THE HIDDEN ECONOMY: STATE AND PROSPECTS FOR MEASUREMENT[1]

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To know the size and development of the hidden or underground economy is important for policy making, mainly because the measures undertaken may be misdirected if they are based on biased official statistics. The hidden economy can be measured by considering indicators. The direct methods are based on voluntary surveys and on tax auditing and other compliance methods. The indirect estimation methods rely on the identification of residuals with respect to income and expenditures, as well as in the labor and money markets. The strengths and weaknesses of each of these measurement approaches are discussed and the resulting estimates of the size of the hidden economy are compared. A different approach to measurement is to look at the determinants leading to the existence and growth of the hidden economy. Finally, the method of "unobserved variables" allows the combination of the two approaches by simultaneously considering the determinants and indicators of the underground economy. The results show a considerable range of sizes for a given country and year. Though there is a broad range of size estimates, there is general agreement that the hidden economy's size has been growing for all countries over recent decades. Further progress in quantitative knowledge about the hidden economy requires the development of a theoretical model which analyses the interdependencies between the official private sector, the hidden economy, and the public sector.

I. INTRODUCTION

In the last few years, the phenomenon of the hidden economy has received ever increasing attention among the public and politicians in industrial countries. The hidden economy is known under many names such as the underground, subterranean, submerged, clandestine, shadow, informal or irregular economy; in Italy the corresponding activity is referred to as "lavoro nero" and in Germany as "Schwarzarbeit." In planned communist countries the phenomenon is often called "secondary" or "parallel" economy.

There are three main reasons why the public and politicians in industrial countries have become concerned about the hidden economy (Tanzi 1980b):

(i) The rise of the hidden economy is interpreted as a reaction to the overburdening of individuals and firms.

(ii) An increase in the size of the hidden economy caused by a rise in tax burden may lead to a fall in tax receipts. The "Laffer-curve" is affected by the change in the allocation of labor between the taxed and the untaxed sectors.

(iii) Economic policy measures may be of a wrong magnitude or even in a wrong direction if they are based on mistaken indicators of the state of the economy. In particular, the official unemployment rate is too high

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if part of the unemployed do indeed work in the hidden economy. Similarly, the growth rate of real income is underrated if indeed the hidden sector expands more quickly than the official economy, and for a similar reason, the rate of inflation may be overrated.

The hidden sector is not a completely new subject for economists. Specialists in public finance have for a long time been concerned with tax evasion and the existence of the legal and illegal underground economy (see e.g. Meisel 1914, Jostock 1943). Because of the seeming importance of the underground economy in their country, Italian economists have undertaken many empirical studies of "lavoro nero" in the past.[2]

Modern methods of analysis have first been applied by Cagan (1958) who studied the development of the hidden economy in the United States during World War II. He assumes that the transactions in the hidden sector use *currency* in order to leave as few traces of the illegal activities as possible and attributes the increase of the use of currency to hidden activities. Cagan finds that the underground economy grew strongly during the war. During the last few years many studies have appeared which seek to estimate the size of the underground economy. The earlier books published so far in the area (e.g. Contini, 1979; Heertje and Cohen, 1980; Cantelli, 1980; Saba, 1980) have concentrated mainly on a verbal (rather untheoretical) discussion of the causes, appearance and consequences of the underground economy. Only some of the most recent books (Isachsen and Strøm, 1981; Tanzi, 1982; Simon and Witte, 1982) deal with quantitative aspects of the hidden sector by using well defined methods.

This paper contains a critical discussion and analysis of the estimation methods, reports the results for various time periods and countries, and indicates in which directions future research may fruitfully proceed. Part II discusses the basic aspects of estimating the hidden economy in western industrialized countries. Part III is devoted to the measurement by indicators using various independent methods. Part IV considers estimates with the help of determinants, and Part V looks at a combination of the two general ways of approaching the problem. Part VI offers concluding remarks.

II. Basic Aspects of Estimation

The underground economy is a complex phenomenon comprising many different, interrelated aspects. One of the main problems in estimating its size is that the participants have an incentive to conceal their activity. Many approaches have been suggested to capture the hidden economy empirically.

Even considering only *well defined* methods of estimation—i.e. excluding speculations and guesstimates[3]—it remains often unclear *what* exactly is being measured. Some studies take turnover in the underground economy (e.g. in the

[2] See, for example, Deaglio (1974), CENSIS (1976), Maraffi (1976).

[3] Pure speculations are, for example, the figure reported by De Grazia (1980) that the West German hidden economy amounts to 2 percent of GNP, or Intersocial (1980) that it is 1 percent of GNP in Japan. An example of guesstimates is Sir William Pile's (then chairman of the British Inland Revenue Service Board) widely quoted figure (see, for example, OECD, 1980b; Macafee, 1980; Dilnot and Morris, 1981) that the underground economy in the United Kingdom amounts to $7\frac{1}{2}$ percent of GNP.

case of illegal activities such as dealing with drugs), the total outlays for such goods, while other studies take partial aspects of the hidden economy only, such as fiddling (Henry, 1978). Recently a consensus (see e.g. Macafee, 1980; Tanzi, 1980a; Isachsen, Klovland and Strøm, 1982; and Smith, 1981) has emerged, however, that a suitable working definition of the hidden or underground economy should consider two aspects: For reasons of nonreporting or underreporting, the hidden economy "escapes the purview of our current societal measurement apparatus" (Feige, 1980, p. 3) *and* the activities taking place in the underground economy should be measured in terms of GNP. It thus makes sense to compare the size of the hidden economy with (officially measured) gross national product. Income creating illegal and unreported legal activities, including in some cases in-kind and barter transactions, are measured, but otherwise standard national income conventions[4] are followed. Consequently, work performed in one's private household or in the "voluntary" or "third" sector are excluded. These increasingly important aspects of economic activity have been extensively studied (see in particular Weisbrod, 1977; Gershuny, 1978; Badelt, 1980) and "total incomes" including household services and do-it-yourself have been estimated for various countries.[5]

III. Measurement by Indicators

There are many different ways in which the indicator approaches may be classified, for example, into those using individual versus others using aggregate data, or those employing an accounting versus others employing an econometric framework. It seems to be more promising, however, to look at the *rationale* behind these approaches. Two of the estimation methods attempt to uncover the hidden economy by directly examining individual behavior. They try to overcome the incentive of individuals to hide their involvement in the underground economy by:

(1) using well-designed *surveys* and *samples* based on *voluntary* replies;

(2) *tax auditing* and other *compliance* methods.

