

# Tax Financing and the Shadow Economy\*

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## I. The Burden of Taxation and Existing Research on the Shadow Economy

Over the last twenty years, the burden of taxation in all industrial countries has greatly increased. The rising burden of taxation is commonly taken to be one of the dominant reasons for the existence and growth of the shadow or underground economy. The shadow economy may be defined as that part of income creating (value adding) economic activities which is presently not included in official statistics.<sup>1</sup>

Up to now, economists' research on the shadow economy has concentrated almost exclusively on measuring the size of this sector in the economy. In view of the importance attached to taxes as the cause of the shadow economy, it is surprising to note that (with one exception) the measurement approaches used so far completely disregard this determinant.<sup>2</sup> The purpose of this paper is to show that it is indeed useful to explicitly consider the role of taxation when the size of the shadow economy is evaluated. However, it will also be argued that it is not sufficient to consider only taxation and to disregard other possible causal influences, since this may result in a serious misspecification and distortion of the estimates.

Part II of this paper reviews the role of taxation in current measurement approaches. In part III the *multiple* causes leading to a shadow economy are discussed, and the method of "soft modelling" used in order to derive an estimate of the size and the development of the shadow economy, for example in the Federal Republic of Germany, is described. Part IV

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considers both multiple determinants and multiple effects (indicators) of the shadow economy which makes it possible to *test* the influence of taxation on the shadow economy econometrically. Part V offers concluding remarks.

## II. The Role of Taxes in Current Measurement Approaches

There is only one approach in the literature, the (sophisticated) currency demand approach, which explicitly considers the causal effect of taxation on the size and development of the shadow economy. The currency demand approach assumes that all "black market" transactions are done in cash. This assumption does not seem to be unfounded; a survey undertaken in Norway by Isachsen, Klovland and Strøm (1982, p. 220) finds that about 80% of all shadow sector payments are indeed in cash. The *simplistic* currency demand approach further assumes that the "normal" currency-demand deposit ratio in the official economy is constant over time, so that all increases in the C/D-ratio can be attributed to the growth of the shadow economy (Gutmann, 1977, 1979).

However, the currency-demand deposit ratio (or any similar ratio of currency to the monetary magnitude such as  $M_2$ ) does not only depend on the growth of cash transactions in the "black" sector, but is also influenced by a great many other factors, such as the rate of interest, the level of income, the rate of inflation etc. The *sophisticated* currency demand approach evaluates what increase in currency demand is due to an increase in the rate of taxation, keeping all other influences constant. A full-scale currency demand equation is estimated, taking the general form

$$\frac{C}{M} = f(i, Y, \dots, \tau),$$

where  $\frac{C}{M}$  = currency relative to some money magnitude;  
 $i$  = interest rate;  
 $Y$  = (per capita) income;  
 $\tau$  = tax burden.

(The points indicate that there may be other factors influencing the demand for cash which are not further considered). The size and development of the shadow economy is evaluated by considering the partial effect of taxation on the demand for cash,  $\partial(M/C)/\partial\tau$ . Most authors compare the "excess" currency demand brought about by the increase of the tax rate over its lowest level in the period considered (e.g. Tanzi 1980, Klovland 1980).

Having no independent knowledge about the (relative) velocity of currency, it is assumed that it is the same in the shadow as it is in the official economy.

The (sophisticated) currency demand approach is based on various crucial assumptions. It is in particular very sensitive to the choice of the velocity of the circulation of cash in the shadow economy, about which little or nothing is presently known. What matters most in the context of our study is the implicit assumption that the size of, and increase in, the shadow economy depends exclusively on the increase of taxes. If there are other causes inducing people and firms to become active in the shadow economy, the approach involves a serious misspecification: the influence of the burden of taxes is incorrectly measured, and what is measured is not the total size of the shadow economy, but instead that part of it which is due to taxation.

