

Has the Shadow Economy Grown in Germany? An Exploratory Study

By

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I. The Problem

Interest in the shadow economy has recently been rapidly growing in the public, among politicians and social scientists. A convenient working definition of what constitutes the shadow economy¹ is: That part of economic activity which contributes to value added and which should be included in national income according to national accounting conventions, but which is presently not registered by the societal measurement agencies². This definition involves three important aspects:

- (a) Only value added (in the national income sense) is considered. Thus “black” financial transactions are excluded and only the income creating part of the turnover in “black markets” is included.
- (b) Economic activities such as work by housewives and housemen within their own household or work in the “voluntary” or “third” sector are not included because national income statisticians have made the convention to exclude them³.
- (c) The size of the shadow economy depends on the state of the official societal measurement apparatus in each particular country. There are

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¹ It is also called hidden, underground, subterranean, submerged, clandestine, or irregular economy. In Italy the corresponding work is known as “lavoro nero”, in France as “travail au noir”, in Germany as “Schwarzarbeit”.

² For similar definitions see e.g. Macafee [1980], Smith [1981], Feige [1982], and Isachsen *et al.* [1982].

³ Its size has been estimated as “total income” for various countries, see e.g. Kendrick [1979] and Hill [1979]. For a theoretical analysis see Weisbrod [1977], Gershuny [1979], and Badelt [1980].

some countries, especially Italy, which try to account for some underground activities in the *official* national income estimates, while other countries — among them the Federal Republic of Germany — do not [see Blades, 1982].

An attempt at defining the shadow economy in legal terms runs the risk of failing to include a significant share of what is generally understood as “shadow” economy: Only a relatively small part of shadow activities is forbidden as such (e. g. production of heroin); in most cases the activity itself is legal but government regulations are not observed (e. g. in the case of “black” production of consumer goods) and taxes are evaded. In many cases, shadow activities are not even prohibited by law if they can be declared as “neighbourly help”. In the Federal Republic of Germany, “black work” cannot be punished as long as it cannot be proved that it is undertaken on a “considerable scale” with the “sole goal of making a profit”¹.

An attempt at defining the shadow sector as that part of the economy which people enter in order to evade taxation [e. g. Tanzi, 1981] certainly pinpoints an important cause. However, as will be argued in this paper, there are several *other important factors* contributing to a shadow economy so that a definition looking at tax evasion only seems too narrow.

At the present stage of the scientific analysis of the shadow economy² an important question to ask is that of what size the shadow economy is, and even more important, of whether it has *grown significantly* over the last few years. The fact that the phenomenon is extensively discussed in the media nowadays is no proof of the shadow economy’s importance; it may well be that just the *awareness* has increased. If only the latter is the case, quite different courses of action can be advised than if the shadow economy is of ever increasing size. Once this empirical question is settled it also makes sense to think about the normative questions involved.

This paper presents and empirically applies a method to evaluate whether the shadow economy has been growing or decreasing since the 1960s in the Federal Republic of Germany. The method is based on exploring the *causes* which may be assumed to lead to a shadow economy. Our approach — though open to criticism — is motivated by the short-

¹ The legal definition of “black work” in the Federal Republic of Germany is to be found in the *Gesetz zur Bekämpfung der Schwarzarbeit* in the version of January 1, 1975 (Bundesgesetzblatt I, 1974, p. 1252) and reads as follows: “Schwarzarbeit liegt vor, wenn Dienst- oder Werkleistungen aus Gewinnsucht für andere in erheblichem Ausmaß erbracht werden”.

² For a survey see Frey and Pommerehne [1982], and for a collection of articles Tanzi [1982].

comings of the methods used so far in the literature. Another motivation for our kind of approach is the obvious and especially serious lack of statistical data on this area which makes it very difficult or even impossible to use the standard econometric apparatus. Our method can best be considered to be a kind of sensitivity analysis which tests the robustness of particular assumptions.

Section II identifies the incentives contributing to the existence of a shadow economy and shows their empirical development. Section III deduces therefrom the shadow economy's development in the period 1960—1978. We consider it plausible that the shadow economy has increased strongly, relative to measured GNP. In Section IV the results are compared with those of other attempts to estimate the West German shadow economy's temporal development. It is concluded (Section V) that one may assume that the German shadow economy has indeed been growing strongly over the 1960s and 1970s.

II. What Contributes to a Shadow Economy ?

According to the economic model of behaviour, individuals act as if they (at least implicitly) compare the benefits and costs of alternative actions. The incentive to become active in the shadow economy, or to step up such activities, will *ceteris paribus* be stronger

- (1) the higher the cost of working in the official sector is;
- (2) the lower the cost of working in the shadow sector is; and
- (3) the lower the psychological barriers are of switching from the official to the shadow sector.

These costs (which from the opposite point of view are of course benefits) and their development over time will be discussed subsequently.

1. The Increasing Cost of Working in the Official Sector

Taxes and governmental regulations are the two major components of such costs which burden individuals working officially.

a. Taxes

In many popular accounts as well as in most scientific studies on the subject, the high and rising burden of taxation is taken as the major and often as the only cause for the existence and growth of the shadow economy¹. There can be little doubt that a rising burden of taxation

¹ The measurement approaches e.g. by Tanzi [1980], Klovland [1980], Kirchgässner [1981], and Mirus and Smith [1981] use taxation as the sole cause.

ceteris paribus makes it more attractive to switch labour input from taxed to untaxed occupations.

An individual who thinks about switching from the official to the shadow economy will consider how much taxes he can save by so doing, i. e. he will implicitly calculate his (marginal) tax burden. In the case of general taxation not linked to specific expenditure items, he will tend to neglect the benefit side of the public budget, partly due to the classical public good effect. This applies particularly in the case of savings on income taxes. The indirect taxes, above all the turnover or value added taxes, are likely to be a relevant cause for working in the shadow economy in some countries. In the case of social security, the exchange relationship between contributions and benefits seems to be recognized more often. However, to a considerable extent it may still be perceived as a tax because the benefits are only partly related to the contributions.