Three of the estimation methods currently used rely on the identification of *residuals* at the aggregate level, but the residuals are computed in quite different ways, as the

(3) discrepancy between *income* and *expenditures*;

(4) difference between *officially measured* and *actual participation rates*;

(5) additional demand for *currency* and/or *money* actually observed compared to a situation in which there would be no hidden economy.

(1) *Voluntary Surveys and Samples*

Individuals are interviewed and asked whether they have actively participated in the hidden economy over a specified period in their capacity as buyers or

[4] For a discussion of national income accounting in the light of the measurement of the hidden economy see Blades (1982).

[5] See, for example, Adler and Hawrylyshyn (1978) for Canada, Kendrick (1979) and Eisner *et al.* (1982) for the United States, and Vanoli (1980) for France; a survey of previous empirical estimates is provided in Hawrylyshyn (1976).

sellers of irregular goods and labor services. If the sample asked is representative, and if the questioning technique is designed to overcome the incentive to give a biased answer as far as can be done, it is possible to derive an estimate of the size of the hidden economy.

A good example of this approach is provided by a recent study combining interview and postal survey techniques for a representative sample of about 900 persons in Norway (Isachsen, Klovland and Strøm, 1982). The survey was limited to the labor market, i.e. the questions related to unreported income from work only. As must be expected, respondents were more willing to admit having paid for irregular labor services (29 percent of the persons interviewed) than having themselves worked in that sector (20 percent). 9 percent of the respondents admitted having been active in the labor market as buyer and seller over the previous twelve months, so that overall participation amounts to 40 percent $(29+20-9)$ of the whole population. The number of hours of work and the hourly wage rate were also asked, making it possible to compute the size of the underground economy to be 0.9 percent of officially measured GNP in 1979. As the gross (=net) wage rate in the hidden economy was less than 40 percent of the (gross) wage rate in the regular labor market, the estimate amounts to 2.3 percent of GNP. The survey also finds that men were about three times as likely to work in the hidden economy as women (28 percent compared to 9 percent) and that young people are more inclined to supply work in that sector. The buyers of labor services are in general quite pleased about the quality of the work performed, and the accessibility of it.

The crucial importance of a well designed questioning technique can be demonstrated with an example from Italy. The Italian Statistical Office ISTAT (as well as other institutes such as DOXA and ISFOL, see CENSIS 1976) proceeds in two steps in order to find out who is actually working. In a first step, those stating that they do not work are separated from those openly declaring that they do work. A month later in a second step, those declaring that they do not work are asked whether they have not occasionally been active "simply to put their time to better use," and whether they were not able to contribute at least *something* to the family's upkeep. The result is astonishing: in 1974, not less than 2,400,000 of those persons who formerly declared that they did not work now admit that they in fact do. Similar (somewhat lower) figures obtain for later years. The rate of participation climbs from 36.1 percent after the first question to 38.9 percent after the second question. This increase in the participation rate can be interpreted as the number of people engaged in the underground economy (see section 4).

The sample survey method has the advantage of being able to bring forward detailed information on the composition of the hidden work force, the characteristics of employment and the quality of the work performed. It remains doubtful, however, whether the questioning leads *all* underground workers to reveal themselves; it is very likely that an (uncertain) share of total employment remains undetected. In particular, it is unlikely that activities that are illegal (e.g. income from drug dealing) are reported. This method must therefore be expected to give lower boundary estimates. To fully capture the size of the underground economy, the approach should be extended to income attributable to capital inputs. The

unofficial transactions (turnover) with goods may be taken as a starting point, but it will not be easy to deduce the value added therefrom.

(2) *Non-Voluntary Tax Auditing and Other Compliance Methods*

Information on the size of the hidden economy can be gained based on the efforts of tax authorities to uncover concealed income.[6] The individuals picked are forced to reveal their income situation under threat of severe punishment. Tax auditing is used to a varying degree in the various countries. It is, for example, extensively used in France where various programs have been developed in order to gain detailed information on the size and distribution of income underreporting. Taxpayers have been randomly drawn in the various Départements, a national sample of taxpayer households has been collected, and discriminant analysis has been applied in order to find an algorithm selecting those taxpayers expected to be most worthwhile to audit (see OECD, 1980a; Conseil des Impôts, 1972–79).

The tax audit results have been extrapolated to cover the whole taxable population in a few countries only. The Swedish Riksskatteverk estimates that in 1978 between 8 and 15 percent of declared income has been concealed (Hansson, 1980, p. 598). In order to estimate those individuals (households) who do not file their Federal income tax at all, the United States General Accounting Office (GAO, 1979) used a representative sample of 50,000 households. It concludes that between 5.6 and 7.8 percent of those required to file in 1972 actually did not. On the basis of this figure, the Internal Revenue Service (IRS, 1979) estimates that in 1976 unreported legal-source income amounts to between 4.4 and 5.9 percent of official GNP, and if guesstimates for illegal-source income are added to between 5.9 and 7.9 percent. These guesstimates do not cover factors such as skimming from corporate expense accounts, theft from business, or barter (see also Wolfe, 1981). More recent estimates of legal and illegal-source income reach a figure of between 9 and 16 percent for 1974 (Simon and Witte, 1982).

Tax auditing has again the advantage that detailed information is obtainable on how far particular income groups and occupations underreport their income or do not report at all. Tax auditing does not, however, allow the direct estimation of the full size of unreported income but rather that amount which would be detected if the same intensive audit techniques were applied to the tax population as a whole. The method is better able to identify the overstating of deductible expenses than the underreporting of income, especially the non-reporting from certain sources (see OECD, 1978a, p. 5).

Besides tax auditing there are a number of *other compliance methods* which can be used to uncover *parts* of the underground economy. Firms and enterpreneurial associations (e.g. the U.S. Chamber of Commerce, the American Management Association) collect data on employees' theft by undertaking control action.[7] Immigration agencies check into the size of illegal work by immigrants.