### **III. Taxes and other determinants of the shadow economy**

The burden of taxation is not the only factor which causes individuals and firms to become active in the shadow economy. Considering the decision process on the micro level we may distinguish the following set of incentives (or disincentives) to move to the shadow economy:

(a) *The higher cost of working in the official economy.* Besides taxes, the increasing amount and intensity of government regulations are an important reason to switch to the shadow sector. In many countries it has, for example, become difficult, if not impossible, to dismiss workers once they are hired. In order to adjust to the varying demand conditions, many firms therefore resort to the "black" labour market, where they are able to hire people just for the period they need them. Recently, a great many regulations have been introduced with respect to health, safety, and environmental standards which a job or production process must meet. Though such regulations may be beneficial to the society as a whole, both individual workers and producers often find it advantageous not to keep to the rules—which means that they have to enter the shadow economy.

(b) *The legal and moral cost of working in the shadow economy.* To be active in the "black economy" is generally illegal. Individuals and firms therefore have to consider the probability of being detected and punished. The more extensive and effective the controls, and the higher the punishments, the larger is the expected cost of being in the shadow economy. This factor works as a disincentive to leave the official economy. Undertaking an illegal activity also imposes a moral burden in addition to ex-

pected punishment. There is a barrier to "black" market work even if the legal sanctions are considered to be negligible. The readiness to commit an illegal act by being active in the shadow economy depends on the population's attitude towards the government. If the government is considered to be an oppressive and alien entity not caring for the welfare of its citizens, people will have fewer moral qualms to violate the law and to cheat on taxes. If, on the other hand, the state's activities are mainly seen as being in the interest of the citizens, and if the subjects are satisfied with the exchanges between the taxes they pay and the benefits in terms of goods and transfers they get, they will incur higher moral costs when moving into the shadow economy.

(c) *The opportunity cost of time.* The longer the official *working time* per week (or year), the higher the opportunity costs of additionally working in the shadow sector are. (In most countries, one usually keeps one's job in the official sector in order to remain within the social security system and to make detection more difficult for the tax authorities). A decrease in official working hours on the other hand enlarges the capacity to enjoy both more leisure time *and* to work in the shadow sector.

In some countries, especially in Italy<sup>3</sup>, some "black" workers leave the official sector completely. We therefore expect that a decrease in the official (age-specific) participation rate indicates an increased participation in the shadow economy.

(d) *Structural influences.* The factors outlined which give an incentive to work in the shadow economy do not work with the same intensity for all individuals and firms. There are economic sectors (in particular those with low capital intensity and changing location such as construction), occupations (e.g. craftsmen), types of goods (in particular services), types of workers (in particular foreign "gastarbeiter"), which are more likely than others to be involved in the shadow economy. It is useful to identify such activities, because participation in the "black" sector may increase even with the cost factors (a), (b), (c) staying constant, if their share in total (official) employment and value added increases (structural effect).

We have now identified seven determinants of the shadow economy, namely: the burden of taxation; the burden of regulation; the expected legal punishment; the moral cost of working illegally; the length of the working day; the age specific sex participation rates, and structural influences. Normally, one would regress these determinants  $D$  on the size of the shadow economy,  $S$ . In the simplest case of linear multiple regression, we would have

$$S_j = \sum_{i=1}^n \hat{\alpha}_i \cdot D_{ij} + \epsilon_j,$$

the  $\hat{\alpha}_i$  representing the coefficients estimated on the basis of time-series or cross-section data.

Such an approach is, of course, not possible here, because it is the dependent variable  $S_j$  whose size is to be determined. Unlike in regression analysis, given the determinants  $D_{ij}$ , the coefficients  $\alpha_i$  have to be determined on the basis of outside knowledge, in order to derive the size of the shadow economy  $S_j$  (at a given moment of time  $j=t$ , or between regional units  $j=r$ ). As the determinants indicate the various factors increasing the incentive to become active in the shadow economy, it is useful to interpret the coefficients  $\alpha_i$  as weights, satisfying the conditions  $0 \leq \alpha_i \leq 1$ ,  $\sum \alpha_i = 1$ .

