the complex and frequently contradictory relationships among consequences of its own policy decisions.

---

changing variables in the model and over the years.

Table 11: **Average Size of the Shadow Economy for Developing, Transition and OECD-Countries in Terms of Value-Added and of the Labor Force over two periods (1999/2000)**

Countries	Average Size of the Shadow Economy – Value added in % of official GDP 1999/2000 *Currency Demand and DYMIMIC method (Number of Countries)*	Average Size of the Shadow Economy Labor Force in % of official Labor Force 1999/2000 *Survey and Discrepancy Methods (Number of Countries)*
Developing countries:		
Africa	**41** (23)	**48.2** (23)
Central and South America	**41** (18)	**45.1** (18)
Asia [1]	**29** (26)	**33.4** (26)
Transition countries	**35** (23)	-
Western OECD Countries - Europe	**18** (16)	**16.4** (7)
North American and Pacific OECD Countries	**13.5** (4)	-

1) Here not all countries are developing countries like Japan, Singapore or Hongkong.

Source: Own calculations.

7 References

Aigner, Dennis; Schneider, Friedrich and Damayanti Ghosh (1988): Me and my shadow: estimating the size of the US hidden economy from time series data, in W. A. Barnett; E. R. Berndt and H. White (eds.)*: Dynamic econometric modeling*, Cambridge (Mass.): Cambridge University Press, pp. 224-243.

Andreoni, James; Erard, Brian, and Jonathan Feinstein (1998): Tax compliance. *Journal of Economic Literature*, 36, pp. 818-860.

Bagachwa, M.S.D. and A. Naho (1995): Estimating the second economy in Tanzania, *World Development*, 23, no. 8, pp. 1387-1399.

Bhattacharyya, D.K. (1999): On the Economic Rationale of Estimating the Hidden Economy, *The Economic Journal* 109/456, pp. 348-359.

Blades, Derek (1982): "The Hidden Economy and the National Accounts", *OECD (Occasional Studies)*, Paris, pp. 28-44.

Boeschoten, Werner C. and Marcel M.G. Fase (1984): *The volume of payments and the informal economy in the Netherlands 1965-1982*, M. Nijhoff, Dordrecht.

Brehm, J.W. (1966): *A theory of psychological reactance*. New York (Academic Press).

Brehm, J.W. (1972): *Responses to loss of freedom. A theory of psychological reactance*. Morristown (General Learning Press).

Cagan, Phillip (1958): "The Demand for Currency Relative to the Total Money Supply," *Journal of Political Economy*, 66:3, pp. 302-328.

Cebula, Richard J. (1997): "An Empirical Analysis of the Impact of Government Tax and Auditing Policies on the Size of the Underground Economy: The Case of the United States, 1993-94:" *American Journal of Economics and Sociology*, 56:2, pp.173-185.

Clotefelter, Charles T. (1983): Tax evasion and tax rates: An analysis of individual return, *Review of Economic Statistics*, 65/3, pp. 363-373.

Contini, Bruno (1981): Labor market segmentation and the development of the parallel economy – the Italian experience, *Oxford Economic Papers*, 33/4, pp. 401-12.

Del Boca, Daniela. (1981): Parallel economy and allocation of time, *Micros (Quarterly Journal of Microeconomics)*, 4/2, pp. 13-18.

Del Boca, Daniela and Francesco Forte (1982): Recent empirical surveys and theoretical interpretations of the parallel economy in Italy; Tanzi, Vito (1982) (ed.): *The underground economy in the United States and abroad*, Lexington (Mass.), Lexington, pp. 160-178.

Feige, Edgar L. (1986): A re-examination of the "Underground Economy" in the United States. *IMF Staff Papers*, 33/ 4, pp. 768-781.

Feige, Edgar L. (1989) (ed.): *The underground economies. Tax evasion and information distortion*. Cambridge, New York, Melbourne, Cambridge University Press.

Feige, Edgar L. (1994): The underground economy and the currency enigma, *Supplement to Public Finance/ Finances Publiques*, 49, pp. 119-136.

Feige, Edgar L. (1996): Overseas holdings of U.S. currency and the underground economy, in: Pozo, Susan (ed.): *Exploring the Underground Economy*. Kalamazoo, Michigan, pp. 5-62.

Franz, A. (1983): Wie groß ist die "schwarze" Wirtschaft?, *Mitteilungsblatt der Österreichischen Statistischen Gesellschaft*, 49/1, pp. 1-6.

Frey, Bruno S. and Hannelore Weck (1983a): "Bureaucracy and the Shadow Economy: A Macro-Approach", in Horst Hanusch (ed.): *Anatomy of Government Deficiencies.* Berlin: Springer, pp. 89-109.