[6] For a theoretical treatment of tax evasion and its implications see Allingham and Sandmo (1972), Kolm (1973), Isachsen and Strøm (1980), and Sandmo (1981).

[7] See Cunningham and Gross (1979) for estimates for the United States; for the United Kingdom see Henry (1978) and Outer Circle Policy Unit (1978).

According to the specialized literature on the subject[8] this part of the hidden economy is especially sizeable in the United States, but also important in many other industrialized nations (see for example Tahar, 1980). Other public authorities contributing to the detection of clandestine work are the social security agencies.

Tax auditing and other involuntary compliance methods are likely to give higher estimates of the hidden economy compared to extrapolations based on the results of voluntary sample surveys because of the threat of legal sanctions for misreporting.

(3) *Discrepancies between Income and Expenditure*

The first method relying on the residuals approach assumes that income received in the hidden economy will be reflected in expenditures. The surplus of expenditure over income at (a) the *aggregate national income level* or (b) the level of *individual households* thus gives a clue about the size of the hidden economy.

(a) National Income Level

Statistical offices compute national income by measuring national expenditure for goods and services and by income estimates built up from tax returns or from production accounts. The "initial discrepancy" between the two sides—i.e. before adjustments to reconcile the two sides are undertaken—may be taken to reflect the hidden economy's size. This approach has been used in various countries. In the United Kingdom the "unexplained difference" of income estimate shows a strongly increasing trend (O'Higgins, 1981). The absolute size of the hidden economy, however, is estimated to be 2.5–3 percent of officially measured GNP in 1978 only (Macafee, 1980). The corresponding procedure for Sweden shows no clear trend, though the share in GDP is higher than in the United Kingdom, being about 5 percent of official GDP. For the United States, the initial discrepancy has been calculated for an even longer period (Park, 1979). Somewhat surprisingly, the estimates indicate a downward trend; the same holds for the Federal Republic of Germany (Petersen, 1982).

The basic idea of taking the size of the initial difference between the income and the expenditure side of the national accounts as an indicator of the size of the hidden economy certainly makes sense. There is without doubt *some* relationship between the initial discrepancy and the hidden activities. It is, however, equally clear that there are a great many *other* factors influencing the national accounts calculations of the income *and* expenditure or production sides. One is that for various reasons, the expenditure side is more difficult to collect and that in general even the "initial" estimates already contain some information gained from the evaluation of income tax authorities. The absolute size and the development over time of the initial discrepancy also reflect tax authorities' behavior. The discrepancy approach is likely to give a lower bound estimate of the hidden economy, according to various authors (Hornstein, 1980; O'Higgins, 1981).

[8] The most recent are, for example, Martin and Sehgal (1980), North (1980), Sehgal and Vialet (1980).

(b) Individual Household Level

This disaggregated approach to measuring the discrepancy between income and expenditure has been undertaken for the United Kingdom based on the Family Expenditure Survey which measures income and expenditure independently from each other, based mainly on daily record book entries, as well as on credit and hire purchase information collected (Dilnot and Morris, 1981). The discrepancy between expenditure and income arrived at results in a higher bound estimate of 3.0 percent of GNP. It should be noted that these figures correspond almost exactly to the discrepancy measures at the national income level as calculated by O'Higgins (1981) and Macafee (1980).

The discrepancy method applied at the household level is able to give interesting information on disaggregated aspects of the hidden economy and is therefore a useful complement to the aggregate studies. The method also helps to identify the industries and branches where a large amount of hidden activity is expected.

(4) *Difference between Official and Inferred Participation Rates*

This approach attributes the residual between the participation rate as it is officially measured in aggregate statistics and the participation rate derived from comparisons with other countries and previous periods. The participation rate approach has mainly been used by Italian economists (see OECD, 1978b). In Italy one observes indeed a much lower rate of participation in the labor market than in other industrial countries of the West. The Italian participation rate also fell by more than 10 percentage points in less than 20 years, which is significantly more than in comparable industrial countries (Contini, 1981b). The participation rate of other countries or of the beginning of the period considered may be taken as an estimate of the actual participation rate of the country looked at. This allows one to derive an estimate of the relative size of the irregular work force compared to other countries and periods.

The approach is confronted with various rather obvious difficulties. The participation rate for a particular country (or region) and period is influenced by many different factors; it is therefore most doubtful to assume a *constant* participation rate as a benchmark. Only if influences on the participation rate unrelated to the factors causing people to work in the underground are controlled for may the residual be taken as an indicator of the hidden economy.

The identification of what constitutes "participation" in the labor market entails a difficult measurement problem which is particularly relevant here, because the share of second and multiple-job holders may be quite different in the official and in the underground economy. It thus matters how part-time job holders are measured. In order to take account of these measurement problems, Italian researchers have put great emphasis on concurrently using a more direct approach. They have devised special interview techniques to find out the "true" participation rate. While the official participation rate for 1975 is 35.5 percent, the interviews undertaken by DOXA–ISFOL (see CENSIS 1976) have come to an estimate of 39.5 percent. On this basis more than 10 percent of the total working population is attributed to the underground economy. The estimates

presented differ, however, substantially in size. For 1977, for example, the Italian Statistical Office estimates "lavoro nero" to be 13 percent of the labor force. Contini (1981a, b) comes to somewhat more than 17 percent, and to 20 percent if (part of) double-job holders are included, and the CERES Institute (see Frey, 1978) even reaches 25 percent if all multiple-job holders are included.

In order to derive an estimate of the size of the hidden economy in terms of GNP it is necessary to know labor productivity in the underground economy, about which very little is known. It may be argued that it is higher because there are no government restrictions, or that it is lower because activities must be concealed and private contracts are not enforceable by public law.

To look for residuals in the labor market and to infer therefrom the size of the hidden sector has, on the other hand, the advantage of getting close to where the concealed activity takes place.