The size of the weights  $\alpha_i$  of the various determinants is not exactly known, but the scientific as well as the popular literature on the shadow economy gives some indication about their relative size. Using this information makes it possible to employ the "soft modelling" approach which has recently been developed (see Kofler and Menges 1976) to facilitate decision making when only the ranking, but not the probabilities of the underlying variables are known.

### *Empirical Application*

The determinants of the shadow economy discussed, and the sketched "soft modelling" technique, have been empirically analyzed for various purposes. A *cross-section* study of 17 OECD countries has been done, establishing the expected relative size, and the expected relative increase in size of the shadow economy between 1960 and 1978 (Frey and Weck 1983a, 1983b)<sup>4</sup>. A *time-series* study for the Federal Republic of Germany has been made for the period 1960–1978 (Frey, Weck and Pommerehne 1982). It reaches the conclusion that the incentives for joining the shadow economy have noticeably increased over this period, and that one can therefore safely expect that the income produced in the shadow economy has grown as compared to the official GNP.

The "determinants" approach sketched emphasizes that there are a number of causes motivating individuals and firms to take up work in the shadow economy, over and besides taxation. The approach does not, however, allow one to test this hypothesis econometrically, because the size of the shadow economy is unknown. In order to be able to use econometric estimation, it is necessary to approximate the size of the shadow sector by several *indicators*, and then to relate the determinants to these indicators by way of the "unobserved variable" method. This approach is discussed in the following section.

#### IV. Testing the Influence of Taxation on the Shadow Economy

In the ordinary regression analysis there is only one indicator for the dependent variable, and the various determinants can be regressed on this indicator. In our case, as the shadow sector size cannot be observed, we have to take more than one indicator into account ( $k > 1$ ), and a more sophisticated estimation procedure is in order. The "unobserved variables" method, which is an extension of factor analysis, may be used for this purpose<sup>5</sup>, the size of the shadow economy being the unobserved variable.

Indicators for the size of the shadow economy may be observed in three different areas:

(a) *Value added.* As an increase in the shadow economy involves a relative outflow of resources from the official economy, official GNP is lower than it would be if no shadow economy existed. Real GNP, or its rate of growth, compared to its "normal" size or trend, is thus an indicator of the shadow economy's growth.

(b) *Labour.* One may concentrate on one, and the most important, factor of production (at least in the "black" sector), labour. A decrease in official labour supply in terms of hours worked and persons is an indicator of the size of the shadow economy.<sup>6</sup>

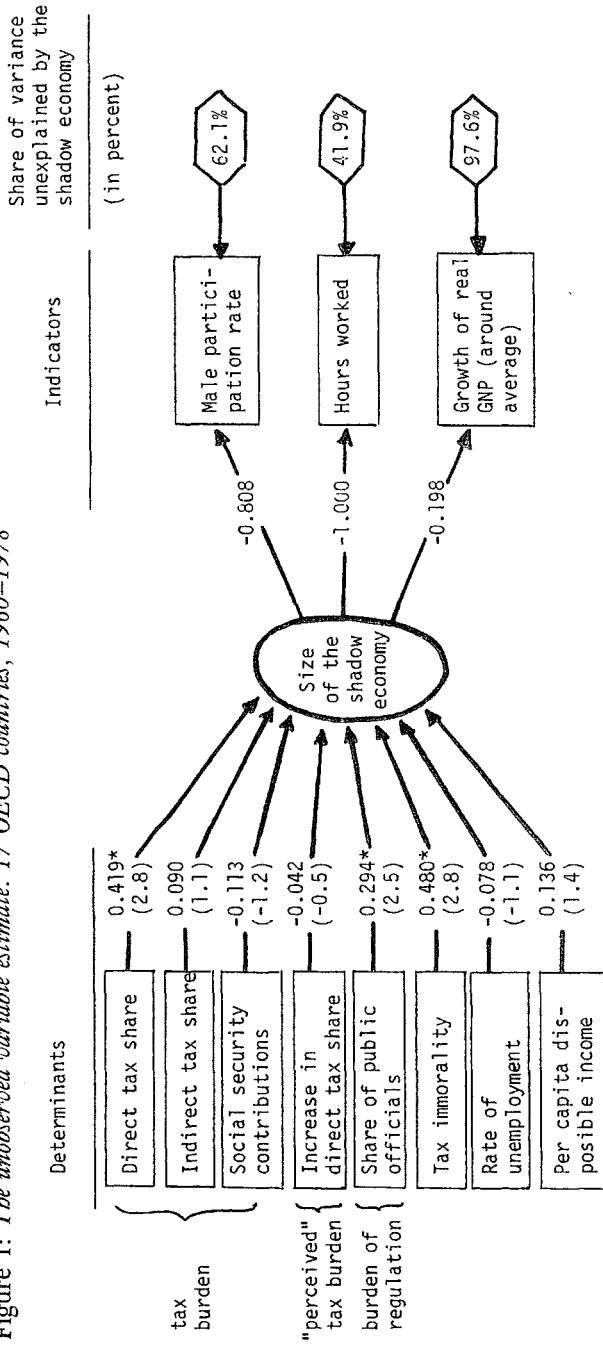
(c) *Money.* As suggested by the monetary approaches (see the discussion in section II and Feige (1979)), the size of total money or of currency supply may serve as an indicator of the size of the shadow economy.