Frey, Bruno S. and Hannelore Weck (1983b): "Estimating the Shadow Economy: A 'Naive' Approach," *Oxford Economic Papers*, 35, pp. 23-44.

Frey, Bruno S. and Hannelore Weck-Hannemann (1984): The hidden economy as an "unobserved" variable, *European Economic Review*, 26/1, pp. 33-53.

Frey, Bruno S. and Werner Pommerehne (1984): The hidden economy: State and prospect for measurement, *Review of Income and Wealth*, 30/1, pp. 1-23.

Frey, Bruno S., Weck Hannelore and Werner W. Pommerehne (1982): Has the shadow economy grown in Germany? An exploratory study, *Weltwirtschaftliches Archiv*, 118/4, pp. 499-524.

Friedman, E., Johnson, S., Kaufmann, D. and Zoido-Labton, P. (1999): Dodging the grabbing hand: The determinants of unofficial activity in 69 countries, *Discussion paper*, Washington D.C: World Bank.

Garcia, Gillian (1978): "The Currency Ratio and the Subterranean Economy," *Financial Analysts Journal*, 69:1, pp. 64-66.

Giles, David, E.A. (1999a): Measuring the hidden economy: Implications for econometric modelling, *The Economic Journal*, 109/456, pp.370-380.

Giles, David, E.A. (1999b): Modelling the hidden economy in the tax-gap in New Zealand, *Working paper*, Department of Economics, University of Victoria, Canada.

Giles, David, E.A., Tedds, Linsey, M. and Werkneh, Gugsa (1999): The Canadian underground and measured economies, *Working paper*, Department of Economics, University of Victoria, Canada.

Giles, David, E.A. and Linsey M. Tedds (2002): Taxes and the Canadian Underground Economy, Canadian Tax Paper No. 106, Canadian Tax Foundation, Toronto/Ontario.

Gutmann, Pierre M. (1977): "The Subterranean Economy," *Financial Analysts Journal*, 34:1, pp. 24-27.

Hartzenburg, G.M. and Leimann, A.: The Informal Economy and its Growth Potential, In: Adebian, E. and Standish, B. (eds.) *Economic Growth in South Africa*, Oxford: Oxford University Press, 1992, pp. 187-214.

Helberger, Claus and Hans Knepel (1988): "How big is the shadow economy? A re-analysis of the unobserved-variable approach of B. S. Frey and H. Weck-Hannemann", *European Economic Journal*, 32, pp. 965-76.

Hill, Roderick and Muhammed Kabir (1996): Tax rates, the tax mix, and the growth of the underground economy in Canada: What can we infer? *Canadian Tax Journal/ Revue Fiscale Canadienne*, 44/ 6, pp. 1552-1583.

IRS (1979): *Estimates of income unreported on individual tax reforms*, Washington D.C.: Internal revenue service, U.S. Department of the Treasury.

IRS (1983): *Income tax compliance research: Estimates for 1973-81*, Washington D.C.: Internal revenue service, U.S. Department of the Treasury.

Isachsen, Arne J. and Steinar Strom (1985): The size and growth of the hidden economy in Norway, *Review of Income and Wealth*, 31/1, pp. 21-38.

Isachsen, Arne J.; Klovland, Jan and Steinar Strom (1982): The hidden economy in Norway, in: Tanzi Vito (ed.): *The underground economy in the United States and Abroad*, Heath, Lexington, pp. 209-231.

Johnson, Simon; Kaufmann, Daniel; and Andrei Shleifer (1997): *The unofficial economy in transition*, Brookings Papers on Economic Activity, Fall, Washington D.C.

Johnson, Simon; Kaufmann, Daniel and Pablo Zoido-Lobatón (1998a): Regulatory discretion and the unofficial economy. *The American Economic Review*, 88/ 2, pp. 387-392.

Johnson, Simon; Kaufmann, Daniel and Pablo Zoido-Lobatón (1998b): *Corruption, public finances and the unofficial economy.* Washington, D.C.: The World Bank, discussion paper.

Kaufmann, Daniel and Kaliberda, Aleksander (1996), Integrating the unofficial economy into the dynamics of post socialist economies: A framework of analyses and evidence, Washington, D.C., The Worldbank, *Policy research working paper 1691*.

Kirchgaessner, Gebhard (1983): Size and development of the West German shadow economy, 1955-1980, *Zeitschrift für die gesamte Staatswissenschaft*, 139/2, pp. 197-214.

Kirchgaessner, Gebhard (1984): Verfahren zur Erfassung des in der Schattenwirtschaft erarbeiteten Sozialprodukts, *Allgemeines Statistisches Archiv*, 68/4, pp. 378-405.