(5) *Residuals in the Monetary Sphere*

Individuals active in the hidden economy have an incentive to undertake monetary transactions in *cash* in order not to reveal payments in bank statements. The survey made for Norway (Isachsen, Klovland and Strøm, 1982) empirically supports this notion: 82 percent of the number of transactions, and 80 percent of total payments, are made in cash. The importance of cash transactions in the hidden economy is also documented by a British survey which indicates that 71 percent of all clandestine services are paid in cash (Miller, 1979). Though individual cash transactions do not leave any trace in written form, the hidden activities as an *aggregate* still leave an observable trace: The demand for currency increases in comparison to what one would expect if there were no underground economy. This residual between the "normal" and actual currency demand is taken as an indicator for the size of the hidden economy. A first method assumes that currency demand relative to (some measure of) money is a *fixed ratio*, a second one controls for the various influences on that ratio by estimating a currency demand function (*econometric approach*). A quite different method is the *transaction approach*, based on the quantity theory of money.[9]

(a) Fixed Ratio Approach

The "excess" of currency in use compared to a "normal" level may be taken as an indicator of the size of the hidden economy, provided the transactions there taking place rely on cash for payments. The simple approach first used by Gutmann (1977) considering the ratio of currency to demand deposits (C/D)

[9] Not discussed here is the large denomination bills approach which assumes that an increase in the volume of hidden activities is reflected in a rising number of high denomination notes in circulation. This method has obvious shortcomings. It suffices to note that the "theory" connecting the use of large bills and the size of the underground economy is extremely vague and that a large number of factors immediately come into one's mind which could as well explain the shift toward large denominations such as inflation, increased hoarding (for whatever reason) and the outflow to foreign lands. The literature is rightly sceptical about this approach (see, for example, IRS, 1979; Macafee, 1980; O'Higgins, 1981). The approach may, however, be useful to geographically locate the areas in which hidden activities are likely to be highest. A recent study (Stankey, 1979) indicates, for example, that disproportionately large volumes of currency are flowing into Florida, due to criminals tending to deal in cash.

makes three crucial *theoretical* assumptions: First, there is a one to one relationship between transactions and cash payments in the hidden economy, i.e. there are no payments by check, and barter is excluded. Second, the velocity of currency in the hidden economy is the same as in the official economy. Third, the "normal" currency-demand deposit ratio is constant.

The second assumption allows one to make the step from "excess" currency to the size of the hidden economy in terms of GNP. Applying the approach to the United States, Gutmann also makes two additional *empirical* assumptions relating to the base period: Fourth, the C/D ratio prevailing in 1937/41 is considered "normal" (and would thus still exist today if it were not for the shadow economy). Fifth, in 1937–41 there was no underground economy.

On the basis of these theoretical and empirical assumptions Gutmann (1977, 1979) estimates that in the United States in 1976 and 1979 the hidden economy comprised at least 10 percent of officially measured GNP. A "more realistic" figure would be 13 to 14 percent of GNP (Gutmann, 1979).

The fixed ratio approach is rather sensitive to the precise theoretical and empirical assumptions made. This creates major problems, since Gutmann and many of the authors following him do not provide any rationale why one particular assumption is made, and not another one. Klovland (1980, Table 9) has shown with data for Norway and Sweden that the C/D-method is very sensitive to the second assumption on the velocity of currency: Increasing the velocity of currency from 4.7 to 11.7 (all values which can be considered "reasonable"), the size of the hidden economy rises from 6.9 to 17.2 percent of GNP in Sweden, and from 6.4 to 16 percent of GNP in Norway, both for 1978. It has also been shown that the two *empirical assumptions* (four and five) about the base year crucially determine the size of the estimates: If the currency-demand deposit ratio for the period 1935–39 is taken as the base in Gutmann's estimate, the hidden economy is estimated to be $165 billion in the United States in 1976; if the period 1925–29 is taken as the base, the corresponding estimate is $262 billion, implying a range of nearly $100 billion in response to a variation in the base currency-demand deposit ratio of only 0.06 (IRS, 1979, p. 48). In the United Kingdom, the currency-demand deposit ratio declined in the 1960s and 1970s and by 1974 was only about two-thirds as large as in 1963 which would lead to the estimate that the underground economy's size has been *falling* over this period. If 1963 instead of 1964 is taken as the base year, the estimated size of the hidden economy for 1974 would be negative! (O'Higgins, 1981, Table 3). A major weakness of the C/D-method is the third assumption that the "normal" ratio between currency and demand deposits is fixed, and that *all* changes in this ratio are attributed to the hidden economy. Such a residual approach only makes sense if there are no other factors influencing the C/D ratio. As has been demonstrated in the path-breaking study by Cagan (1958), and which has since then been integrated into monetary theory,[10] there are a great many factors influencing the relationship between currency and other monetary magnitudes (be it demand deposits or some measure of M). According to Cagan (1958) these are the opportunity cost of

[10] See, for example, Goldfeld (1973, 1976), Laurent (1974), and Porter, Simpson and Mauskopf (1980).

holding currency, expected real per capita income, the volume of retail trade, the amount of travelling per capita, the degree of urbanization, and the level of income taxation. In addition, many other relative price and income changes (such as that with increasing crime rates, people will tend to carry less cash, and in smaller denominations), changes in institutional arrangements (e.g. the increased use of checks and credit cards), and changes in tastes may affect the demand for currency.[11]

(b) Econometric Approach

The need to control for such influences has been recognized in some of the most recent studies and has lead to a new "generation" of models to estimate the size of the hidden economy. An effort is made to identify the influences of these factors on currency demand in order to ensure that the "extra" currency can really be attributed to the working of the underground economy. Assuming that the increasing burden of taxation leads people to take up additional currency, the goal is to econometrically estimate a stable relationship between currency and personal taxes. This makes it possible to evaluate the level of, and the change in, the size of the hidden economy which can be attributed to the burden of taxation. This approach has been pioneered by Tanzi (1980a) for the United States and Klovland (1980) for Sweden and Norway.

Tanzi (1980a, Table 2) estimates a currency demand equation over the period 1929–76 taking besides the tax burden, the share of wages and salaries in personal income, real per capita income, and the interest rate on time deposits as explanatory variables. He reaches the result that a rising burden of personal taxation increases currency holdings (relative to M_2) in a highly significant way. On the basis of the estimated equation and the actual figures for the explanatory variables, the difference in currency demand is then predicted when the actual tax burden in 1976 is compared (i) to the lowest tax burden existing over the estimation period, or (ii) to a situation of no taxes at all. Assuming the same velocity of currency in the underground economy as in the official economy, procedure (i) leads to the estimate that the *increase* of the hidden economy attributed to taxation amounts between 3.4 and 5.1 percent of GNP, and if procedure (ii) is used, to a corresponding *level* of the hidden economy of between 8.1 and 11.7 percent of GNP, both for 1976.