##### *Empirical Application*

The "unobserved variables" approach has been used to estimate the relative size of the shadow economy in 17 OECD countries over the period 1960–1978 in a pooled cross-section time series analysis. The estimation model and the estimated parameters are shown in figure 1.

The determinants of the size of the shadow economy comprise eight variables: The impact of taxation (tax burden) is captured by the share of direct taxes, of indirect taxes, and of social security contributions in GNP. Taking into account that individuals react to perceived rather than actual taxes, the increase of the (direct) tax burden is included among the determinants on the assumption that people get used to levels of taxation and note increases on the tax share more fully. The share of public officials in total employment is taken to represent the (unknown) burden of regulations. The moral cost of working illegally is captured by an index of "tax morality" based on survey research in public finance<sup>7</sup>. In order to have an increase of this index "push" for a larger shadow economy, this variable is introduced in the form of "tax immorality". The final two variables are designed to

Figure 1: *The unobserved variable estimate. 17 OECD countries, 1960-1978*



(The figures in parentheses below the parameter estimates indicate the t-values; an asterisk indicates statistical significance at the 99%-level).

pick up structural variables: as is often argued, unemployed persons have a higher propensity to work clandestinely. Per capita disposable income is designed to allow for the idea that workers in poor countries have a higher "need" to supplement their official income in the "black" sector.

The empirical study for the pooled analysis of OECD countries results in three of the determinants having a statistically significant influence, only: Direct taxes (parameter value 0.42), regulation (0.29), and tax immorality (0.48). These parameters have the theoretically expected positive sign. It is interesting to note that an increase in the share of indirect taxes does not tend to increase the size of the shadow economy, possibly because it is not fully noticed by the population. The same is true for social security contributions, in this case the reason being that they are conceived as "prices" for which one "buys" a particular service. The variable with which "tax perception" is measured may well be so inadequate as to explain the insignificance of the respective parameter. The same may be true for the two structural determinants.

The result of estimating the influence of the various determinants thus suggests that taxation is indeed an important cause of the existence and rise of the shadow economy, but that is not the only one. Tax morality may be even more important. The incentive to leave the official economy due to overly tight regulations is a third crucial cause.

The methodology of the "unobserved variable" estimate requires that the coefficient of one of the determinants is normalized. In figure 1, the effect on the hours worked is taken to be  $-1$ . By comparison, the effect on the rate of participation (of males) is smaller (the coefficient is  $-0.8$ ), and the effect on the rate of growth of real official GNP is even smaller ( $-0.2$ ). (Due to the basic differences in the monetary arrangements among countries, no indicators appearing in the money market have been considered in this pooled cross-section time-series estimate). The figures at the right-hand side of the table show the share of variance of the respective indicators not explained by the size of the shadow economy. As may be seen, this share varies between 42% and 98%.

