

THE HIDDEN ECONOMY AS AN 'UNOBSERVED' VARIABLE

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The technique of unobserved variables is used to estimate the relative size and development over time of the hidden economy of OECD countries. The burdens of taxation and regulation and the tax morality turn out to be statistically significant determinants. At the end of the 70's the Scandinavian and Bene(lux) countries are expected to have a relatively large, and Japan and Switzerland a relatively small hidden economy. Canada and the United States are ranked in the middle. The size of all hidden sectors is estimated to have increased in the period 1960-1978 relative to officially measured GNP.

1. Introduction

Almost everybody's reaction to the proposition that the size of the hidden economy could be measured is: How do you measure something which is hidden? This seems to be a contradiction in itself as the hidden economy may be defined as that part of the economy which escapes official measurement [see, for example, Feige (1982)]. It is useful to look at the hidden economy in terms of GNP, as it is customary to compare its size to the officially measured national product. This also means that activities within the private household are not counted as part of the hidden economy [this part of total income has been the subject of measurement by, for example, Eisner et al. (1982) and Kendrick (1979)].

Four approaches for measuring the hidden economy's size may be distinguished:¹

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¹They are only mentioned, but not fully discussed here. For an extensive survey and empirical results, see Frey and Pommerehne (1984).

- (1) The figures about *tax evasion* are used as a basis for evaluating the hidden economy's economic activity in terms of GNP (i.e., value added, not turnover).²
- (2) Independent estimates of the *income* and the *expenditure side* of individual households as well as of national accounts reveal that the expenditure side is larger than the income side. This 'initial discrepancy' between income and expenditure can be attributed to the hidden economy.³
- (3) A decline in the *participation rate* of the population (in the official economy) can be taken as an indication of increased activities in the hidden economy. The same is assumed when the participation rate in a particular country is low compared to other countries.⁴
- (4) The most developed approach is to consider the changes in the *demand for money* brought about by changes in the hidden economy activities. The *currency demand approach*⁵ assumes that the hidden transactions are undertaken in cash in order not to leave any easily observable traces for the tax authorities. An increase in activities in the hidden economy mirrors itself in an increase of currency demand. The *transactions approach*⁶ starts from the quantity equation and deduces from the total quantity of money what the size of total economic activity has to be. Subtracting official GNP from the thereby estimated total GNP gives an estimate of the GNP of the hidden sector.

All the measurement approaches mentioned consider just one indicator capturing the effects of the hidden economy. It is clear, however, that its effects may show up simultaneously in the product, labour and money market. An even more important critique is that the *causes* which determine the size of the hidden economy are to a large extent not taken into account. There are only few authors within the monetary approach⁷ who consider at least *one* cause. While other likely determinants are sometimes mentioned in verbal descriptions of the shadow economy,⁸ the few existing formal econometric estimates of the hidden economy so far take the tax rate only to induce an increase in the activities of the hidden economy. The general neglect of other determinants leading individuals to be active in the hidden economy makes the existing estimates of limited use for economic policy,

²See, for example, OECD (1978a, 1980), GAO (1979), IRS (1979), Smith (1981).

³See, for example, Park (1979), Frank (1976), Macafee (1980), O'Higgins (1980), Dilnot and Morris (1981).

⁴See, for example, Fuà (1976), OECD (1978b, 1979), Contini (1981), Del Boca (1981).

⁵See, for example, Tanzi (1980), Klovland (1980).

⁶It is due to Feige (1979).

⁷In the currency demand approach in particular, Tanzi (1980), Isachsen, Klovland and Strom (1982), Kirchaessner (1983); in the transactions approach, Feige (1982).

⁸See, for example, Charreyron and Klatzman (1980), De Grazia (1980). A quantitative approach is used in Frey and Weck (1983).

because it gives political decision-makers few hints about how to *influence* the hidden economy (if they wish to do so).

This paper simultaneously considers the *multiple causes* leading to the existence and growth, as well as the *multiple effects* of, the hidden economy. The method used is radically different from those existing 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. (In contrast, multiple regression analysis is confined to one indicator of the endogenous variable only.) This approach is discussed and applied to the hidden economy in section 2. In section 3 the determinants and indicators of the hidden economy to be included in the model are identified for 17 OECD countries and the period from 1960 to 1978. The empirical test of the theoretical model is presented in section 4. It turns out that the burden of taxation and of regulation, as well as tax morality, significantly influence the size and development of the hidden sector. The results suggest that we can expect a relatively large hidden economy in Scandinavia (Sweden, Denmark and Norway) and the *Bene(lux)* countries (Belgium, the Netherlands). In comparison, the hidden economy of the Anglo-Saxon (in particular Canada and the United States) and German speaking countries (Austria, Germany) is of medium size. A still smaller hidden economy is to be expected in Japan and Switzerland. Over time, the hidden sectors of Denmark, Italy and Belgium are likely to have grown much faster than in the other OECD countries. The empirical estimates suggest, on the other hand, that in the United States, Canada and the United Kingdom the hidden economy's growth is likely to be considerably slower than in the other OECD countries.

2. The model

A factor analytic approach is used to measure the hidden economy as an unobserved variable. The unknown coefficients are estimated in a set of structural equations of which the 'unobserved' variable cannot be measured directly. The LISREL (linear interdependent structural relationship) model⁹ consists in general of two parts, the measurement model and the structural equations model. The measurement model links the unobserved variables to observed indicators. The structural equations model specifies the causal relationships among the unobserved variables. In our case, we have *one* unobserved variable, the size of the hidden economy. It is assumed to be influenced by a set of (exogenous) *determinants* (to be discussed in the next section). These exogenous variables are taken to be measured without error. Another set of variables is assumed to serve as *indicators* for the hidden economy's size, thus capturing the effects of the hidden economy.

⁹The LISREL model is a generalization of the MIMIC (multiple indicators multiple causes) approach [see Jöreskog and Goldberger (1975)]. The LISREL model and the estimation procedure are described in detail in Jöreskog and Van Thillo (1973).