In the Federal Republic of Germany, it is impossible to find data on the marginal tax system *as a whole*; it is available for the *average* total tax share only. The development of this percentage share of direct and indirect taxes and social security contributions in GDP is¹: 33.2 (1960), 33.7 (1965), 35.6 (1970), 39.1 (1975), 41.3 (1978). The tax burden has thus been increasing steadily since 1960².

b. Regulation

Another reason why individuals may decide to become active in the shadow sector are the restrictions imposed by the government. An international cross-section comparison [Frey, Weck, 1982] shows that it is very unplausible that taxation is the only (relevant) factor to be taken into account. Italy, for example, has a rather low share of taxes (including social security contributions) compared with all OECD countries, but there is an almost general consensus that Italy has a large shadow economy³. The regulations cover in particular the detailed specifications of the health, safety and environmental standards a job and a production process must meet, but also extend to a great many other areas. Though such regulations may be beneficial to the society or the economic sector concerned, an individual worker or producer may often find it advantageous

¹ The sources of the data used in the following are given in the Appendix.

² The marginal tax rates on gross *income* of a representative worker show a similar development, namely from 20 per cent (1960) to 35 per cent (1978) [see Kirchgässner, 1981].

³ Using one particular measurement approach (currency-deposit ratio), Saba [1980, p. 64] estimates it to be about 25 per cent in terms of GNP for 1976. Estimates based on an alternative approach (participation rate method) also come to 20 per cent in terms of GNP for the same year [see Alvaro, 1979; Forte, 1979; Martino, 1981; Contini, 1981b].

for himself not to keep to the rules. The cost of complying with the regulations in some instances does not consist in the direct burden imposed as such but rather in the time delay until a decision has been taken by the public administration concerned (e.g. until one is allowed to extend a building).

The cost of regulation on the economic activity in the official sector and therefore the incentive to switch to the unregulated shadow sector is difficult to measure. Attempts have been made to locate the cost of regulation by two different approaches:

- (a) A *direct* attempt is made to estimate the *effect* of regulations. At present, there are only some (preliminary) studies for the United States available¹. According to Weidenbaum [1979], the total cost of regulation amounted to 3.6 per cent of GNP in 1976 alone from (part of) U.S. federal regulations; another estimate which also included state regulations even arrived at a figure of 9.4 per cent of GNP for the same year [Downing, Lawson, 1979].

Another variant of the direct approach consists in a comparison of economic performance under substantially different levels of regulation, e.g. the less regulated Canadian railroads vs. the more strongly regulated U.S. railroads. Caves *et al.* [1981] come to the conclusion that Canadian railroads have achieved not only a far higher productivity growth, but also a higher level of productivity, in spite of the natural conditions favouring U.S. railroads.

- (b) *Indirect* attempts endeavour to estimate the repercussions of regulations on various economic magnitudes by using indicators of regulatory intensity. The *number* of regulations is counted, assuming that this is a rough indicator of the intensity with which the official economy's working is affected. This approach can best be documented for the United States: The stock of "major" federal regulations having been indexed 1947 = 100 had increased to 388 for job safety and other working conditions, to 295 for consumer safety and health, and to 350 for environment and energy by 1980. The same development as for these "social" regulations could be observed for "economic" regulations which increased to an index value of 302 in 1980².

Other indirect measures of regulatory intensity are the number of (full-time) *public officials* engaged in regulatory agencies, and the

¹ The only study on Germany restricts itself to the cost imposed on the economy by having to assist the public bureaucracy in some tasks ("Bürokratische Hilfsarbeiten"), in particular the completing of forms for statistical purposes [see Hamer, 1979].

² Calculations based on Penoyer [1981], weighting each "major" regulatory change equally.

volume of real *government expenditures* on regulatory activities. For the U.S. manufacturing sector the two indices developed in a similar way, from 100 in 1947 to 682 in 1980 for federal public officials, and from 100 to 1184 for federal regulatory expenditures¹.

Using such indices for the intensity of regulation, Denison [1979a; 1979b; 1979c] suggests that the average annual impact of environmental regulations imposed after 1967 on the rate of productivity growth was 0.05 percentage points for the period 1967—1969, 0.1 percentage points for 1973—1975, and 0.08 percentage points for 1975—1978. Christainsen and Haveman [1981] find that federal regulations are responsible for between 12 and 21 per cent of the slowdown in the growth of labour productivity in the official U.S. manufacturing sector during the period 1973—1977 as compared to 1958—1965.

At the present stage of social measurement, the intensity of regulation in the case of Germany may best be measured by the number of full-time officials employed in the general public administration at all federal levels. Their percentage share in total employment increased in the following way: 6.0 (1960), 6.9 (1965), 7.9 (1970), 9.5 (1975), 9.9 (1978). There is thus a marked growth in the public administrators' share in the total number of employees over the 1960s and 1970s.

According to the figures presented, the cost of taxation and regulation in the official economy has increased strongly between 1960 and 1978. This suggests that individuals (and firms) have had an increasing incentive during this period to become active in the shadow sector in order to evade the cost increase in the official sector.

2. The Changing Cost of Working in the Shadow Sector

a. Expected Punishment

Individuals and firms active in the shadow economy run the risk of being detected, convicted and punished. The cost consists in the probability of being apprehended times the size of punishment. What matters, however, is the cost as *perceived* by those who consider entering the shadow economy, which does not necessarily equal the actual expected cost.

At present, no data on this cost factor exist for Germany (as little as for other countries). What is needed are surveys which inquire into the individuals' and firms' perceptions of the risk of acting in the illegal economy. Objective data on the expected cost can only serve as

¹ Private communication by Gregory Christainsen, December 1981.

an approximation but are possibly easier to collect on an aggregate level. Data for the following five steps would be required:

- (i) frequency of controls;
- (ii) intensity (i.e. the length and rigour) of controls, given frequency;
- (iii) detection rate per "unit" of control, given intensity;
- (iv) probability of conviction, given detection;
- (v) size of punishment, given conviction.

Official authorities including tax offices are reluctant to reveal the necessary data¹, probably because they fear that their procedures will become known to actual and potential tax violators. As of now, no data for Germany could be found for steps (ii), (iii) and (iv) mentioned above. The frequency of tax controls (i) is published for regular investigations of firms only. The following information is available for a limited period of time²:

	<u>1970</u>	<u>1975</u>	<u>1979</u>
Number of firms controlled	101,464	124,607	178,304
Firms per controller	17.9	18.3	20.3
Share of firms investigated	4.2	4.9	6.3

Each public official engaged in tax controlling is responsible for an increasing number of firms because the share of firms subject to regular tax controls has been increasing since 1970.