The size of the shadow economy  $S$  in one country relative to that in each of the other countries can be calculated by considering the statistically significant determinants shown in figure 1. The coefficients of the share of direct taxes,  $\tau_d$  (0.42), of regulation  $R$  (0.29) and of tax immorality  $IM$  (0.48) are normalized to add up to one in order to be interpretable as weights. This yields the equation

$$S = 0.35\tau_d + 0.25R + 0.40 IM,$$

with all variables measured in terms of  $z$ -values. Figure 2 shows the resulting *ranking* of the size of the shadow economy (conceived as share of official GNP) of 17 OECD countries for the final year of our study.



Figure 2: The relative size of the shadow economy in 1978. 17 OECD countries.

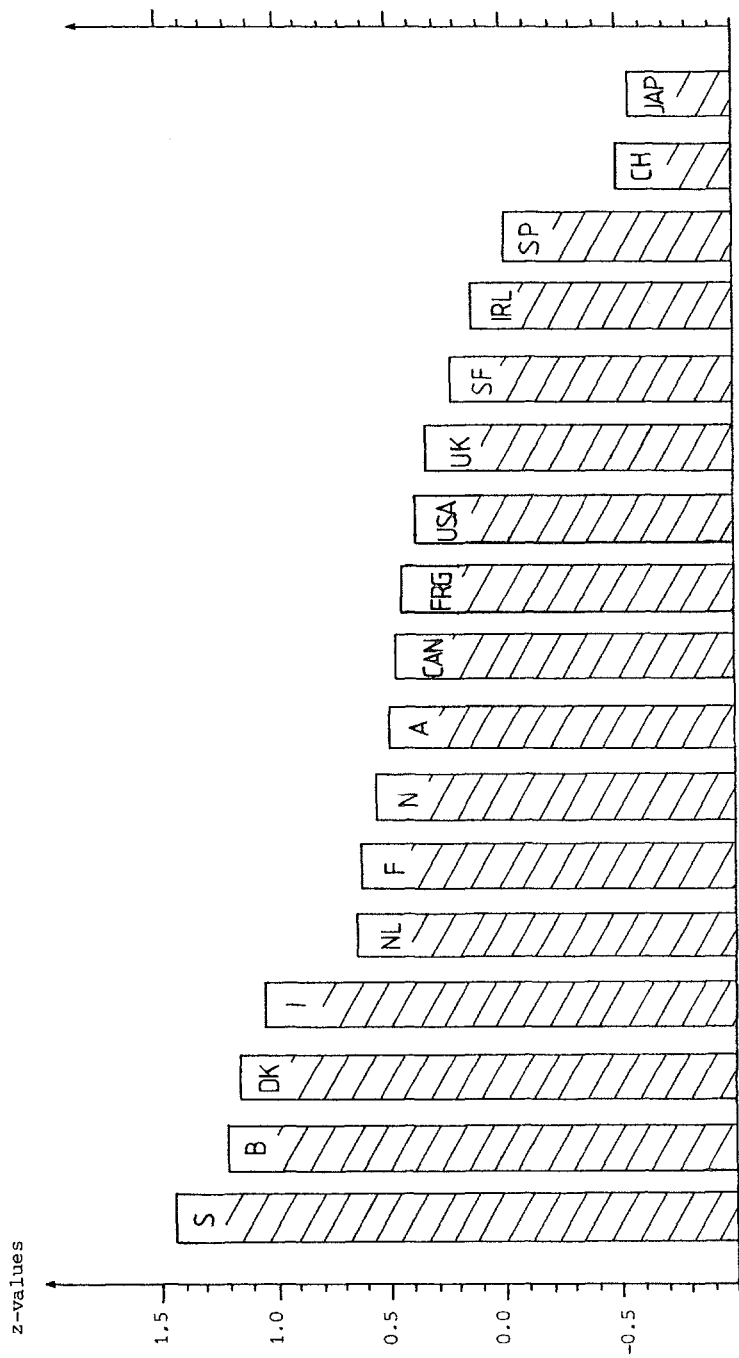


Table 1

The size of the shadow economy as percent of GNP. 17 OECD countries, 1960 and 1978.		
	1960	1978
Sweden	5.4	13.2 (base)
Belgium	4.7	12.1
Denmark	3.7	11.8
Italy	4.4	11.4
Netherlands	5.6	9.6
France	5.0	9.4
Norway	4.4	9.2 (base)
Austria	4.6	8.9
Canada	5.1	8.7
Germany (F.R.)	3.7	8.6
United States	6.4	8.3
United Kingdom	4.6	8.0
Finland	3.1	7.6
Ireland	1.7	7.2
Spain	2.6	6.5
Switzerland	1.1	4.3
Japan	2.0	4.1

The Scandinavian countries (except Finland) turn out to be on top, together with the Benelux countries and Italy. A comparatively small shadow sector is attributed to Japan and Switzerland, Ireland and Spain. The Anglo-Saxon countries (U.S. and U.K.), and the German speaking countries (Austria and the F.R.G.), are calculated to have below average size shadow economies, a result which strongly conflicts with some of the (fantastic) estimates which have been put forward particularly for the United States<sup>8</sup>.

The relative measures (rankings) of the size of the shadow economy shown in figure 2 may be transformed into absolute measures (shares of official GNP) if two points are fixed (to determine the level and the distances of one country's shadow economy from the next). For that purpose, the currency demand estimates undertaken by Klovland (1980) for Sweden (13.2% of official GNP) and Norway (9.2%) for the year 1978 are used. Table 1 shows the resulting estimates for the beginning and the final year of our study.