The model of the interaction between the determinants D_i ($i=1,2,\dots,n$), the size of the hidden economy H , and the indicators I_j ($j=1,2,\dots,m$) is shown in fig. 1. The relationships between the determinants D_i and the size of the hidden economy H is subject to random error, symbolized by μ . The terms ϵ_j affecting the variables I_j are measurement errors. These influences may be of a systematic or a random nature. Since only the relative magnitude of the relationships between the hidden economy and the indicators can be determined, a normalization procedure must be used, i.e., one of the parameters of the I_j -variables must be set to unity. All the variables used in the model are standardized by computing z-values, i.e., by taking the deviations from the mean (divided by the standard deviation).

The parameters of the model are estimated by maximum likelihood, provided that all parameters of the model are identified. The deviation between the true and the estimated variance-covariance matrix of the observed variables is minimized. In addition, the measurement error variances are estimated.

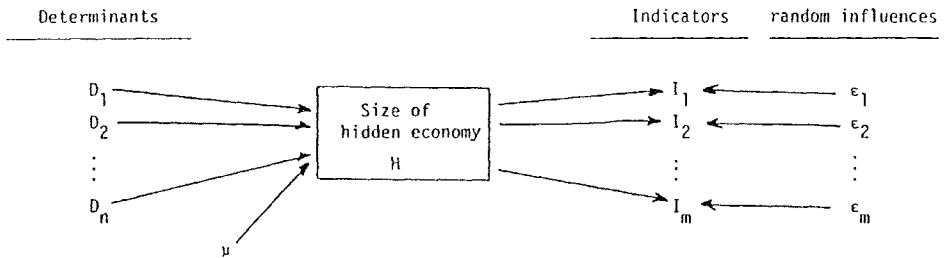


Fig. 1. The size of the hidden economy as an unobserved variable.

In the next section the abstract model is specified by establishing hypotheses about the factors determining the size of the hidden economy and of its indicators. The model is applied to pooled cross section/time series data for 17 OECD countries in the period 1960–1978.

3. Determinants and indicators of the hidden economy

There exists today a vast verbal literature¹⁰ on the possible determinants and indicators of the hidden economy. While these discussions are useful as a general background, they are not very helpful when it comes to determining exactly in what way the determinants and indicators are connected with the hidden economy, and how they should, and can, be measured. Four types of *determinants* are distinguished:

¹⁰It has become impossible to keep track of the hundreds of articles in many languages. For books see, for example, Contini (1979) Heertje and Cohen (1980), Saba (1980), Isachsen and Strøm (1981), Simon and Witte (1982).

(1) The *burden* imposed by the public sector on individuals. It consists of the 'objective' burden of taxation (measured by the share of taxes in GDP); the 'perceived' tax burden (measured by the increase in the share of taxes, assuming that the tax payers partly become accustomed to a given level of taxation) and the burden of regulation (measured by the number of 'regulators', i.e., the number of public employees in general government as a share of total employment). It is hypothesized that increases in the 'objective' and the 'perceived' tax burdens and in the burden of regulation give an incentive to enter the hidden economy. The particular values of these variables and of the 17 countries studied over the five-year time periods 1960–1975, and for 1978, are given in the appendix.

(2) The *tax morality* which captures the readiness with which individuals leave the official economy and enter the illegitimate (untaxed) hidden economy. On the basis of the limited literature presenting internationally comparable data,¹¹ the following hierarchy can be constructed: Switzerland has the highest tax morality, followed by the Scandinavian countries (Norway, Sweden, Denmark and Finland) and the United Kingdom. A medium tax morality is accorded to the population in the Federal Republic of Germany, Austria and the Netherlands. A below average tax morality is found to hold in Spain and Belgium. France's bad tax morality is only surpassed by Italy whose population seems to be more inclined to cheat on taxes than that of other OECD countries. For the purpose of cardinal measurement, this ranking is attributed numbers, Italy being attributed the value of 17, Switzerland the value of 1 for the year 1970 (see the appendix). For the United States, Canada, Japan and Ireland no comparable data are available; for lack of knowledge they are attributed a median rank, lying between the Scandinavian countries including Britain, and the German speaking countries including the Netherlands.¹²

It cannot be assumed that tax morality has stayed constant over time; available evidence rather suggests that tax morality has steadily diminished in the period in question. In the United States survey questions have been put which relate to the population's attitude towards taxes and government, and which are available for the period 1960–1978. The questions chosen for our paper are: 'Do you consider the amount of federal income tax which you have to pay too high?', 'Do you think that governments waste a lot of money?', 'Do you think that government is untrustworthy?', and 'Do you think that government does not care much what people like you think?.'

¹¹See in particular Tretter (1974), also Beichelt et al. (1969), Schmoelders (1960), Struempel (1966). Studies for particular countries are, for example, Vogel (1974) for Sweden and Lewis (1979) for the United Kingdom. Due to the basic problem of measuring attitudes, the data on tax morality are of doubtful quality.

¹²As the values of tax morality (or rather immorality) are chosen so that the differences between them are of similar size, these countries are given a value 6.3.

Taking the average share of affirmative answers to these questions, the following index (with 1970=100) of factors contributing to a decline in tax morality for the United States results:¹³

1960: 62 1965: 73, 1970: 100, 1975: 118, 1978: 121.

These figures suggest that tax morality in the United States has continually declined from 1960 to 1978.

There is no knowledge about the development of tax morality in other countries (except, as indicated, for Germany). It has, therefore, been assumed that the same decline of tax morality as in the United States took place in all of them. This means that the ranking of the countries with respect to their tax morality is unchanged over time. (See the appendix for the full set of values). It is, of course, hypothesized that a declining tax morality tends to increase the size of the hidden economy.

(3) The third type of determinant of the size of the shadow economy is the *rate of unemployment*. The verbal literature (quoted above) often argues that the incentive to work in the hidden economy is particularly high for an unemployed person. He or she has more leisure than desired, and it is often easy to work in the hidden economy while still cashing the unemployment benefits. While the *demand* for hidden work rises with unemployment, it is also likely that the *supply* of such work opportunities falls with rising unemployment. The rate of unemployment is one (of many) indicators for the state of the economy, and when it rises, employers reduce the supply of all jobs, official and clandestine. It is therefore theoretically ambiguous whether an increase in unemployment should be expected to increase or decrease the size of the hidden economy.