This measure of normal tax control excludes a large number of control activities of the tax authorities, e.g. those referring to the income tax of individuals, to value added tax, customs duties and special (i.e. particularly intensive) investigations of potential tax frauds.

With respect to step (v), the total size of punishment is published for specific types of tax violations, again for a restricted period of time. The following data refer to the punishments for frauding value added taxes and customs duties:

	<u>1971</u>	<u>1975</u>	<u>1979</u>
Size of punishment (in millions DM, current prices)	2.1	4.1	6.7
Cumulated years of prison sentences	530	3,458	5,153
Number of convictions	5,673	10,397	13,869

¹ This becomes clear in a letter from the Bundesministerium für Finanzen (BMF) addressed to us on March 19, 1982.

² The following calculations are based on official publications of the Bundesministerium für Finanzen (*BMF Finanznachrichten*, Bonn, various years).

These data allow us to get a rough indication of the trend in average punishment per conviction:

	<u>1971</u>	<u>1975</u>	<u>1979</u>
Average monetary punishment per conviction (in DM)	370	394	483
Average years of prison sentence per conviction	0.09	0.33	0.37

It is unknown whether these averages have any meaning or whether they are the result of aggregating grossly heterogeneous areas of punishment. Accordingly, it is precipitate to interpret the revealed increasing size of punishment per offense as indicating that tax fraud is being punished more severely by the authorities (the increase may simply be due to grave violations increasing more rapidly than minor violations).

Overall, the evidence on the control of the shadow economy is seriously deficient for two reasons:

- In those two areas in which some data are available they are not comparable (the controls considered in (i) refer to enterprises, while the punishment considered in (v) refers to specific revenue authorities);
- For the important intermediate steps (ii), (iii) and (iv), no data at all are available.

Moreover, there are a number of agents other than tax authorities who also undertake controls of the shadow economy, such as regulatory authorities, social security administrations, chambers of commerce and trade unions. In order to know the full amount of controls, an estimate of the effectiveness of these controlling activities would be needed. At present, it is known at best for some specific economic branches and areas, and usually only at a given point of time.

These considerations make it impossible to construct a reasonable time series of the expected (and perceived) cost of being active in the shadow economy. It is one of the most important tasks of future research to improve the situation in this area.

b. Work Length

It seems plausible that a reduction in the effective workweek — especially if it is a result of collective bargaining — induces individuals to increase both the time spent on leisure as well as on shadow-market activities. The opportunity set for working in the shadow sector has grown, contributing to the likelihood of individuals making use of it. The

reduction in the official work length may be said to have lowered the cost of becoming active in the hidden economy.

The following figures show the development of the effective workweek in Germany (in hours per week). The figures relate to males only, because the reduction of the effective work length of women which is mainly due to an increased availability of part-time jobs in the official economy, may be taken both by women leaving the household or the shadow sector. The effective workweek of males developed in the following way: 44.2 (1960), 43.2 (1965), 43.1 (1970), 40.6 (1975), 40.3 (1978). While in 1960 the effective workweek was above 44 hours, it was only somewhat more than 40 hours in 1978. This reduction in the effective number of official working hours has provided an opportunity to take up work in the shadow economy.

c. Participation Rate

A fall in the participation rate of the population (in the working age) in the official economy increases the opportunity of working in the shadow economy. The participation rate of women is not considered because it is subject to an upward bias caused by the general increase of women in *all* kinds of market activities.

The male participation rate developed in the following way: 94.9 (1960), 94.2 (1965), 92.5 (1970), 85.7 (1975), 83.2 (1978). There is a clear decline of male participation in the official economy. While in 1960, 95 per cent of the age group between 15 and 65 years of age were (officially) active, this percentage dropped to 83 per cent at the end of the 1970s. We therefore assume that an increasing share of this age group becomes active in the shadow economy¹. The development of both the effective work time and the participation rate in the official sector suggests that the incentive for working in the shadow sector has been growing and that the shadow economy has been increasing from 1960 to 1978.

3. The Declining Psychological Barriers to Switch from the Official to the Shadow Economy

The readiness with which individuals engage in the shadow economy depends on their general attitude towards the government and the state. If individuals accept the government and the state as legitimate and on

¹ The declining (male) participation rate can also be interpreted to be an indicator of the size of "black" work, and not as one of the contributing factors. Italian economists, in particular, use this approach to estimate the size of the shadow economy. See e.g. Fuà [1976], Contini [1981a, 1981b], L. Frey [1978], Martino [1981], Gaetani-d'Aragona [1981]; for a critical discussion see Pommerehne and Frey [1981].

the whole acting in their interest, they will be less willing to cheat by working in the shadow economy than if they consider the state mostly as an oppressive force taking away what they have earned. This attitude towards the state can be captured by an index of "tax moral". It is difficult to measure because of its many different dimensions. Survey research in public finance has long since tried to measure this phenomenon empirically, but has found it extremely difficult to do so¹. For Germany, there is no consistent series available which would represent the development of the tax moral between 1960 and 1978². There are, however, four "series" of survey questions (each one consisting of two to four observations only) which may serve as an indicator of a change in the tax moral:

- (a) "With what type of person would you most closely associate a tax delinquent or a tax evader?" Those who decide to point to the rubric "bon vivant, acute businessman" or "cunning type" are likely to express therewith approval, or at least no explicit moral condemnation of tax evasion. There are only two observations available based on representative surveys [Däke, 1979, p. 2]: 43.0 per cent in 1958 and 61.1 per cent in 1978. The percentage of respondents implicitly approving of tax evasion has thus been growing strongly over the twenty-year period.
- (b) "How heavily do you feel burdened by taxes?" Those who answer that they "pay much too high taxes" or "too high taxes" may be assumed to be (particularly) dissatisfied about the increasing tax burden, and therefore to be quite ready to evade taxes. The percentage of respondents answering in this way is known for four points of time³: 46.9 (1958), 67.9 (1971), 66.3 (1976), 65.3 (1978). The share of people who feel overburdened by taxes has strongly increased between 1958 and 1971, and has then remained roughly constant.
- (c) "What political demands do you personally consider to be the most important?" Those who answer "that the government should decrease taxes" (out of a given list of possible answers) may be taken to be more averse to taxation than other respondents, and therefore are more likely to cheat on taxes. There are four observations as percentages in subsequent years [Noelle, Neumann, 1974, p. 360]: 41 (1969), 41 (1970), 36 (1971), 36 (1972). According to this series, the

¹ For a long tradition in German-speaking countries see Schmolders [1960], Strümpel [1966], Schmolders and Strümpel [1968], Beichelt *et al.* [1969], and Tretter [1974].