According to table 1, the shadow economy occupies in all countries an increasing share of total economic activity. In some countries such as Sweden, Belgium, Denmark, Italy and Ireland, the share in official GNP has increased more than 5 percentage points while in Japan the rise is only 2 percentage points. The increase is also relatively small for the United States which is mainly due to the small increase in direct taxes.

## **V. Policy Relevance and Future Research**

The estimates presented are preliminary; they are subject to various shortcomings, three of which will be mentioned here. The first is the weak data base especially with respect to internationally comparable figures. As has been pointed out, there is (to our knowledge) no internationally comparable data available on the extent of controls. Our figures capturing the extent of regulation and of the moral cost of illegal work are also quite weak. The second shortcoming is the estimation method employed, which is not robust with respect to alternative specifications, though it certainly employs a measurement approach which is in principle well suited to the problem at hand. The third shortcoming is the weak theoretical basis of the model. The micro-economic, i.e. the behavioral base of the model must quite clearly be improved. Also, the concepts such as "moral cost of working illegally" or of "tax morality" must be put into a rigorous framework. What matters even more, is that important links of interdependence are neglected by our (and all other) approaches. As is shown in figure 3, it should be taken into account that the government (as well as other institutional decision makers) may react to changes in the size of the shadow economy, as reflected by the indicators.