Klovland (1980, see also Isachsen, Klovland, Strøm, 1982) estimates currency-demand equations for various periods between 1910 and 1965 for Sweden and Norway. The out of sample predictions of currency holdings for 1978 are smaller than actual holdings, showing "excess" currency demand attributable to the increase of taxation over the period 1965–78. Assuming equal velocity of currency in the official and hidden sectors, the underground economy is estimated to be 13.2 percent of GDP in Sweden and 9.2 percent of GDP in Norway in 1978.

[11] Gutmann's approach has been criticized on this account in various studies. Garcia (1978) and Garcia and Pak (1979) point out that the increase in the currency-demand-deposit ratio is largely due to a slowdown in demand deposits rather than to an increase in currency. Dynamic simulations with the MIT-PENN-SSRC econometric model show indeed that the observed rise of the C/D-ratio has been dominated by developments in demand deposits, and not currency. The IRS study (1979) strongly emphasizes (pp. 31–38) that the predominant reason for the increase in currency is household savings. For related criticisms of Gutmann's study see e.g. Laurent (1979) and Bowsher (1980).

Estimates for the Federal Republic of Gernany for 1980 yield a size of the hidden economy of 4–13 percent (Langfeldt, 1982) and 8–12 percent (Kirchgaessner, 1983). The corresponding estimate for Canada and 1976 is 5–8 percent (Mirus and Smith, 1982).

The econometric estimates consider only one particular factor causing the existence of an underground economy, taxation: The estimate of the currency demand equation leads to rather large differences in the parameter sizes showing the effect of taxation on currency holdings in alternative, equally "reasonable" estimation equations. The results also differ greatly depending on which precise assumptions have been made with respect to the velocity of circulation in the official and underground sectors. Accordingly, the estimates of the size of the hidden economy in terms of GNP based on this method show large variations not only between countries and time periods, but also for a given country and period. For the United States in particular, the fact that the dollar is used as an international currency creates problems. The U.S. dollar is used as a national currency unit in countries such as Liberia and Samoa; in many countries such as the Bahamas, Bermuda, Dominican Republic and Panama it is used freely alongside the official currency; in many parts of South America and throughout the Far East it is as acceptable as national currencies. This means that relating total U.S. dollars in circulation throughout the world to domestic activity in the United States is questionable (see Blades, 1982 for a fuller discussion).

(c) Transactions Approach

Activities in both the official and underground economy require money to undertake the necessary transactions. If, following the quantity theory of money, a constant relationship between money and transactions is assumed, the total stock of money gives an indication of *total* transactions in both the official *and* hidden economy. Relating *total* nominal GNP to total transactions, the hidden economy's GNP can be derived residually by subtracting officially measured GNP from total GNP. This approach does not need to make any assumption about the type of money used in the underground economy (except that it is not by barter), but following the quantity equation $M \cdot v = p \cdot T$ (v = velocity of money, p = price level of transactions, T = volume of transactions), assumptions are required about v and about the relationship between the value of total transactions $p \cdot T$ and nominal total GNP.

This approach has been propagated by Feige (1979) who applies it to the United States. 1939 is taken as the "base year" in which it is assumed that there was no underground economy and in which therefore the ratio of $p \cdot T$ to nominal (official and total) GNP was "normal" (it equals 10.3). The hidden economy is estimated to be 22 percent of official GNP for 1976, and 33 percent for 1979. The hidden economy increased by 91 percent over these two years, compared to a nominal growth rate of the official economy of only 23 percent. Again the choice of the base year is crucial. The transactions method gives a negative hidden economy for the whole period between 1939 and 1968, and it suggests a falling underground economy during World War II, when casual observations suggest a strongly rising trend. Feige (1980) therefore modified his approach in various ways. In particular, he estimated the velocity of money by analyzing the length

of life of paper currency, which decreased during the war due to deteriorating paper quality. The modified estimates of the hidden economy resulted in positive estimates for the entire period 1939–79. Its size is estimated at 27 per cent of GNP in 1979. The implied huge increase in the hidden economy could not, however, be corroborated by Denison's (1982) careful research of the necessary consequences in the labor market.

The discussion shows that the application of the transactions method requires rather strong assumptions. As in the currency demand approach, the choice of the base period is crucial. In line with the simple Gutmann (1977) method, it is assumed that a monetary ratio—here the ratio of the total value of transactions to officially measured GNP—would stay constant at its "normal" level if it had not been for the growth of the underground economy, i.e. all *changes* in the ratio are attributed to the hidden economy. In order to improve the transactions method it is necessary to develop a theory of what factors may influence the above-mentioned ratio, to develop a test equation, and to econometrically estimate it for the country and period chosen. The quality of the banknotes is only one of the many possible factors.

Comparison of Indicator Approaches

Tables 1–4 show estimates of the size of the hidden economy in terms of GNP for the United States, the United Kingdom, Sweden and the Federal Republic of Germany based on the various estimation approaches discussed.

The general impression is that the underground economy is *sizeable.* For the United States, for example, the *median* estimate of the studies shown in Table 1 for the year 1976 (for which estimates are available for all approaches) is 7–10 percent of GNP. If this median estimate of the studies available bears a reasonable relationship to the true size, the large magnitude of the hidden economy points to important problems in developed societies and may suggest major revisions in economic policy.

The next thing to be observed is the *variation* of the estimates presented, not only between countries and periods, but also for the same country, period and even author. For the United States, the estimates based solely, for example, on the monetary approach for 1976 range from 8.1 to 22 percent of GNP. The variance of estimates increases even more if the results reached by the other approaches are considered. This large variance in estimates is not really surprising because different aspects of the hidden economy are measured. The large range of results obtained should thus not so much be attributed to the shortcomings of any particular method as such but rather to different objects measured. Depending on the intended use of the results, the *appropriate* method should be chosen. If the purpose in measuring the hidden economy is, for example, to detect the amount of taxes not reported, the national income definition of what constitutes "income" is of relatively little interest because there are many taxable items—in particular transfer payments and realized capital gains—which are not income from current production of goods and services (and therefore are not included in national income measures).[12] On the other hand, there is of course

[12] For the many different meanings of "income" see Bittker and Stone (1972, pp. 37–126) and other literature quoted in IRS (1979, p. 18).