² Hibbs and Madsen [1981] e.g. even come up with just one observation for one year!

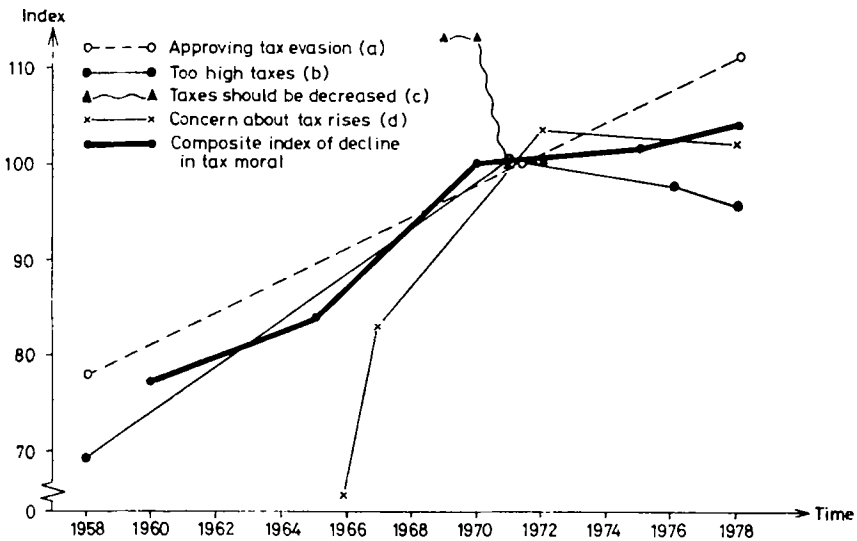
³ For 1958, 1971 and 1978 see Däke [1979, p. 43], for 1976 Noelle-Neumann [1977, p. 196].

respondents do not have a strong desire for a tax reduction between 1969 and 1972.

(d) "What are the problems about which you are personally most concerned?" The respondents answering "that taxes will be strongly increased" (out of a given list of possible answers) may again be assumed to be specially averse to taxation. There are four observations¹: 38 (1966), 50 (1967), 61 (1972), 60 (1977). This series suggests that the respondents have become clearly more concerned about a rise in the future tax burden.

The four series constitute the contributing factors to an *index of the decline in tax moral*. Series (a) and (b) are weighted equally, and, because they seem to be somewhat closer to expressing a view about tax moral, they are given twice the weight of series (c) and (d). Each of the two latter series relates to quite similar aspects — whether taxes should be decreased or will be raised (out of a given list of possible answers) — and are therefore attributed the same total weight as series (a) or series (b). Using this weighting scheme and intrapolating between the years for which there are no observations, the following index of factors contributing

Figure 1 — *Individual Factors and Composite Index of a Decline in Tax Moral in Germany, 1960—1978 (1970 = 100)*



¹ Source: Noelle and Neumann [1967, p. 205] for 1966 and 1967; Noelle and Neumann [1974, p. 350] for 1972; Noelle-Neumann [1977, p. 93] for 1977.

to the decline in tax moral results: 77 (1960), 84 (1965), 100 (1970), 102 (1975) and 104 (1978). The development of the indices of the four series, and the overall "index of decline in tax moral" constructed on their basis are shown in Figure 1. This figure shows that the individual series, as well as the aggregate series, in general show a clear upward trend. Tax moral can thus be assumed to have decreased in the 1960s and 1970s.

It may be interesting to compare this development of the tax moral in Germany to that in the *United States* for which better data are available. Table 1 shows the values of the four underlying series in the period 1960—1978, and the overall index of the factors contributing to a decline in tax moral (equal weighting).

Table 1 — *Factors Contributing to a Decline in Tax Moral in the United States, 1960—1978 (1970 = 100)*^a

Survey questions	1960	1965	1970	1975	1978
(a) "Do you consider the amount of federal income tax which you have to pay is too high?"	74.0	81.7	100.0	109.9	106.9
(b) "Do you think that government wastes a lot of money?" . . .	66.0	73.5	100.0	109.2	114.8
(c) "Do you think that government is untrustworthy?" . . .	51.4	57.5	100.0	141.9	150.8
(d) "Do you think that government does not care much what people like me think?" . . .	51.3	79.5	100.0	108.8	111.3
Overall index (average) .	60.7	73.1	100.0	117.5	121.0

^a Listed are indices of the share (%) of persons saying yes.

Source: Series (a) for the years 1959, 1961, 1967, 1969, 1973—1978 is compiled from various numbers of *Public Opinion*, Washington, and is linearly intrapolated; series (b), (c) and (d) are based on an election survey, conducted by the Center for Political Studies, Survey Research Center, University of Michigan, and published in *Public Opinion*, various issues.

This table suggests that in the United States all the contributing factors as well as the index of decline in tax moral constructed on their

basis have increased markedly, i.e. that Americans seem to have less and less moral qualms about cheating on taxes. There are some indications that a decreasing "trust in government" is positively correlated with an (independently arrived at) measure of the size of the hidden economy; the empirical evidence presented [Feige, 1982, p. 47] is, however, rather weak, being based on very few (eight) observations and on a doubtful specification of the relationship. The strong downward trend of tax moral observable in the United States gives the falling index of tax moral constructed for Germany more credibility because it does not seem unreasonable to think that the citizens in the two countries (both highly industrialized, democratic societies) have undergone a similar change in values with respect to the duty of paying taxes. It may thus be assumed that in the period 1960—1978 the psychological barriers to switch from the official to the shadow economy have been decreasing in Germany, and that this has — *ceteris paribus* — contributed to a rising size of the shadow economy.