(4) The last type of determinant is the *level of development of an economy*. It might be argued that at a low real disposable per capita income, individuals have a strong incentive to hold various jobs (and to pay taxes only on the first job). Evidence for Italy¹⁴ however, suggests that there is more 'lavoro nero' in the rich North than in the poor South. This may be due to the increase in the *supply* of hidden economy jobs going with a higher GDP per capita. Again, the sign of the corresponding coefficient is a priori ambiguous.

A change in the size of the hidden economy may be mirrored by two types of variables:

(a) The first indicator is the growth rate of 'official' real GDP. An increase in the hidden economy means that inputs (in particular labor) move out of

¹³The index is derived in Frey, Weck and Pommerehne (1982). There, along similar lines, tax morality has been analyzed for Germany, but the underlying survey questions were less reliable, so that this tax morality index is not used here.

¹⁴Gaetani-D'Aragona (1981).

the official economy; this has a depressing effect on the officially measured growth rate of the economy. We thus hypothesize a negative sign.¹⁵

- (b) The second type of indicator refers to the *labor market*. An increasing activity of workers in the hidden sector results in a decrease in participation in the official economy, as measured by the participation rate. As the participation rate of women is in most countries increasing due to factors not related to the hidden economy (e.g., the general emancipation of women), the official participation is restricted to males of working age. The respective parameter estimate is thus expected to be negative. Similarly, an increased activity in the hidden sector may be expected to be reflected in shorter working hours in the official economy.¹⁶ The theoretical hypothesis thus suggests a negative sign. The respective coefficient is normalized to -1 .

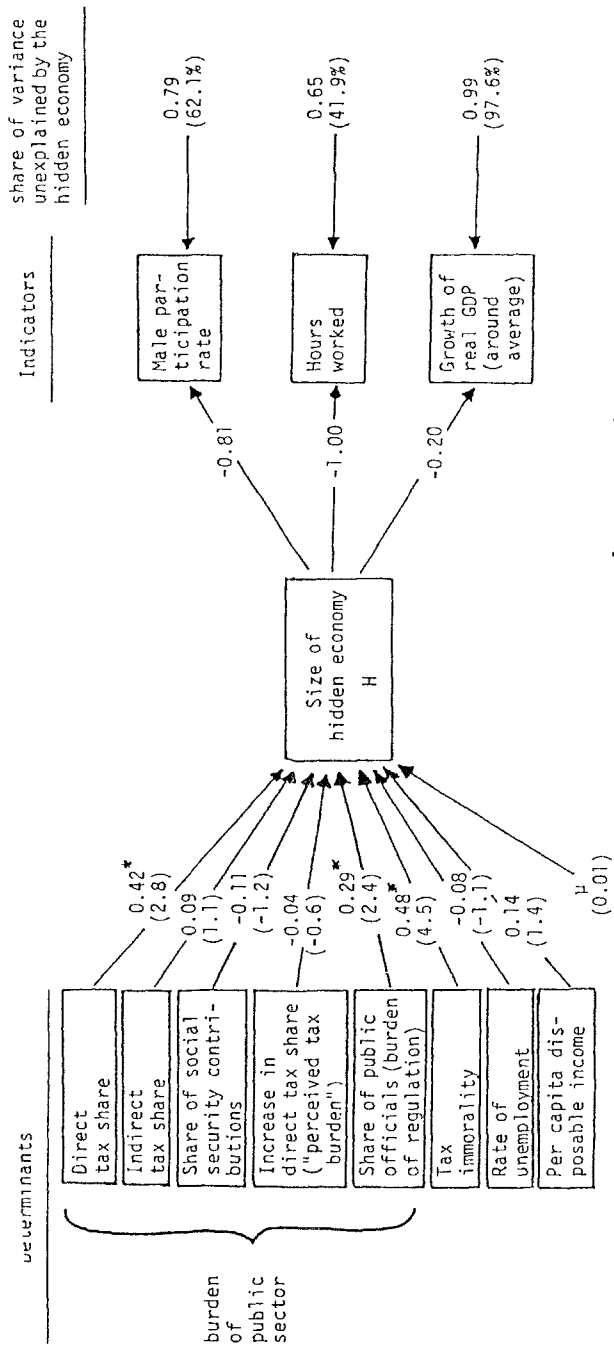
A possible third type of indicator is the development of monetary aggregates, as suggested by the monetary approaches. While such an indicator may make sense for the temporal development of a particular country, it does not seem appropriate to use this indicator for a comparison *between* countries. Firstly, there are very large differences as to the amount, and development, of means of payment such as checks and credit cards between the countries. What is more important is that one country's money is often used in another country (or countries) exactly for the purpose of hidden economy transactions. It is, for example, well known that in the German Democratic Republic the Deutsche mark (of the Federal Republic) is commonly used to pay for 'black' labor. The U.S. dollar is used in many South American and Far Eastern countries for hidden (as well as for legal) transactions, and the same holds true for the Swiss franc [see OECD (1981)]. For this reason, the demand for money is a too unreliable biased indicator for the purpose of comparing the size of the hidden economy between countries, and it is therefore not used here.

4. Estimation results

The results of estimating the model are shown in fig. 2: the parameter estimates and the corresponding *t*-statistics (in parentheses) are given above the arrows showing the direction of influence. The statistically significant parameters (according to the *t*-test and a significance level of 99%) all have the theoretically expected sign: an increase in the 'objective' tax burden

¹⁵In order to compensate for the general decline of growth rates in the wake of the oil price rises of 1973–1974, in each year the deviation of individual countries from the average real growth rate of GDP of all 17 OECD countries is taken as the indicator.

¹⁶Due to problems of international comparability, the actual weekly working hours in the metal industry are taken as indicator.



$\chi^2 = 61.5, d.f. = 52$

Fig. 2. Model estimates.