TABLE 1

UNITED STATES: ESTIMATES OF THE SIZE OF THE HIDDEN ECONOMY IN TERMS OF GNP, VARIOUS MEASUREMENT APPROACHES

Year	Size in terms of GNP (%)	Specification	Approach	Author
1976	4.4–5.9	undeclared legal-source income	tax auditing	IRS (1979)
	5.9–7.9	undeclared legal- and illegal-source income		
1968	5.5	—	initial discrepancy: national income level	Park (1979)
1970	5.0			
1972	4.2			
1974	4.3			
1976	3.9			
1977	4.0			
1968	5.8	base: 1937–1941	fixed currency-demand deposit ratio	Gutmann (1977, 1979)
1970	6.2			
1974	6.3			
1976	11.0			
1979	13.5			
1979	28.0	base: 1964 (assuming a hidden economy of 5 percent of GNP)	modified currency-demand deposit ratio	Feige (1980)
1976	3.4–5.1	increase in hidden economy due to taxation; base: 1931	currency-demand equation estimate	Tanzi (1980a)
	8.1–11.7	corresponding level		
1976	22.0	base: 1939	simple transaction	Feige (1979)
1979	33.0			
1979	27.0	base: 1939	modified transaction	Feige (1980)

income not subject to taxation, e.g. small incomes of housewives or students below a minimum level.

The approaches discussed lead to different typical estimates relative to each other:

Sample surveys tend to lead to comparatively small estimates of the hidden economy, as evidenced by Sweden (Table 3) with an estimate of 0.5 percent for the late 1970s. This may be explained by the voluntary nature of this approach: Respondents have little to gain by stating that they are active in the underground economy, but they have to fear that—despite the promises of the interviewers—they may be punished for tax cheating.

Tax auditing results in higher estimates of hidden incomes than voluntary responses to surveys. The reason is likely to be that the people subjected to examination by the tax authorities are forced to reveal their underground activities under threat of possibly severe punishment, and the investigators are not easily

TABLE 2

UNITED KINGDOM: ESTIMATES OF THE SIZE OF THE HIDDEN ECONOMY IN TERMS OF GNP, VARIOUS MEASUREMENT APPROACHES

Year	Size in terms of GNP (%)	Specification	Approach	Author
1968 1970 1972 1974 1976 1978	0.7 1.0 1.1 2.0 2.5 2.9	—	initial discrepancy: national income level	O'Higgins (1981)
1978	2.5–3.0	—	initial discrepancy: national income level	Macafee (1980)
1977	2.3–3.0	—	initial discrepancy: individual household level	Dilnot and Morris (1981)
1968 1972 1977 1979	18.8 16.2 7.5 7.2	base: 1977 (assuming a hidden economy of 7.5% of GNP)	fixed currency-demand deposit ratio	Dilnot and Morris (1981, Table 1)
1979	15.0% GDP	base: 1960	simple transaction	Feige (1981)

deceived. For Sweden and the 1970s, the size of the hidden economy is indeed estimated to be larger (1.4–5.4 percent of GNP) than is the case with voluntary sampling (0.5 percent of GNP).

The *discrepancy* approach yields estimates of similar size to the tax auditing method. In the United Kingdom (Table 2), for example, and the 1970s, the discrepancy method yields between 1–3 percent of GNP, whereas tax-auditing-based estimates lie between 1–2 percent of GDP. Similarly, in Sweden tax auditing yields 1 to 5 percent of GNP in 1977, while the initial discrepancy approach yields about 5 percent. In the United States the results based on the discrepancy method come to around 4 percent of GNP for the late 1970s, whereas tax-auditing-based methods yield about 1.5 percent. The IRS study using tax auditing statistics comes to higher estimates (up to 8 percent of GNP) because non-filers and illegal-source income are included. As is the case with tax auditing, concealed income particularly from barter and in-kind activities are not fully counted.

The *participation rate* approach leads to rather large estimates for Italy (between 14 and 20 percent of GNP). This approach underestimates the true size if it is based on a comparison of the participation rate in Italy with that of other countries since this implicitly assumes that there was *no* hidden economy in those other countries. The participation rate approach underestimates the true size of the hidden economy in so far as concealed income from non-work sources is disregarded.

TABLE 3

SWEDEN: ESTIMATES OF THE SIZE OF THE HIDDEN ECONOMY IN TERMS OF GNP; VARIOUS MEASUREMENT APPROACHES

Year	Size in terms of GNP (%)	Specification	Approach	Author
1979	0.5	—	sample survey	SIFO (1981)
1977	1.4–5.6	—	tax auditing	Rikspolisstyrelsen (1977)
1968	4.2–5.8	—	initial discrepancy: national income level	Hansson (1982, Table 2)
1970	4.3–6.9			
1972	3.5–6.1			
1974	4.4–7.1			
1976	4.0–6.6			
1978	4.0–6.7			
1979	3.9–6.5			
1976	10.0	base: 1955	fixed currency-demand deposit ratio	Veckans Affaerer (1978)
1978	13.2	same currency velocity in both sectors; base: 1952	currency demand equation estimate	Klovland (1980, Table 9)
	6.9–17.2	various assumptions about currency velocity in the hidden and the official sectors		

TABLE 4

FEDERAL REPUBLIC OF GERMANY: ESTIMATES OF THE SIZE OF THE HIDDEN ECONOMY IN TERMS OF GNP, VARIOUS MEASUREMENT APPROACHES

Year	Size in terms of GNP (%)	Specification	Approach	Author
1968	12.4	—	initial discrepancy: national income level	Petersen (1982, Table 4)
1971	6.5			
1974	4.8			
1980	8.0–12.0	base: 1955	currency demand equation estimate	Kirchgaessner (1983)
	4.0–13.0	base: 1952		Langfeldt (1982)
1980	16.0–24.0	base: 1956	simple transaction	Langfeldt (1982)

The *monetary* approaches give by far the largest estimates of all approaches as they are in principle able to capture all activities in the underground economy transacted with money, including illegal ones. For the United States (Table 1), the estimates for the 1970s lie between 8 percent (considering only tax influences) and 33 percent of GNP, with most estimates lying above 20 percent, compared to estimates of less than 10 percent with the tax audit or initial discrepancy methods. For Sweden too, this approach gives by far larger estimates (7–17 percent of GNP) than the sample survey or the tax audit approach (up to $6\frac{1}{2}$ percent of GNP). For the United Kingdom, the fixed currency-demand deposit ratio approach gives questionable results, showing that the hidden economy has been falling over time or is of negative size, depending on the base chosen.