Klovland, Jan (1984): "Tax Evasion and the Demand for Currency in Norway and Sweden: Is there a Hidden Relationship?" *Scandinavian Journal of Economics*, 86:4, pp. 423-39.

Lackó Mária (1996): *Hidden economy in East-European countries in international comparison*, Laxenburg: International Institute for Applied Systems Analysis (IIASA), working paper.

Lackó Mária (1998): *The hidden economies of Visegrad countries in international comparison: A household electricity approach*, In: Halpern, L. and Wyplosz, Ch. (eds.), Hungary: Two wards a market economy, Cambridge (Mass.): Cambridge University Press, p.128-152.

Lackó Mária (1999): *Hidden economy an unknown quantitiy? Comparative analyses of hidden economies in transition countries in 1989-95*, Working paper 9905, Department of Economics, University of Linz, Austria.

Langfeldt, Enno (1984): The unobserved economy in the Federal Republic of Germany, in: Feige, Edgar L. (ed.): *The unobserved economy*, Cambridge University Press., pp. 236-260.

Lippert, Owen and Michael Walker (eds.) (1997): *The underground economy: Global evidences of its size and impact*, Vancouver, B.C.: The Frazer Institute.

Lizzeri, C. (1979): *Mezzogiorno in controluce*. Enel, Naples.

Loayza, Norman V. (1996): The economics of the informal sector: a simple model and some empirical evidence from Latin America. *Carnegie-Rochester Conference Series on Public Policy* 45, pp. 129-162.

MacAfee, Kerrick (1980): A Glimpse of the hidden economy in the national accounts, *Economic Trends*, 136, pp. 81-87.

Madzarevic, Sanja and Davor Mikulic (1997): *Measuring the unofficial economy by the system of national accounts*, Zagreb: Institute of Public Finance, working paper.

Mauleon, Ignacio (1998): Quantitative Estimation of the Spanish Underground Economy, *Discussion paper*, Department of Economics and History, University of Salamanka, Salamanka, Spain.

Mogensen, Gunnar V.; Kvist, Hans K.; Körmendi, Eszter and Soren Pedersen (1995): *The shadow economy in Denmark 1994: Measurement and results*, Study no. 3, Copenhagen: The Rockwool Foundation Research Unit.

Morris, B. (1993), *Editorial Statement.* International Economic Insides, IV, International Statistical Yearbook, Budapest.

O'Higgins, Michael (1989): Assessing the underground economy in the United Kingdom, in: Feige, E.L. (ed.): *The underground economies: tax evasion and information distortion*, Cambridge: Cambridge University Press, pp. 175-195.

O'Neill, David M. (1983): Growth of the underground economy 1950-81: Some evidence from the current population survey, *Study for the Joint Economic Committee*, U.S. Congress, Joint Committee Print 98-122, U.S. Gov. Printing Office, Washington.

Park, T. (1979): *Reconciliation between personal income and taxable income*, pp. 1947-77, mimeo, Washington D.C.: Bureau of Economic Analysis.

Pelzmann, Linde (1988): *Wirtschaftspsychologie.* Arbeitslosenforschung, Schattenwirtschaft, Steuerpsychologie. Wien, New York (Springer).

Petersen, Hans-Georg (1982): Size of the public sector, economic growth and the informal economy: Development trends in the Federal Republic of Germany, *Review of Income and Wealth*, 28/2, pp. 191-215.

Pissarides, C. and Weber, G. (1988): An expenditure – based estimate of Britain's black economy, *CLE working paper* no. 104, London.

Pommerehne, Werner W. and Friedrich Schneider (1985): The decline of productivity growth and the rise of the shadow economy in the U.S., *Working Paper 85-9*, University of Aarhus, Aarhus, Denmark.

Portes, Alejandro (1996): The informal economy, in: Pozo, Susan (ed.): *Exploring the underground economy.* Kalamazoo, Michigan, pp. 147-165.

Pozo, Susan (ed.) (1996): *Exploring the underground economy: Studies of illegal and unreported activity*, Michigan: W.E. Upjohn, Institute for Employment Research.

Rogoff, Kenneth, (1998), Blessing or Curse? Foreign and underground demand for euro notes, *Economic policy: The European Forum* 26, pp. 261-304.

Schneider, Friedrich (1986): Estimating the size of the Danish shadow economy using the currency demand approach: An attempt, *The Scandinavian Journal of Economics*, 88/4, pp. 643-668.

Schneider, Friedrich (1994a): Measuring the size and development of the shadow economy. Can the causes be found and the obstacles be overcome? in: Brandstaetter, Hermann, and Güth, Werner (eds.): *Essays on Economic Psychology*, Berlin, Heidelberg, Springer Publishing Company, pp. 193-212.