(share of direct taxes) and in the burden of regulation (share of public officials) tends to increase the size of the hidden economy. A worsening of tax morality (which increases the index discussed above) also tends to increase the size of the hidden economy. Unexpectedly, the share of indirect taxes and of social security contributions in GDP does not exert a statistically significant effect on the hidden economy. This suggests that individuals do either not fully perceive these components (which is likely to be the case for indirect taxes) or see a specific return (which is likely to be the case for social security contributions). Also the influence of the index of 'perceived' tax burden (the increase in the direct tax share) is not statistically significant. The same is true for the two determinants for which the sign is not determined *a priori* — the rate of unemployment and disposable real per capita income.

As the right-hand side of the figure indicates, the (male) participation rate is an important indicator of the hidden economy, its loading coefficient being -0.81 , compared to hours worked (with a normalized parameter of -1). The growth rate of real GDP (relative to the average growth rate of 17 OECD countries) is much less important, having a parameter of -0.20 . The corresponding measurement error variances convey an estimate of the respective dependability of the indicators. The share of variance unexplained by the size of the hidden economy, but rather due to systematic exogenous and random influences (given in parentheses below the ϵ_j 's), amount to 41.9% in the case of hours worked. It is higher in the case of the male participation rate (62.1%). Finally, in the case of the growth rate of real GDP, the size of the hidden economy contributes little, the exogenous and random influences amounting to 97.6% of the variance. The χ^2 of the estimate equals 61.5 with 52 degrees of freedom. It should be taken into account that the dependent variable is not directly observed but rather mirrored by indicators subject to measurement errors. The χ^2 -test is thus not comparable to the R^2 in multiple regression analysis [see Jöreskog (1969)].

The relative size of the hidden economy H can be determined by using the statistically significant influences shown in fig. 2. The coefficients of the direct tax share T (0.42), of the share of public officials P (0.29) and of the tax immorality index M (0.48) are normalized to sum up to unity in order to allow an interpretation in terms of weights contributing to the size of the hidden economy. This yields the equation

$$H = 0.35 \cdot T + 0.25 \cdot P + 0.40 \cdot M.$$

The resulting values for H of the 17 OECD countries for the five time periods are given in table 1.¹⁷ As the numbers in the table are in terms of

¹⁷The standardized z-values given in table 1 are calculated such that their mean equals zero for the aggregate of all countries and all time periods.

Table I
 Estimate of the relative development of the hidden economy (LISREL procedure); 17 OECD countries, 1960-1978.

Rank	Country 1978	Standardized z-value	Country 1975	Standardized z-value	Country 1970	Standardized z-value	Country 1965	Standardized z-value	Country 1960	Standardized z-value	Rank
17	S	(1.46)	DK	(1.25)	S	(0.70)	S	(0.22)	USA	(-0.03)	17
16	B	(1.21)	S	(1.16)	DK	(0.50)	USA	(0.06)	NL	(-0.21)	16
15	DK	(1.15)	B	(0.98)	CAN	(0.39)	NL	(-0.08)	S	(-0.26)	15
14	I	(1.06)	I	(0.80)	B	(0.34)	CAN	(-0.10)	CAN	(-0.32)	14
13	NL	(0.67)	CAN	(0.63)	USA	(0.28)	A	(-0.11)	F	(-0.35)	13
12	F	(0.62)	NL	(0.62)	I	(0.25)	I	(-0.12)	B	(-0.40)	12
11	N	(0.58)	A	(0.57)	NL	(0.23)	B	(-0.13)	UK	(-0.43)	11
10	A	(0.51)	F	(0.53)	F	(0.22)	F	(-0.20)	A	(-0.44)	10
9	CAN	(0.48)	UK	(0.49)	UK	(0.19)	N	(-0.29)	N	(-0.47)	9
8	FRG	(0.45)	N	(0.35)	A	(0.13)	DK	(-0.30)	I	(-0.48)	8
7	USA	(0.39)	FRG	(0.31)	FRG	(-0.04)	UK	(-0.34)	FRG	(-0.63)	7
6	UK	(0.32)	USA	(0.28)	N	(-0.06)	FRG	(-0.36)	DK	(-0.64)	6
5	SF	(0.23)	SF	(0.24)	SF	(-0.27)	SF	(-0.54)	SF	(-0.77)	5
4	IRL	(0.13)	IRL	(-0.02)	IRL	(-0.34)	IRL	(-0.75)	SP	(-0.88)	4
3	SP	(-0.02)	SP	(-0.18)	SP	(-0.57)	SP	(-0.81)	JAP	(-1.01)	3
2	CH	(-0.50)	JAP	(-0.51)	JAP	(-0.77)	JAP	(-0.91)	IRL	(-1.06)	2
1	JAP	(-0.55)	CH	(-0.56)	CH	(-0.90)	CH	(-1.09)	CH	(-1.20)	1

standardized (z) values, the level of the countries' hidden economies remains undetermined. Table 1 thus gives the *ranking* of the 17 OECD countries relative to each other at a given point of time, and the development over time (1960–1978). Six of the countries shown exhibit a marked upwards or downwards trend in their ranking, i.e., in their position relative to the other OECD countries. The developments for these countries are graphically presented in fig. 3.