4. Structural Effects

Another influence relates to the *structural conditions* under which the factors so far considered are in operation. If a group of individuals has a particularly strong inclination to work in the shadow economy, and the group's relative share increases, the structural effect is an increase of the shadow economy. One such group are foreign workers. In general they have lower opportunity costs when working in the shadow economy in addition to their official job because they value leisure less than the native German population. This is particularly so when their families live abroad. Another reason why they can be expected to have a structurally higher participation in the shadow sector is that in the countries they originate from tax moral is generally lower than in Germany. By way of extensive survey research, individuals in various European countries have been asked the same questions (translated into the national language) about their feelings of duty as to paying taxes and the extent of moral punishment of tax cheaters¹. The results suggest that in Italy and Spain the tax moral is lower than in Germany. (No comparable results exist for Turkey and Yugoslavia). Overall, there is some indication that foreign workers have a higher participation rate in the shadow economy than native Germans have.

The share of foreign workers in total employment developed in the following way: 1.4 (1960), 5.5 (1965), 8.3 (1970), 9.9 (1975), 8.7 (1978).

¹ See Strümpel [1966], Beichelt *et al.* [1969], and Tretter [1974]. For various reasons the answers are not fully comparable. For a quite different approach based on content analysis coming to the same general conclusion see Scholten [1952].

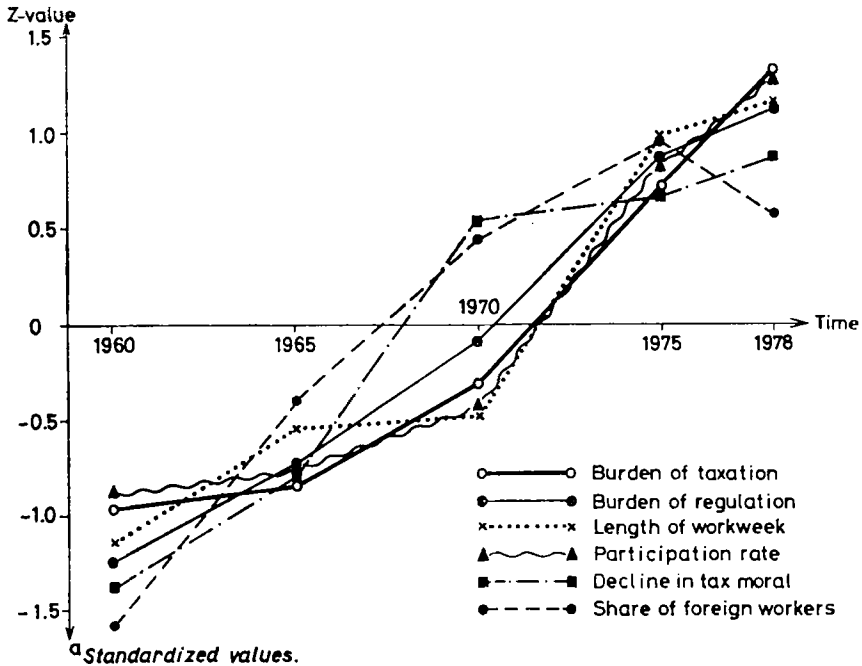
There was a strong increase since 1960, peaking in 1975, and a decrease thereafter. We thus expect that this structural effect contributed to a growth of the shadow economy up to 1975, and to a decrease thereafter.

III. Estimating the Development of the Shadow Economy

I. The Contributing Factors

The temporal development of the six factors which are assumed to cause the existence of a shadow economy, and for which data are available, namely (1) burden of taxation, (2) burden of regulation, (3) length of workweek (males), (4) participation rate (males), (5) decline in tax moral, (6) share of foreign workers, is shown in Figure 2. As the relevant factors are expressed as a share of totals, the conclusion with respect to the size of the shadow economy is relative to the officially measured GNP. In order to make the series comparable, the values are standardized ($Z_i = (X_i - \bar{X}_i)/\sigma_i$, with \bar{X}_i the mean and σ_i the standard deviation of series i). The standardized values Z_i are given in the Appendix.

Figure 2 — *Factors Contributing to the Shadow Economy in Germany, 1960—1978*^a



A glance at Figure 2 shows that *all* the factors causing the existence and growth of the shadow economy have increased over the period (and subperiods) considered. The only exception is the period 1975—1978 when the share of foreign workers fell which — *ceteris paribus* — worked in the direction of a decline of the shadow economy.

2. Aggregating the Components

The six factors contributing to a shadow economy can — to take the most simple case — be assumed to affect the shadow sector's size S in a linear way:

$$S_t = \alpha_1 Z_{1t} + \alpha_2 Z_{2t} + \dots + \alpha_6 Z_{6t}$$

where Z_{it} ($i = 1, 2, \dots, 6$) are the standardized values of the factors discussed in the previous section. (Consequently, the size of the shadow economy S is also in standardized form, with $\Sigma \alpha_i = 1$.)

Social scientists are used to regressing the (known) dependent variable S on the (known) explanatory variables Z_1, Z_2, \dots, Z_n , and to determine the size of the parameters $\alpha_1, \alpha_2, \dots, \alpha_n$ by using, for example, the least squares method. This procedure, however, cannot be applied to our problem because the dependent variable, the size of the shadow economy S , is *unobserved* and has to be determined. The procedure must therefore be "reversed": Using the explanatory variables Z_i , assumptions must be made about the weights α_i , in order to infer the sought for dependent variable S .¹

Two procedures will be used here in order to infer the development of the shadow economy, and to make as weak assumptions about the weights α_i as possible.

a. Domination

In those periods in which all the determinants Z_i are increasing, the shadow sector will also increase, whatever the weights α_i ($\alpha_i \geq 0$). We have seen that in the period 1960—1975, *all* determinants Z_i isolated by us were growing so that it can be concluded that the shadow economy's size was increasing.

¹ This procedure has been used particularly in psychology. It has been shown that a linear model gives superior forecasts compared to a method in which experts make a prediction on the basis of their evaluation without using an explicit model. This holds irrespective of whether the weights used in the linear model are chosen on the basis of intuitive judgement, by equal (or "unit") weighting or randomly [see Einhorn, Hogarth, 1975; Dawes, Corrigan, 1974; Wainer, 1976]. The authors mentioned also show that unit regression weights give better forecasting performance than least square weights in certain circumstances.