The transaction method yields much larger estimates than the currency-demand deposit method for all countries. For Germany and 1980 (Table 4), for instance, the hidden economy is estimated to be 16–24 percent of official GNP by the transaction method, while it is only up to 13 percent by the currency-demand function estimate. The transactions approach covers *all* transactions using money as a means of payment (but excludes barter).

Each one of the approaches has its *specific* strength and weakness. It is important to be well aware of the *crucial* assumptions necessary to apply a particular method, i.e. those assumptions on whose choice the estimate of the hidden economy's size is most sensitive. There is no need here to go into the general problems of each of the methods discussed (e.g. the incentive to misreport in surveys) or to repeat the problems with which every residual method is confronted, i.e. the control of other influences and the choice of the base period. Rather, the particular assumptions needed by the various methods to reach an estimate *in terms of GNP* will be discussed:

(a) The approaches considering the payments in the hidden economy—the sample survey and the transaction methods—need to make an assumption transforming the monetary transactions made into value added (GNP). This relationship depends on the degree of integration and the relative prices between all goods (total transactions) and newly produced goods (included in GNP) (see Feige, 1979). This is, of course, well known, but what matters is to know if, and if so to what extent, these factors *differ* as between the official and the hidden economy.

(b) The approaches considering money (in a narrow or wide sense) holdings—the currency and the transactions approaches—have to make an assumption about the velocity of money. So far, there is no information about whether currency and other types of money flow more quickly in the hidden than in the official economy.

(c) The participation rate approach has to transform the number of people working in the hidden economy into GNP by making an assumption about labor productivity. Again it matters to what extent this productivity differs as between the official and hidden sectors. As has been remarked above (section 4) on the basis of theoretical reasoning it is impossible to say where productivity is higher.

It should be noted that in all three cases (a), (b), and (c), the assumptions required to provide an estimate in terms of GNP have no direct relationship to

the type of theoretical approach used. The currency-demand deposit ratio method is e.g. based on the theory that underground activities are paid in cash. The relative velocity of currency in this sector (compared to the official sector) is completely *exogenous* to this theory. The identification of the crucial and at the same time *ad hoc* assumption required by each approach points the way to the direction in which the approach must be further developed both with respect to theory and enquiry.

The discusssion of the various methods for estimating the underground economy shows that each one of them is confronted with major problems, and that none is near to being perfect. Due to the *different* strengths and weaknesses it makes sense that the various methods co-exist, and that they may complement each other in a fruitful way. The survey approach, for example, has given important information on how payments are undertaken in the hidden economy (see Isachsen, Klovland and Strøm, 1982), and thus provides an important input necessary for the application of the monetary methods. The multitude of approaches existing is not a sign of confusion but rather of the fact that economists have been able to see that the hidden economy is multifaceted.

IV. Measurement by Determinants

The approaches so far discussed endeavour to measure the size and development of the hidden economy by looking at various *indicators* or *traces* left behind. Only one approach, the currency demand equation estimate, takes determinants or causes into account, but it has so far been restricted to just *one*, the burden of taxation. This section considers a number of possible causes for the rise of a hidden economy. It will be shown how the method of "soft modelling" makes it possible to derive an estimate of the development of the hidden economy on the basis of the development of the various determinants.

The following variables may be considered to be among the causes leading to a hidden economy:[13]

(i) *Burdens on the official economy.* These burdens are composed of *taxes* and *social security contributions.* There can be little doubt that increasing taxation makes activities in the hidden economy more attractive. Another reason why people join the hidden economy is the increasing number of *public regulations* to be observed in the official economy.

(ii) *Tax morality and government controls.* A worsening of *tax morality* (which in turn is due to factors such as subjectively perceived tax burdens and reduced trust in government) tends to lead to an increased readiness to become active in the hidden economy. A growing intensity of *public controls* and a rise in expected *punishment* ceteris paribus reduces the return on hidden activities and therefore has the opposite effect.

(iii) *Labor market conditions.* The longer *official worktime*, the higher are the opportunity costs of taking up additional work in the hidden economy. A reduction in the *official participation rate* also indicates increasing opportunities to become active in the unofficial economy.

[13] Only the most important determinants are discussed here; for some other causes see, for example, Ferman and Ferman (1973) and Grubel (1982).

(iv) *Structural factors.* The determinants listed so far do not apply to all individuals and firms in the same way. Rather, there are certain *economic sectors* (particularly those with low capital intensity), *industries* (e.g. handicraft) but also *workers* (e.g. foreign workers) in which a higher probability of working in the hidden economy can be assumed. If these branches or groups of workers gain in weight, the hidden economy will ceteris paribus also grow relative to the official economy.[14]

The usual procedure in econometrics is to regress the various determinants $D_i (i = 1, 2, \ldots n)$ on the dependent variable H(hidden economy). In the simplest case of linear regression, $H = \sum_{i=1}^{n} \alpha_i D_i + \varepsilon$ (where ε is the random error), the parameter or weights $\hat{\alpha}_i$ of the determinants D_i are derived. In the case of the hidden economy, this procedure is impossible because the dependent variable H is unknown. The procedure must be reversed: on the basis of information about the determinants D_i assumptions are made about the weights α_i (with $0 \leq \alpha_i \leq 1$, $\sum \alpha_i = 1$), which makes it possible to infer the (relative) size of the hidden economy. (Method of "*soft modelling*", see Kofler and Menges 1976). While the exact weight of the various determinants is unknown, the literature provides information about their *relative* weight. For the United States and the Federal Republic of Germany the following relative size of the weights has been assumed:[15]

$$\alpha_1(\text{tax burden}) \geq \alpha_2(\text{decrease of tax morality}) \geq \alpha_3(\text{burden of regulation}) \geq \alpha_4(\text{participation rate}) = \alpha_5(\text{work time}) \geq \alpha_6(\text{share of foreign workers}).$$