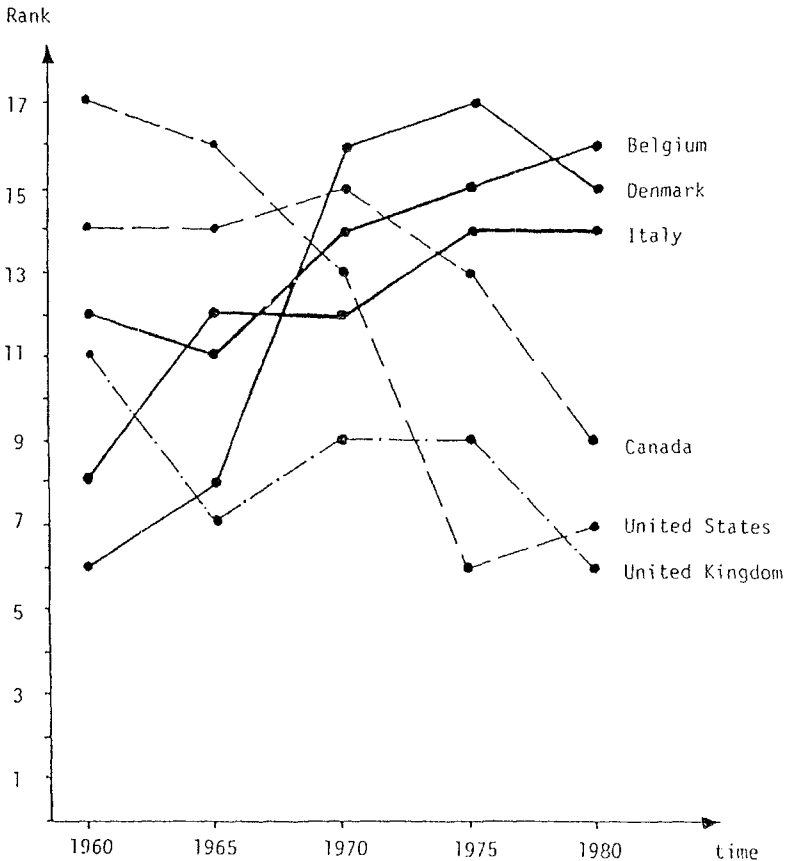


Fig. 3. The ranking of the size of the hidden economy for six countries over time.

Fig. 3 suggests that in Denmark, Belgium and Italy the hidden economy grew *more rapidly* than in the other OECD countries. The Danish hidden economy was ranked sixth from below in 1960, but in 1978 had the third largest 'black economy', i.e., the third highest rank, 15. This jump is mainly due to the extremely large increase of the burden of taxation (an increase of over 12 percentage points) and the burden of regulation (an increase of

almost 13 percentage points in the share of public administrators). In Belgium, the change was from rank 12 up to 16. This relative growth compared to the other countries can be attributed to a more than doubling of the direct tax share. In Italy, the hidden economy's ranking changed from rank 8 up to 14. The main reason is that the share of direct taxes approximately doubled.

According to fig. 3, the hidden economy grew *less rapidly* in the Anglo-Saxon countries than in the OECD countries. The largest decline can be observed for the United States which was ranked top (17) in 1960, and dropped to rank 7 in 1978. This (relative) decline is due to the constant tax burden (the share of direct taxation was 14.3% in 1960 and 14.9% in 1978) and the small increase in the share of regulators. Canada's rank with respect to the size of the hidden economy fell from rank 14 to rank 9, which can be attributed to relatively small increases in the burden of both taxation and regulation. The relative position of the United Kingdom is somewhat uneven, but comparing 1960 (rank 11) to 1978 (rank 6) there is a marked decline.

The ranking of the hidden economy's size is quite *stable* in eight countries (see table 1). Sweden is consistently at the top of the list; France and Germany occupy a position in the middle over the entire period, and five countries (Finland, Ireland, Spain, Switzerland and Japan) are always at the bottom, i.e., are expected to have a consistently smaller hidden economy than the other OECD countries.

The relative size of the hidden economies of the 17 countries (in terms of standardized z-values) is shown for the *final year* (1978) in fig. 4. The figure shows both the point estimates and the 95% confidence intervals. According

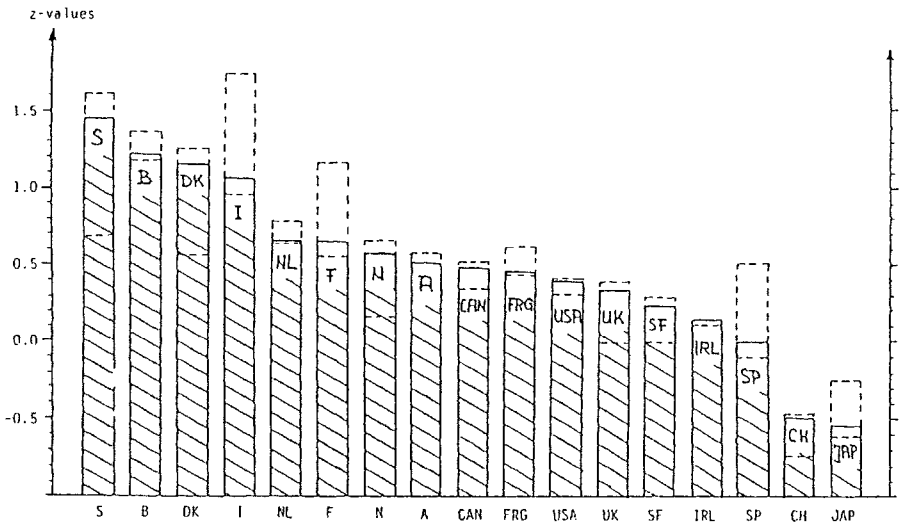


Fig. 4. The relative size of the hidden economy in 1978; 17 OECD countries.

to our estimates, the two *Scandinavian* countries Sweden and Denmark have (besides Belgium) the largest hidden economies; they dominate all other countries with respect to the burdens of taxation and regulation. Norway is ranked somewhat lower (rank 11); though its burdens of taxation and regulation are high, they are below those of Sweden and Denmark. It is interesting to note that the fourth Scandinavian country, Finland, is expected to have a small hidden economy compared to the other countries (rank 5); the burdens of taxation and regulation are both lower than in Norway (all Scandinavian countries are assumed to have the same tax morality).

The Bene(lux) countries are also ranked high (ranks 16 and 13, respectively) in 1978. Besides the heavy burden of taxation and regulation, the above average size of the hidden economy can be attributed to the low tax morality (especially in Belgium).