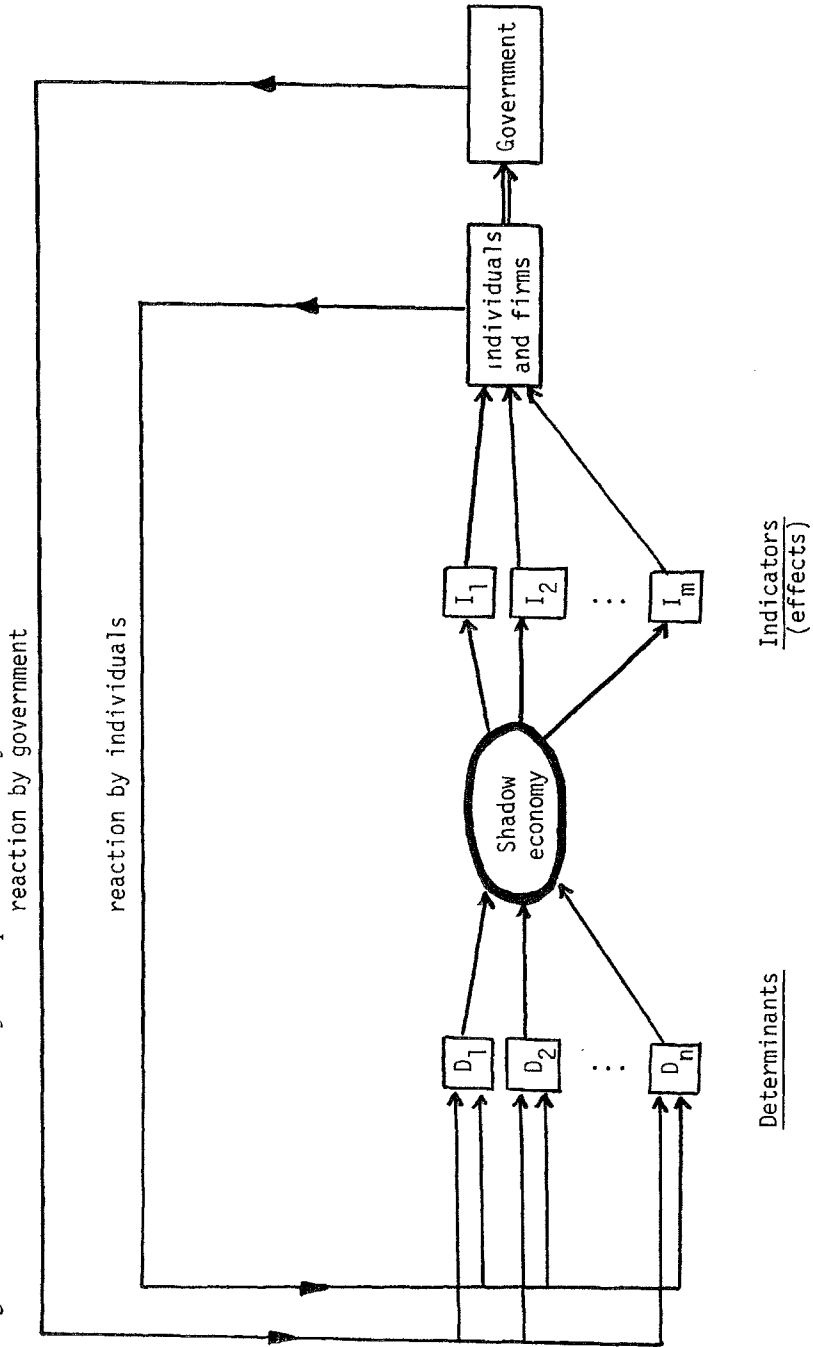
Two possible reactions of the government should in particular be explicitly modelled: when the government observes that the shadow economy increases and that its tax revenue is thereby reduced (compared to a situation with no shadow sector) it may well decide to raise tax rates in order to make up for the loss. Such a policy would, of course, raise the incentive to leave the official economy. Alternatively, or in addition, the government may decide to intensify the controls.

Another feedback which may be of importance is transmitted through the taxpayers: when they observe an increase in the shadow economy, this may reduce or even destroy their tax morality; the intrinsic motivation to contribute to financing the public goods offered by government is impaired.

There are many other such feedbacks which may and should be taken into account when modelling the shadow economy. It is in effect necessary to put the unofficial sector within the framework of a whole politico-economic system which explicitly models the political sector's reactions. To neglect this aspect means that the estimates may be seriously distorted, and that the policy conclusions drawn on the basis of the estimates may be mistaken.