This ranking of weights is compatible with five weighting schemes, the most extreme being that only the tax burden matters ($\alpha_1 = 1$, $\alpha_j = 0, j = 2, \ldots 6$), or that every determinant has the same weight ($\alpha_i = \frac{1}{6}, \forall$). The analyses for the United States (1952–80) and Germany (1960–78) strongly suggest that in both countries the hidden economy has been growing over time, absolutely and in comparison to officially measured GNP.[16]

V. Combining Determinants and Indicators

Section III discussed how the hidden economy can be measured by looking at *indicators.* The last section IV discussed how the hidden economy can be measured by looking at the *determinants.* A logical next step is to combine these two general approaches by jointly considering the determinants *and* indicators. The "unobserved" hidden economy is influenced by the determinants and in turn has an effect on the indicators. The factor analytic method of "*unobserved variables*" can be used to estimate empirically the parameters linking the deter-

[14] Such a purely structural approach is used by Fisher (1983) who therewith estimates that the hidden economy was 3–4 percent compared to official GNP in Australia in 1980.

[15] See Weck, Pommerehne and Frey (1983) for the United States, and Frey, Weck and Pommerehne (1982) for Germany.

[16] Soft modelling has also been used to determine the relative size of, and the relative increase in, the size of the hidden economies of OECD countries (Frey and Weck, 1983a, b).

minants to the size of the hidden economy, and the size of the hidden economy to the indicators. Using the specific LISREL estimation procedure (Joereskog, 1969), this method has been used to quantify the relative size of the hidden economies of 17 OECD countries by using both cross-section and time series (1960–78) information (Frey and Weck, 1982). It turns out that while all parameters bear the theoretically expected sign, the burden of direct taxation, of regulation and of tax immorality (i.e. of negatively coded tax morality) have a statistically significant influence on the size of the hidden economy. The strongest indicator for an increase in the hidden economy proves to be the decrease in official work time, followed by a decrease in the participation rate and in the officially measured real growth rate of GNP.

The statistically significant parameters pertaining to the determinants can be used to estimate the relative size and temporal development of the hidden economy. The respective estimation equation is

$$H = 0.36\,(\text{burden of direct taxes}) + 0.28\,(\text{burden of regulation}) + 0.36\,(\text{tax immorality}).$$

The estimation procedure makes it possible to derive the size of hidden economies relative to each other only. 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, and another to establish the difference in size between the countries. Table 5 shows the size of the hidden economy for the 17 OECD countries in the year 1978 when the estimates of Klovland (1980) for Sweden (13.2 percent of official GNP) and for Norway (9.2 percent) are taken as bases.

According to these estimates, Sweden, Denmark, Belgium and Italy have the largest hidden economies, amounting to more than 10 percent of official GNP, among the OECD countries. France, Canada, Germany, the United States and the United Kingdom have a medium sized hidden economy (8–10 percent of GNP). Switzerland and Japan have the smallest hidden economy, around 4 percent of GNP.

TABLE 5

ESTIMATES OF THE SIZE OF THE HIDDEN ECONOMY IN TERMS OF GNP (%), 17 OECD COUNTRIES, 1978

Sweden[a]	13.2	Germany	8.3
Denmark	11.8	United States	8.2
Belgium	11.5	United Kingdom	8.1
Italy	10.5	Finland	7.6
Netherlands	9.2	Ireland	7.0
Norway[a]	9.2	Spain	6.0
France	8.7	Switzerland	4.5
Canada	8.6	Japan	3.9
Austria	8.6		

[a] The base values for Sweden and Norway are taken from currency demand equation estimates by Klovland (1980).

Source: Frey and Weck (1982).

Evaluation

The "soft modelling" and the "hidden variables" method used in this and the last sections constitute a definite improvement over the methods previously discussed, in so far as they take the causes of the rise of the hidden economy into account. This is not only crucial from the point of view of economic policy but also makes it possible to bring available information into the formal estimation process usefully. The disadvantage of both approaches is that only the relative size of the hidden economy can be derived. From the economic policy point of view this is not so grave, as it is usually more important to know whether the illegal economy has increased or decreased (relative to the official economy). While estimations by soft modelling are quite robust against changes in the explanatory variables, the unobserved variable method is rather sensitive, so that one must be careful in interpreting the results. The estimates presented share another shortcoming, namely the weak data base. In particular, there is insufficient information on tax morality and on the extent and intensity of controls.

VI. Concluding Remarks

It has been argued that for economic theory and policy it is important to know the size and development of the hidden economy. It can be quantitatively estimated in various ways, using indicators, determinants, and a combination of the two. There is no one "best" method; each approach highlights different aspects and therefore has specific strengths and weaknesses. The results of the estimates that lead to a considerable range of sizes for the underground economy are evaluated and compared to each other for various countries. Though the range of size estimates is wide, there is general agreement that the size has been growing for all countries over recent decades.

As is often the case with areas receiving rapidly increasing attention, the research emphasis has been directed towards gaining an overall quantitative picture of the phenomenon concerned. The next step must be to derive a *theoretical model* analyzing the relationship between the official private sector, the hidden economy, and the public sector which is connected to both, especially via taxation and regulation. This would also mean that explicit demand and supply functions for irregular activities are derived. Such a model will make it possible to study the interdependent nature of the relationships identified. Thus, a rising tax burden not only provides an incentive to enter the hidden sector, but when the hidden sector increases, government may be inclined to raise the tax rate in the official sector in an effort to keep up revenues. The same holds for other "causal" variables, for example, the nature of government controls of the hidden economy is not an exogenous, but rather an *endogenous* variable, as they will certainly be set in reaction to the (supposed) size of the hidden economy. An interdependent model of the three sectors would also help to solve the problem of the changes in variables such as the participation rate, which are at the same time the cause and effect of the existence and growth of the underground economy. Such a broadening of the analysis would provide the necessary foundation for a normative evaluation of the hidden economy.

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