If our estimates are correct, the *Latin* countries do not have such a large hidden economy (compared to other OECD countries) as sometimes hypothesized. Italy ranks quite high (rank 14), which is mainly due to the very low tax morality (actually the worst of all). The size of the hidden economy in France is somewhat above average. As in the case of Italy, the upper boundary of the confidence interval is quite high. Spain is predicted to have one of the smaller hidden economies (rank 3). Spain's position can be attributed to the extremely low share of direct taxes (5.5%), and to the low share of regulators. According to our estimates, these dampening effects are not compensated by the low tax morality which obtains in all three Latin countries.

The *Anglo-Saxon* countries occupied in the final year positions around the middle and the lower end of the ranking. The expected average size of their hidden economies is due to the reasonably good tax morality, and the relatively modest tax burdens.

The *German speaking* countries are ranked in a similar way as the Anglo-Saxon countries, but their positions are somewhat more varied. Austria (rank 10) and the Federal Republic of Germany (rank 8) occupy a position in the middle, but Switzerland (which is, of course, only partly German speaking) has the second lowest hidden economy in 1978. This comparatively small size is due to the extremely high tax morality and the low share of regulators. Contrary to the traditional view Switzerland's direct taxes have (by now) reached the average of the OECD countries. According to our estimates, Japan has the lowest hidden economy due to a very low burden of taxation and regulation.

As has been mentioned above, the standardized z -values shown in table 1 and fig. 3 allow us to determine only a country's relative position. In order to derive the hidden economy's absolute size (in percent of official GNP) it is necessary to fix two points: one to establish the overall level, another to establish the distance between the ranks. Table 2 shows the hidden

Table 2
Size of the hidden economy as percent of GNP; 17 OECD countries, 1978^a

Sweden	13.2% (base)	Germany (F.R.)	8.6%
Belgium	12.1%	United States	8.3%
Denmark	11.8%	United Kingdom	8.0%
Italy	11.4%	Finland	7.6%
Netherlands	9.6%	Ireland	7.2%
France	9.4%	Spain	6.5%
Norway	9.2% (base)	Switzerland	4.3%
Austria	8.9%	Japan	4.1%
Canada	8.7%		

^aThe base values for Sweden and Norway are taken from the currency demand estimates by Klovland (1980).

economy's size for 1978 when the estimates of Klovland (1980) for Sweden (13.2% of official GNP) and for Norway (9.2%) for the year 1978 using the currency demand approach are taken as bases.

It is worth noting that the resulting estimate for the United States, around 8% of GNP, lies at the upper end of the estimates provided by the U.S. Internal Revenue Service in 1979 — 6%–8% of GNP for 1976 based on tax auditing — and at the lower end of the estimates provided by Tanzi (1980) — 8%–12% of GNP for 1976 based on the currency demand approach. Our estimate is, however, considerably smaller than those arrived at by Feige (1979) — around 30% of GNP for 1979. It need not be stressed that the results here presented do, of course, change if other base points are chosen.

5. Concluding remarks

This paper focuses on the relationship between the determinants and the indicators of the hidden economy. Using the 'unobserved' variable estimation procedure the relative size and development over time of the hidden economies of the OECD countries are derived.

Our theoretical and empirical analysis suggests that there are a *number* of relevant *determinants* of the hidden economy, besides taxation also the burden of regulation and tax morality. It also suggests that the existence of the hidden economy leaves a *number* of *traces*.

According to our quantitative estimates, at the end of the 70's the hidden economy is particularly large (compared to other OECD countries) in Scandinavia and the Benelux countries, while it is expected to be particularly small in Switzerland and Japan. The United States take a middle position. As a general tendency, the size of all hidden sectors has increased in the period 1960–1978 relative to officially measured GNP. In Denmark, Belgium and Italy the growth is expected to have been above average, while in

Canada, the United Kingdom and the United States it has been below average.

An important shortcoming of our study is the weakness of the data at our disposition. This applies especially to tax morality and to regulation. There are also determinants of the hidden economy, in particular the perceived expected risk of being punished while being active in the illegal sector, for which cross-national data are not at all available at present.

Future research on the hidden economy should, in order to be useful, not exclusively concentrate on the tax burden as a determinant of the hidden economy, but should, in particular, endeavour to study the impact of the burden of regulations, to measure 'tax morality' more adequately, and to enquire into the impact of efforts to control the hidden economy on the behavior of the individuals. Once the appropriate data are known, the 'unobserved' variable model may again prove useful to evaluate the size and development of the hidden economy.

Appendix on next page.

Table A.1^a

Country		Burden of taxation:														
		share of direct taxes in GDP, in %					share of indirect taxes in GDP, in %					share of social security contributions in GDP, in %				
		1960	1965	1970	1975	1978	1960	1965	1970	1975	1978	1960	1965	1970	1975	1978
Austria	A	10.1	12.1	10.9	13.1	11.0	14.2	15.3	15.9	16.8	16.0	6.0	7.7	8.8	9.2	9.7
Belgium	B	7.6	8.7	11.0	16.3	18.2	11.5	12.1	12.9	11.3	12.0	7.1	9.2	10.3	12.5	12.4
Canada	CAN	9.6	10.5	14.2	16.0	14.2	12.7	14.5	14.0	12.9	12.3	1.8	1.9	2.9	3.5	3.7
Denmark	DK	11.7	13.4	20.4	26.0	23.8	12.2	13.9	17.1	16.1	16.2	1.5	1.8	1.8	0.7	0.5
Finland	SF	11.4	12.4	13.7	17.7	15.7	13.9	13.6	13.7	13.1	14.6	2.5	3.5	4.3	5.9	6.0
France	F	6.1	6.4	7.2	7.3	7.9	16.1	16.7	15.2	14.1	14.1	11.2	13.8	12.9	15.4	16.5
Germany	FRG	9.3	10.2	10.7	12.0	13.1	14.3	14.1	12.8	12.3	12.8	9.6	9.7	10.9	13.5	14.0
Ireland	IRL	4.7	6.6	9.0	10.4	11.6	16.4	17.4	19.4	17.1	17.4 ^b	1.1	1.7	4.3	6.8	6.7 ^b
Italy	I	5.5	6.6	5.4	7.4	10.2	12.8	12.3	11.1	9.9	10.1	8.7	10.1	10.7	14.2	12.5
Japan	JAP	7.1	7.8	8.1	9.8	9.1	9.0	7.5	7.1	6.7	6.6	2.6	3.4	4.3	5.3	6.9
Netherlands	NL	12.3	12.8	13.8	16.5	16.1	9.9	10.0	11.4	11.3	12.7	8.0	11.2	14.7	18.4	18.2
Norway	N	12.2	13.0	13.3	16.1	18.0	14.4	14.9	18.3	17.9	17.7	5.5	6.7	9.6	13.4	13.2
Spain	SP	4.8	4.2	3.5	4.3	5.5	8.3	8.2	7.9	7.0	6.7 ^b	3.4	3.8	6.6	9.4	11.0 ^b
Sweden	S	14.9	18.9	20.5	22.5	24.0	10.1	12.6	12.9	14.3	14.7	3.6	5.8	7.7	9.0	14.3
Switzerland	CH	8.7	9.8	11.1	14.4	14.6	7.1	7.8	7.1	6.5	7.1	4.6	5.2	5.6	8.4	9.4
U. Kingdom	UK	11.0	11.0	15.6	17.0	14.5	13.0	14.2	16.1	13.3	14.0	3.5	4.8	5.3	6.6	6.2
U. States	USA	14.3	13.7	14.0	13.0	14.9	9.1	9.3	9.6	9.1	8.4	4.1	4.3	6.0	7.2	7.8