Schneider, Friedrich (1994b): Can the shadow economy be reduced through major tax reforms? An empirical investigation for Austria, *Supplement to Public Finance/ Finances Publiques*, 49, pp. 137-152.

Schneider, Friedrich (1997): The shadow economies of Western Europe, *Journal of the Institute of Economic Affairs*, 17/3, pp. 42-48.

Schneider, Friedrich (1998a): Further empirical results of the size of the shadow economy of 17 OECD-countries over time, *Paper to be presented at the 54. Congress of the IIPF Cordowa, Argentina and discussion paper, Department of Economics, University of Linz, Linz, Austria.*

Schneider, Friedrich (1998b): Stellt das Anwachsen der Schwarzarbeit eine wirtschaftspolitische Herausforderung dar? Einige Gedanken aus volkswirtschaftlicher Sicht. Linz, *Mitteilungen des Instituts für angewandte Wirtschaftsforschung* (IAW), I/98, S. 4-13.

Schneider, Friedrich (2000), The Increase of the Size of the Shadow Economy of 18 OECD-Countries: Some Preliminary Explanations, *Paper presented at the Annual Public Choice Meeting*, March 10-12, 2000, Charleston, S.C.

Schneider, Friedrich and Dominik Enste (2000): Shadow Economies: Size, Causes, and Consequences, *The Journal of Economic Literature*, 38/1, pp. 77-114.

Simon, C.B. and A.G. Witte (1982): *Beating the system: The underground economy*, Boston, (Mas.): Urban House.

Smith, J.D (1985): Market motives in the informal economy, in: Gaertner, W. and Wenig, A. (eds.): *The economics of the shadow economy*, Heidelberg: Springer Publishing Company, pp. 161-177.

Spiro, Peter S. (1993): "Evidence of a Post-GST Increase in the Underground Economy;" *Canadian Tax Journal/ Revue Fiscale Canadienne*, , 41:2, pp. 247-258.

Tanzi, Vito (1980): "The Underground Economy in the United States: Estimates and Implications," *Banca Nazionale del Lavoro*, 135:4, pp. 427-453.

Tanzi, Vito (1982) (ed.): *The underground economy in the United States and abroad*, Lexington (Mass.), Lexington.

Tanzi, Vito (1982): A second (and more skeptical) look at the underground economy in the United States; in: Tanzi, Vito (1982) (ed.): *The underground economy in the United States and abroad*, Lexington (Mass.), Lexington, pp. 38-56.

Tanzi, Vito (1983): "The Underground Economy in the United States: Annual Estimates, 1930-1980, "*IMF-Staff Papers*, 30:2, pp. 283-305.

Tanzi, Vito (1986): The underground economy in the United States, Reply to comments by Feige, Thomas, and Zilberfarb. *IMF - Staff Papers*, 33/ 4, pp. 799-811.

Tanzi, Vito (1999): Uses and Abuses of Estimates of the Underground Economy, *The Economic Journal* 109/456, pp.338-340.

Thomas, Jim J. (1986): The underground economy in the United States: A comment on Tanzi, *IMF-Staff Papers*, Vol. 33, No. 4, pp. 782-789.

Thomas, Jim J. (1992): *Informal economic activity*, LSE, Handbooks in Economics, London: Harvester Wheatsheaf.

Thomas, Jim J. (1999): Quantifying the Black Economy: 'Measurement without Theory' Yet Again?, *The Economic Journal* 109/456, pp. 381-389.

Weck, Hannelore (1983): *Schattenwirtschaft: Eine Möglichkeit zur Einschränkung der öffentlichen Verwaltung? Eine ökonomische Analyze*, Bern-Frankfurt.

Williams, Colin C. and Jan Windebank (1995): "Black market work in the European Community: Peripheral work for peripheral localities?", *International Journal of Urban and Regional Research*, 19/1, pp. 23-39.

Witte, A.D. (1987): The nature and extend of unreported activity: A survey concentrating on a recent US-research, in: Alessandrini, S. and Dallago, B. (eds.): *The unofficial economy: Consequences and perspectives in different economic systems*, Gower: Aldershot.

Yoo, Tiho, and Hyun, Jin K., (1998), International comparison of the black economy: Empirical evidence using micro-level data, *Unpublished paper*, Presented at the 1998 Congress of the International Institute of Public Finance, Cordoba, Argentina.

Zilberfarb, Ben-Zion (1986): *Estimates of the underground economy in the United States, 1930-80.* IMF-Staff Papers, 33/ 4, pp. 790-798.