In the last period, 1975—1978, five series ($i = 1, 2, \dots, 5$) were rising, but the share of foreigners in total employment Z_6 was falling. The principle of domination is thus no longer applicable. It may be calculated what the maximum size of the weight α_6 of foreign employment must be compared to $\alpha_1, \alpha_2, \dots, \alpha_5$, in order for the shadow economy to be constant or even declining. The condition for $\Delta S \leq 0$ is

$$\alpha_6 \geq \sum_{i=1}^5 \alpha_i \Delta Z_i / (-\Delta Z_6)$$

Assume e.g. all α_i ($i = 1, 2, \dots, 5$) are equal to one. In the period 1975—1978 $\Delta S \leq 0$, provided that $\alpha_6 \geq 4.7$. The influence of foreign workers on the development of the shadow economy would then have to be almost five times that of each individual contributing factor in order for the shadow economy to decline. Such a disproportionate weight for this factor is quite implausible. This suggests that there are good reasons for assuming that in the period 1975—1978 the overall pressure of the determinants tended to enlarge the shadow economy in Germany.

b. Soft Modelling

“Soft modelling” is an approach to help make decisions when the probabilities of the underlying variables are not exactly known but their ranking¹. For our problem it seems reasonable (according to the literature on the shadow economy) to assume that the tax burden is more — or (at least) equally — important than each of the other contributing factors. Tax moral may be less important than the burden as such but it plays an important role in facilitating the decision of whether

Table 2 — *The Weighting of the Determinants in the Soft Modelling Approach*

	Weighting schemes				
	(a)	(b)	(c)	(d)	(e)
(1) α_{Tax} . . .	1	1/2	1/3	1/5	1/6
(2) α_{Moral} . .	0	1/2	1/3	1/5	1/6
(3) $\alpha_{\text{Regul.}}$. .	0	0	1/3	1/5	1/6
(4) $\alpha_{\text{Partic.}}$. .	0	0	0	1/5	1/6
(5) α_{Worktime} .	0	0	0	1/5	1/6
(6) α_{Foreign} . .	0	0	0	0	1/6

¹ The corresponding mathematical theory was developed by Kofler and Menges [1976] and called LPI (limited probability information). See also Menges *et al.* [1981] for further developments and applications.

to switch (partly or totally) from the official to the shadow economy. It is taken to be more (or at least equally) important than any of the other determinants (except taxation). The burden of regulation also seems to be quite important; it is assumed to have a larger (or at least equal) weight than each of the remaining three factors. The labour force participation and working time are assumed to be of equal importance (because they refer to similar determinants), and the share of foreigners is taken to rank lowest. We then have

$$\alpha_{\text{Tax}} \geq \alpha_{\text{Moral}} \geq \alpha_{\text{Regul.}} \geq \alpha_{\text{Partic.}} = \alpha_{\text{Worktime}} \geq \alpha_{\text{Foreign}}$$

This ranking allows for the five sets of weights (a) to (e) shown in Table 2. It may be seen that in the one extreme (a) the tax burden is assumed to be the only determinant ($\alpha_1 = 1, \alpha_2, \dots, \alpha_6 = 0$), and in the other extreme (e), each determinant has the same weight ($\alpha_i = 1/6, i = 1, 2, \dots, 6$)¹. The weighting schemes thus allow for a very large range of strength of influence of the six contributing factors identified.

The data matrix (5 periods x 6 determinants) given in the Appendix is now multiplied by the weight matrix (6 determinants x 5 weighting schemes) given in Table 2. The result is shown in Table 3. According to

Table 3 — *Development of the Shadow Economy According to the Soft Modelling Approach* (standardized variable S)

Year	Use of weighting scheme				
	(a)	(b)	(c)	(d)	(e)
1960	-0.96	-1.16	-1.18	-1.12	-1.19
1965	-0.82	-0.80	-0.76	-0.72	-0.66
1970	-0.28	0.13	0.06	-0.15	-0.05
1975	0.72	0.72	0.77	0.85	0.84
1978	1.34	1.11	1.11	1.14	1.05

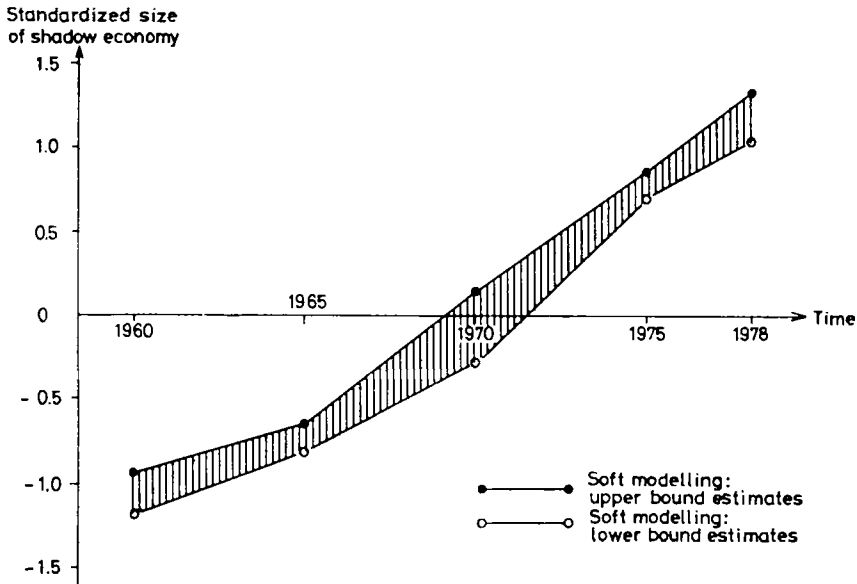
weighting scheme (a) where only the burden of taxation matters, the standardized value of the size of the shadow economy S increases from -0.96 in 1960 to 1.34 in 1978. When the joint influence of tax burden and the decline of tax moral is considered — weighting scheme (b) — the shadow economy develops from -1.16 to 1.11. When the burden of both taxation and regulation, and tax moral are taken into account — scheme (c) — the development is from -1.18 to 1.11. When the labour market influences are added — scheme (d) — the shadow sector develops from -1.12 to 1.14. Finally, when the La Place principle is used — weighting scheme (e) — the development is from -1.19 to 1.05.

¹ This corresponds to the La Place rule of insufficient reason.