^aSource: OECD, *National Accounts Statistics*, various years.

^bInterpolated.

^cCalculated on the basis of general participation rates.

^dPayed working hours.

^eCalculated from working hours per day.

^fCalculated from working hours of male and female employees.

^gCalculated from working hours per month.

¹1957 ²1961 ³1962 ⁴1964 ⁵1966 ⁶1971 ⁷1973 ⁸1977 ⁹Average for 1951, 1951-1960 ¹⁰Average for 1956-1960 ¹¹Average for 1954-1960 ¹²Average for 1953-1960 ¹³1960 ¹⁴Average for 1960-1965 ¹⁵Average for 1965-1970.

Table A.2^a

Country	Tax perception: change of the direct tax share over a five year period (percentage points)					Burden of regulation: share of public employees in total employment, in %					Tax immorality: index				
	1955	1960	1965	1970	1973	1960	1965	1970	1975	1978	1960	1965	1970	1975	1978
	-60	-65	-70	-75	-78										
A	0.0	1.0	-1.2	2.2	-0.5	10.5	11.8	14.0	16.6	17.9	5.5	6.7	9.0	10.6	10.9
B	0.4	1.1	2.3	5.3	4.9	11.8	13.0	13.6	14.6	15.8	7.1	8.6	11.6	13.7	14.0
CAN	0.2	0.9	3.7	1.8	-1.0	15.9 ¹	17.3 ⁵	18.7	19.0	18.3	3.8	4.7	6.3	7.4	7.6
DK	0.4	1.7	7.0	5.6	0.0	9.9	13.1 ⁵	16.8	22.1	22.8 ⁸	2.2	2.7	3.6	4.2	4.4
SF	0.1	1.0	1.3	4.0	0.6	7.9	9.9	11.8	14.7	16.9	2.2	2.7	3.6	4.2	4.4
F	1.3	0.3	0.8	0.1	0.9	12.1	11.5	12.2	13.3	13.6	8.7	10.6	14.3	16.9	17.3
FRG	0.1	0.9	0.5	1.3	-0.4	7.9	9.7	11.1	13.3	13.9	5.5	6.7	9.0	10.6	10.9
IRL	0.8	1.9	2.4	1.4	2.0	9.1 ¹	10.6	12.5 ⁶	14.5	15.3 ⁸	3.8	4.7	6.3	7.4	7.6
I	0.8	1.1	-1.2	2.0	4.2	7.8	9.4	10.6	13.0	13.2	10.4	12.6	17.0	20.1	20.6
JAP	0.1	0.7	0.3	1.7	-0.4	6.7	6.2	5.7	6.4	6.3	3.8	4.7	6.3	7.4	7.6
NL	1.3	0.5	1.0	2.7	0.7	11.6	11.4	12.0	12.9	13.9	5.5	6.7	9.0	10.6	10.9
N	0.6	0.8	0.3	2.8	2.5	12.5 ³	13.7	16.2	18.9	20.1	2.2	2.7	3.6	4.2	4.4
SP	0.2	-0.6	-0.7	0.8	1.6	6.9 ²	6.5	7.0	9.5	11.3	7.1	8.6	11.6	13.7	14.0
S	-1.6	4.0	1.6	2.0	5.4	12.6	15.1	20.3	25.0	28.2	2.2	2.7	3.6	4.1	4.4
CH	0.9	1.1	1.3	3.3	2.3	6.3	6.7	7.9	9.4	10.1	0.6	0.7	1.0	1.2	1.2
UK	-0.8	0.0	4.6	1.4	0.9	14.7	15.5	17.6	20.3	20.1	2.2	2.7	3.6	4.2	4.4
USA	0.3	-0.6	0.3	-1.0	1.0	14.9	16.0	17.1	16.5	15.7	3.8	4.7	6.3	7.4	7.6

^aSources: Tax perception: OECD, *National Accounts Statistics*, various years. Burden of regulation: Martin (1982) and OECD, *Labour Force Statistics*, various years. Tax immorality: Tretter (1974), and see text. For footnotes b-g and 1-15, see table A.1.