Despite the shortcomings just discussed, the measurement approaches presented in this paper constitute an advance over the currently existing approaches, since they explicitly take into account the multiplicity of deter-

Figure 3: *The shadow economy in the politico-economic system.*



minants as well as of indicators. *Taxation* is indeed an important cause for the existence and rise of the shadow economy, but there are in addition other crucial causes, in particular regulation and tax morality, which should not be overlooked. This knowledge has important policy consequences. The studies considering the burden of taxation as the only cause are of little use for policy purposes. They implicitly suggest that there is only one way to influence the size of the shadow economy, i.e. by changing the tax rates. Our approach on the other hand points to several avenues through which the shadow economy can be influenced if so desired. It may well be that when taxes are reduced, the government and the public administration react by intensifying regulations. The effect on the individuals' and firms' incentives to work in the official economy may thereby be counterbalanced.

## Notes

1. See, for example, Macafee (1980), Smith (1981) and Feige (1982).
2. No survey of the methods is intended here, for that purpose consult, for example, Frey and Pommerehne (1982) or Pommerehne and Frey (1982).
3. See Fuà (1976), L. Frey (1978), Contini (1982).
4. These papers discuss extensively the way the determinants are quantitatively measured. It must suffice here to point out that some of the variables are extremely difficult to measure adequately for an inter-country comparison. No information at all is available for the intensity and effectiveness of controls. Quite weak evidence is available on the burden of regulation (it is approximated by the share of public officials in public administration, assuming that there is a fixed relationship between number of regulators and effects of regulations). The same applies to the moral burden of joining the shadow economy.
5. See the LISREL (*Linear Interdependent Structural Relationship*) procedure as developed by Jöreskog and Van Thillo (1973), which is in turn a generalization of the MIMIC (*Multiple Indicators Multiple Causes*) approach, see Jöreskog and Goldberger (1975).
6. It may be observed that the working time and the participation rate are now identified as indicators, while they were taken as determinants in section III. Indeed, both interpretations make sense, because both aspects are present. See the discussion in the concluding section.
7. For the derivation of the index, see Weck (1983).
8. Feige (1979) estimates the U.S. to have a shadow economy amounting to 33% of the official GNP (later revised to 27%; Feige 1982).

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## Résumé

Les analyses qui tentent actuellement d'évaluer l'ampleur de l'économie souterraine rejettent complètement le poids croissant de l'impôt comme une cause possible de l'existence et de l'accroissement de cette économie. Il y a une exception, les évaluations d'une analyse de la demande monétaire attribuent l'augmentation du secteur souterrain à l'accroissement des impôts, *ceteris paribus*.

Cet article soutient que le poids fiscal n'est pas le seul facteur qui

conduise les individus et les entreprises à participer activement à l'économie souterraine. Les autres facteurs déterminants peuvent être le poids de la réglementation, les sanctions légales encourues et le coût moral de travailler dans l'illégalité aussi bien que des influences structurelles. L'ampleur relative de l'économie souterraine peut être mesurée à l'aide de la méthode "des variables non observées" qui prend le taux de participation, le nombre d'heures travaillées et le taux de croissance du PNB réel comme des indices de l'économie souterraine. Les estimations comparatives des séries statistiques temporelles faites pour 17 pays de l'OCDE pour la période 1960-78 suggèrent que l'ampleur de l'économie souterraine dépend de la part de l'impôt direct dans le PNB, du poids de la réglementation (que l'on mesure par le nombre de fonctionnaires publics par rapport à l'emploi total) et du morale de payeurs d'impôt. L'analyse montre que la Suède, la Belgique, le Danemark et l'Italie ont les économies souterraines les plus importantes tandis que la Suisse et le Japon ont les plus petites.

On pourra améliorer l'estimation entreprise si l'on dispose dans le futur de meilleures données. On peut renforcer la base théorique en prenant en compte les réactions du gouvernement à l'importance de l'évolution de l'économie souterraine. Une telle extension requiert simultanément une procédure valable d'estimation de l'économie souterraine.