The weights α_i , however, need not necessarily be kept constant over time. It is possible to choose at each point of time among the weighting schemes according to one of the following principles:

- (i) Choose at each point of time that weighting scheme which gives the smallest shadow economy. This extremely "conservative" principle of measurement gives the following series for S: — 1.19 (1960), — 0.82 (1965), — 0.28 (1970), 0.72 (1975), 1.05 (1978). As may also be seen from the lower bound estimate in Figure 3, this principle based on soft modelling suggests a consistently rising shadow economy.
- (ii) Choose at each point of time that weighting scheme which gives the largest shadow economy. This principle leads to the following steadily rising series for the shadow economy S (see upper bound estimate in Figure 3): — 0.96 (1960), — 0.65 (1965), 0.13 (1970), 0.85 (1975), 1.34 (1978).
- (iii) Alternate between the highest and the lowest estimate of S for consecutive years. This procedure gives the most conservative estimate for the *change* in the shadow economy ΔS :¹ 0.14 (1960—1965),

Figure 3 — *Development of the Size of the Shadow Economy: Various Estimates for Germany, 1960—1978*



¹ For 1960 the highest estimate is — 0.96, for 1965 the lowest estimate is — 0.82, making for an increase in S of + 0.14.

0.37 (1965—1970), 0.59 (1970—1975), 0.20 (1975—1978). According to this decision principle the shadow economy has been increasing in every period. Using even the most conservative principle we are thus led to expect a steadily increasing shadow economy in Germany for the period 1960—1978.

3. Can Controls Countervail Our Results?

As has been pointed out above, there are no data available on the extent of the control of the shadow economy. In our context, it is possible to enquire, however, to which degree controls *would hypothetically have had to increase* in order to prevent the shadow economy from increasing. According to our calculations, and assuming that all contributing factors are of equal weight following the principle of insufficient reason (i.e. weighting scheme (e)), controls would have had to increase from an index of 100 in 1960 to 472 in 1978 in order to keep the shadow economy at the same level as in 1960. This allows for the conclusion that the shadow economy has grown, provided controls (e.g. measured by the share of controllers in total employment) have not more than quadrupled.

IV. Comparison of Results

For the Federal Republic of Germany, there exist as of now (June 1982) only three serious analyses of the size (and development) of the shadow economy.

Petersen [1982] compares the discrepancy between the national income estimates based on the report to the tax authorities and the income figures contained in the national accounts statistics (which are, at least in principle, independently arrived at). This discrepancy approach suggests a *decreasing* size of the illegal underreporting on income from 16.0 per cent in 1961 to 4.8 in 1974. It may be noted that a measurement of the shadow economy with the help of the discrepancy approach also yields a falling trend in other countries: in the United Kingdom e.g. from 3.5 per cent in 1976 to 0.5 in 1980 [O'Higgins, 1982, Table 1], and in the United States from 6.2 per cent in 1960 to 3.9 in 1977 [Park, 1979].

An important study of the shadow economy in Germany has been undertaken recently by Langfeldt [1982]. He applies various methods and is therefore able to compare the results. The first method used is the currency demand approach which was originally used for the United States by Cagan [1958], and was improved by Tanzi [1980] many years later. It has also been applied to some other countries, in particular to Sweden and Norway by Klovland [1980]. The basic assumption of the currency demand approach is that *all* shadow market activities are trans-

acted in currency. An increase in currency use is thus taken to reflect an increase in shadow-market activities, *ceteris paribus*. The more refined studies (Tanzi, Klovland) estimate a currency demand function depending on a variety of determinants such as the income level and interest rates. The currency function is estimated with the tax rate as the *only* factor causing people to become active in the shadow economy and thus to demand currency.

Langfeldt estimates that the increase of the (average) tax share (including social security contributions) created an increasing size of "excess" currency holdings by the public. Assuming equal velocities of circulation in the official and the shadow sector, the size of the shadow economy in Germany in terms of officially measured GNP is calculated to be 3.4 per cent (1976), 3.5 per cent (1978), and 3.7 per cent (1980).

Using the currency demand method, the size of the shadow economy is thus estimated to be below 4 per cent of the (official) GNP and its increase since the mid-1970s to be smaller than half a percentage point. A quite different size and development of the shadow economy is arrived at when the transactions method is used. This approach takes the quantity equation and deduces from the total quantity of money what the size of the total economic activity should be. Subtracting the official GNP gives an estimate of the GNP created in the shadow economy. Assuming that in 1956 there was no shadow economy in Germany, it is estimated to have been 27 per cent of the official GNP in 1980. These (unconvincingly) high figures are typical for the transactions approach: 33 per cent of official GNP for the United States in 1979 [Feige, 1979], and 19 per cent for Canada in 1978 [Mirus, Smith, 1981].

Kirchgässner [1981] also uses the currency demand approach. He estimates the following yearly currency demand function for Germany for the period 1952—1980:

$$\begin{aligned} \ln (C/M2)_t = & -0.014 + 0.802 \ln (C/M2)_{t-1} - 0.160 \ln Y_t \\ & \quad (10.74) \quad \quad \quad (-4.19) \\ & + 0.468 \text{ MTR}_{t-2} + 1.301 \text{ IR}_t - 1.780 i_{t,t} + \varepsilon_t \\ & \quad (3.29) \quad \quad \quad (3.46) \quad \quad (-5.15) \end{aligned}$$

$$\begin{aligned} \bar{R}^2 = 0.98, \hat{h} = 1.12, \text{ S.E.R.} = 0.024, \text{ d.f.} = 23 \\ (\text{t-values in parentheses}) \end{aligned}$$

The symbols are: $C/M2$ = currency/money ratio, Y = real gross domestic income, MTR = marginal tax rate on gross income, IR = rate of inflation (GNP deflator), i = interest rate on time deposits.

All estimated parameters have the theoretically expected sign and

are highly significant. To derive the size of the shadow economy, the currency demand for the historical minimal marginal tax rate (0.16 in 1957) is simulated. It is then compared to the actual currency demand which is (also) influenced by the rise in the marginal tax rate (it rose to 35 per cent in 1978). The "excess currency" is transformed into GNP by assuming that the same velocity of currency holds in the official and the shadow economy. The following estimate of the size of the German shadow economy as percent of GNP results¹:

<u>1960</u>	<u>1965</u>	<u>1970</u>	<u>1975</u>	<u>1978</u>
2.0 [—1.13]	4.3 [—0.16]	3.1 [—0.66]	6.0 [0.56]	8.0 [1.40]

The size of the shadow economy as estimated with the help of the currency demand equation is increasing rapidly, with a minor reduction in the period 1965—1970. A comparison of these estimates with our own upper and lower estimates given in Figure 3 shows a similar development over time.