Table A.3^a

Country	Level of development: disposable per capita income of the population, constant prices and exchange rates of 1975, in 1000 U.S. dollars					Rate of unemployment: share of unemployed persons in the work force, in % (ten-year averages)				
	1960	1965	1970	1975	1978	1951-60	1956-65	1961-70	1966-75	1969-78
A	2,488	2,828	3,669	4,338	4,787 ^b	3.2 ⁹	2.7	1.8	1.6	1.5
B	3,220	3,995	4,927	5,764	6,305	3.9	2.5	2.1	2.4	3.7
CAN	3,689	4,453	5,212	6,315	6,784	4.5	5.4	5.6	5.3	6.3
DK	4,041	4,991	6,326	6,803	7,421	4.0 ¹⁰	2.8	1.1 ¹⁵	1.7	2.8
SF	2,640	3,329	4,224	5,057	5,072	1.2	1.6 ^b	2.0	2.4	3.3
F	3,168	3,959	4,935	5,677	6,302	3.8 ¹¹	1.1	1.5	2.4	3.4
FRG	3,939	4,630	5,527	5,901	6,689	5.7 ⁹	1.5	0.8	1.4	3.1
IRL	1,559	1,823	2,210	2,528	2,683 ^b	7.4 ⁹	5.6	5.0	5.8	7.0
I	1,772	2,198	2,876	3,014	3,292	7.0 ¹¹	4.5	3.2	3.4	6.1
JAP	1,336	1,956	3,305	3,892	4,416	1.5 ¹²	1.2	1.4	1.3	1.8
NL	3,418	4,053	4,991	5,421	5,918	1.9	1.2	1.1	2.1	3.0
N	3,878 ²	4,342	4,981	5,952	6,394	1.0	1.1	0.9	1.3	1.5
SP	1,104	1,858	2,181	2,693	2,803	0.9 ¹⁰	1.0	1.5	2.4	3.7
S	4,840	6,053	7,075	7,500	7,373	1.8 ¹³	1.6 ¹⁴	1.4	2.1	2.0
CH	5,559	6,385	7,497	7,718	7,973	0.2 ¹³	0.0	0.0	0.0	0.2
UK	2,758	3,105	3,414	3,641	3,892	1.2	1.4	1.6	2.3	3.4
USA	4,564	5,414	5,904	6,265	7,184	4.4	5.2	4.6	4.8	5.8

^aSources: Level of development: OECD, *National Accounts Statistics of OECD Countries 1950-1978, 1980*. Rate of unemployment: OECD, *Manpower Statistics* and OECD, *Labour Force Statistics*, various years. For footnote b-g and 1-15, see table A.1.

Table A.4^a

Country	Participation rate: share of male labor force in the total population aged 15-64, in %				Working time: effective weekly working hours of employees in metal industry, in hours				Growth of real GDP: difference of the yearly growth rate of real GDP to the OECD-average (17 countries) in %						
	1960	1965	1970	1975	1978	1960	1965	1970	1975	1978	1960	1965	1970	1975	1978
A	95.5	94.6	85.7	82.5	82.2	43.5 ^d	43.4 ^d	37.4	33.9 ^d	33.4	1.9	-1.6	1.7	-1.3	-2.1
B	88.5	88.2	86.0	83.9	81.3	41.4 ²	40.8	39.9	34.8	35.2	-0.9	-0.8	0.9	-1.4	0.0
CAN	91.9	89.0	85.7	86.2	85.8	40.4 ^d	41.0 ^d	39.7 ^d	38.6 ^d	38.8 ^d	-3.5	2.3	-2.8	1.5	0.5
DK	99.5	96.8	91.8	89.8	91.5	40.2 ³	38.2 ^b	36.2	32.9	38.5	-0.4	0.1	-2.8	-0.2	-1.8
SF	91.1	88.2	83.1	79.7	78.0	44.4	44.0	38.3	38.4	41.0	3.6	0.8	2.5	1.0	-0.8
F	92.6	90.0 ⁴	88.8 ^e	84.1	80.9	45.5	45.6	44.8	41.7	41.0	0.9	0.3	0.3	0.6	0.5
FRG	94.9	94.2	92.5	85.7	83.2	45.6 ^d	44.1	43.8	40.4	41.6	2.6	1.1	0.6	-1.4	0.2
IRL	99.3 ²	98.7	96.5	93.1 ⁷	90.9 ^e	45.4	44.0	42.7	41.3	42.4	-0.7	-2.5	-1.9	2.6	3.2
I	93.3	87.3	86.0	83.5	82.2	43.7 ^e	42.6 ^e	42.0 ^e	41.6 ^e	41.5 ^e	0.0	-1.2	-0.1	-3.2	-0.5
JAP	92.2	88.6	89.4	89.7	89.2	47.8	44.3	43.3	38.8	40.6	7.6	0.6	6.3	1.8	2.8
NL	97.8 ¹	91.9 ⁴	87.1 ^s	83.8 ^e	82.2 ^e	48.8	45.9	44.2	41.2	41.1	2.7	0.7	1.3	-0.6	-0.6
N	92.2	89.9	89.0	85.9	87.7	41.8 ^f	37.1 ^f	34.2 ^f	32.1 ^f	30.1 ^f	-1.6	0.8	-3.4	5.9	0.2
SP	99.8	98.3	96.7	91.6	85.3	43.5	44.4	44.1	42.7	41.6	-3.9	1.8	-1.3	1.5	-0.4
S	93.1 ³	91.3	88.8	89.2	87.7	37.9 ^{6a}	36.5 ^h	34.3 ^h	31.3 ^h	30.0 ^{8a}	-2.5	-0.4	-0.1	1.2	-0.3
CH	101.3	100.0 ^e	100.5	97.2	93.8	46.1	44.8	44.7 ^d	43.2 ^d	44.4 ^d	0.7	-1.3	1.0	-6.9	-2.8
UK	99.1	96.8	94.2	91.7	91.2	47.4	44.3 ^f	43.1 ^f	41.2 ^f	41.9 ^f	-1.6	-2.2	-3.2	-0.4	0.5
USA	91.7	88.6	87.1	85.3	85.5	39.7 ^d	41.2 ^d	39.8 ^d	39.4 ^d	40.4 ^d	-4.2	1.5	-5.5	-0.6	1.3

^aSources: Participation rate: OECD, *Manpower Statistics* and OECD, *Labor Force Statistics*. Working time: ILO, *Yearbook of Labour Statistics*, various years. Growth of real GDP: OECD, *National Accounts Statistics*, various years. For footnotes b-g and 1-15, see table A.1.

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