The currency demand method uses the traditional econometric estimation techniques, and therefore may give an aura of reliability. The empirical estimate is, however, doubtful for various reasons [see, inter alia, Smith, 1981; O'Higgins, 1982]: (1) Shadow market activities are not only transacted in cash; other means of payment as well as barter also play a role; (2) the estimated currency demand equation is quite unstable; the crucial parameter estimate for the influence of the tax rate is sensitive to various influences, and accordingly sensitive is the estimated size of the shadow economy: Kirchgässner [1981, Tables 2 and 4], e.g., presents for 1975 estimates ranging between 2.5 to 6.5 per cent of GNP if the currency/money ratio is used as the dependent variable, and between 3.2 and 8.6 per cent if the currency level is used, depending on the exact specification of the demand equation; (3) the velocity of the currency circulation is assumed to be equal in the official and in the shadow economy, without evidence whatsoever; a change in this assumption has a strong (proportionate) impact on the estimated size of the shadow economy; (4) taxation is assumed to be the only determinant of the existence and growth of the shadow economy; the shadow economy is assumed to be zero when the tax rate is lowest. Therefore the increase shown measures at best the tax-induced rise of the shadow economy.

The approach used in this paper is based on a less orthodox method and does not employ a formal estimation technique (but it uses the formal decisions method LPI). The results are not presented in terms

¹ In brackets the standardized Z-values which may be compared to our own estimates in Table 3.

of percentages of GNP¹, but limit themselves to showing the development over time. The advantage of our approach is that it gives attention to the multitude of factors which may determine the size of the shadow economy.

V. Concluding Remarks

The sensitivity analysis undertaken allows to conclude with some confidence that the shadow economy has been of increasing importance in recent decades in Germany, relative to measured GNP. The results obtained — though certainly quite preliminary in a number of respects — provide a basis to start thinking about the consequences for economic policy. The advantages and disadvantages of having a growing shadow economy must be carefully considered; our analysis certainly does not provide any a priori argument for restricting the shadow economy. The consideration of the factors contributing to the existence and rise of a shadow economy shows possible points of departure for influencing it.

Appendix

Standardized Values of Factors Contributing to a Shadow Economy, Various Years ($Z_i = (X_i - \bar{X}_i) / \sigma_i$)

Factors	1960	1965	1970	1975	1978
(1) Burden of taxation	— 0.96	— 0.82	— 0.28	0.72	1.34
(2) Burden of regulation	— 1.23	— 0.69	— 0.08	0.88	1.12
(3) Length of workweek ^a	— 1.12	— 0.53	— 0.46	0.97	1.14
(4) Participation rate ^a	— 0.89	— 0.76	— 0.45	0.82	1.28
(5) Decline in tax moral	— 1.34	— 0.78	0.54	0.71	0.87
(6) Share of foreign workers	— 1.58	— 0.36	0.45	0.92	0.57

^aOnly males.- (3) and (4) are coded with a reversed sign as a decrease of the workweek and participation rate is assumed to increase the size of the shadow economy.

Source: (1): Statistisches Bundesamt, *Volkswirtschaftliche Gesamtrechnungen*. Fachserie N, Reihe 1: Konten und Standardtabellen, Stuttgart, various years. — (2) and (6): Idem, *Statistisches Jahrbuch für die Bundesrepublik Deutschland*. Stuttgart, various years. — (3): H.-U. Bach *et al.*, *Arbeitszeit und Arbeitsvolumen in der Bundesrepublik Deutschland 1960—1975*. Beiträge zur Arbeitsmarkt- und Berufsforschung, Institut für Arbeitsmarkt- und Berufsforschung der Bundesanstalt für Arbeit, 23, Nuremberg 1978. — (4): OECD, *Labour Force Statistics*. Paris, various years.— (5): For the construction of the index see text.

¹ This does not constitute a basic point of difference to the currency demand method because the latter arrives at a percentage level by assuming that the shadow economy did not exist at a starting point. This assumption may not hold in reality.

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Zusammenfassung: Hat die Schattenwirtschaft in der Bundesrepublik Deutschland zugenommen? — Nach einer Diskussion der wichtigsten Bestimmungsfaktoren einer Schattenwirtschaft wird deren Entwicklung in der Bundesrepublik Deutschland für die Periode 1960—1978 quantitativ erfaßt. Die verschiedenen Determinanten werden gewichtet, und ihr Einfluß auf die Größe und Entwicklung der Schattenwirtschaft wird mit Hilfe von Sensitivitätsanalysen untersucht. Die Ergebnisse aller Sensitivitätsrechnungen lassen vermuten, daß die Schattenwirtschaft in Deutschland während der beiden letzten Jahrzehnte im Vergleich zum offiziell gemessenen Sozialprodukt zugenommen hat.

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Résumé: L'économie informelle a-t-elle augmenté en Allemagne de l'Ouest? — Les auteurs discutent les déterminants les plus importants de l'économie informelle et mesurent leur développement en Allemagne (RFA) pour la période 1960—1978. Ils pondèrent les déterminants différents et évaluent leur influence sur le volume et le développement de l'économie souterraine à l'aide des analyses de sensibilité. Les résultats de ces calculs suggèrent que l'économie informelle en Allemagne a augmenté pendant les dernières deux décades en comparaison avec le PNB officiellement mesuré

*

Resumen: Ha crecido la economía sombra en Alemania? — Se discuten las determinantes más importantes de la economía sombra y se mide su desarrollo cuantitativamente para la República Federal de Alemania en el período 1960—1978. Se sopesan las distintas determinantes y se evalúa su influencia sobre el tamaño y el desarrollo de la economía sombra mediante la ayuda de análisis de sensibilidad. Los resultados de estos cálculos sugieren que la economía sombra en Alemania ha crecido a lo largo de las últimas décadas comparado con el PNB medido oficialmente.