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Measuring the Hidden Economy: Though This Be Madness, There Is Method in It

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Introduction

Few would deny that there is a hidden economy, and many can bring forward amusing examples of how the underground economy works. However, an equally overwhelming majority of people would state that the hidden economy is impossible to measure just because it *is* hidden. If one makes the effort of searching in the gray literature of yet unpublished papers one quickly finds out that this is not the case—there already exist a great many estimates of the size of the hidden economy (though not all researchers seem to be fully aware of this).

The underground economy is a very complex phenomenon comprising a lot of different but interrelated aspects. It is indeed not possible to measure its size directly, but the *traces* it leaves in other spheres of the economy can be analyzed and to some extent measured. Since the hidden economy leaves many different traces, many approaches have been suggested by researchers to capture the size of this sector. Thus, the estimates existing are based on a multitude of methods.

Aspects of Determining the Hidden Economy's Size

From Speculations to Estimates

The size of the hidden economy is quantified in three different ways:

1. Figures advanced on the basis of pure *speculation*, the rationale being that the public, politicians, and academics should be made aware that the phenomenon exists and that it can no longer be disregarded. Examples are the figures provided by DeGrazia (1980) for West Germany based on calculations of the Zentralverband des Deutschen Hand-

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werks according to which Germany's hidden economy comprises 2 percent of gross national product (GNP), or Intersocial (1980) that in the case of Japan it is 1 percent of GNP, or the *Wirtschaftswoche* (1980) that Italy's hidden economy amounts to 30 to 40 percent of GNP.

2. *Educated guesses*, based on some more or less coherent reasoning. The best known and widely quoted example is Sir William Pile's (then chairman of the United Kingdom Inland Revenue Service Board) figure that the British submerged economy plausibly amounts to 7.5 percent of GNP.¹ For the Soviet Union and other communist countries, educated guesses are often the only means of quantifying the size of the private—and in countries based on socialized production, usually the unofficial—economy. Kaiser (1976, p. 370) advances the figure of 20 percent of the official economy for unofficial legal and illegal activities in the USSR in 1970, while Katz (1973, p. 90) reports 10 to 15 percent for the 1960s. Grossmann (1977, p. 35) suggests that in the same country the size of the legal private economy has been falling from 22 percent (1950) to 10 percent (1968) and less than 10 percent of GNP in 1977, and Schroeder and Greenslade (1979, p. 4) report a figure of 8 percent of GNP for 1970.
3. Estimates based on *well-defined methods*. The present study will be restricted to this type of measurement.

With all three types of quantifying the hidden economy, *what* is being measured often remains unclear. Some authors take turnover (for example, in the case of illegal underworld activities, such as dealing in drugs, the total expenditures for such goods are counted) while other authors consider limited aspects of the hidden economy only (for example, tax evasion). There is a growing consensus, however, that the definition of the hidden economy involves two aspects:²

1. The hidden economy is the one that "escapes the purview of our current societal measurement apparatus" (Feige 1980b, p. 3);
2. The activities taking place in the underground economy should be measured in terms of GNP.

Such a definition allows a comparison of the size of the hidden economy with (officially measured) gross national product. What is to be included within national income, is, of course, a matter of accounting convention. We follow the standard national income accounting framework here, and thus exclude activities such as work in one's own private household (like cooking and child rearing) or the work performed in the voluntary or "third" sector. It suffices to point out here that this informal sector is being

studied (see, for example, Weisbrod 1977, Gershuny 1978, 1979, and Badelt 1980) and that there are successful attempts to quantify "total incomes" including such things as household services and do-it-yourself.³ What is neither included in the official national income accounts but what we *do* consider here are those income-producing activities which are either illegal or incorrectly reported, including in some cases in-kind and barter activities.

From Residuals to Identifying Determinants

The most straightforward approach to measuring the hidden economy is to attribute it to the *residual* which is left over after all other (known) influences are accounted for.⁴ This procedure is, for example, followed if one attributes the difference between the income and the expenditure sides of GNP, or the change in currency compared to demand deposits to the underground economy.

It is more sophisticated to identify the factors which *cause* the rise and existence of the hidden economy. Almost without exception, authors stress *taxation* as the crucial factor which induces people to become economically active in the underground. Some studies (Tanzi 1980b, Klovland 1980) therefore explicitly estimate the influence of taxation on the rise of the hidden economy.

Taxation is not the only factor that causes the rise of an underground sector. Some studies (Feige 1980b, Frey and Weck 1981b) make an effort to identify further causes, such as regulation and tax morality.

The Many Methods of Estimation

In view of the extraordinary problem of estimating such a complex phenomenon as the unobserved economy where the participants make a strong effort to conceal their income-producing activity, one would not be surprised if a science confronted with this problem would just give up. It is a tribute to economics as a science that this has not been the case, but that ingenious methods have nevertheless been developed to measure the hidden economy.

The many methods can be classified in different ways, such as distinguishing between micro and macro, or accounting and econometric approaches. In order to prepare for an approach more deeply rooted in economic theory, we will classify according to the behavior of the various decision makers who generate the traces on the basis of which the hidden economy's size is estimated. Four general approaches are distinguished:

1. Traces in the form of *discrepancies between income and expenditures*, both at the macro and micro level;
2. Traces revealed by *tax auditing* and other *compliance methods*;
3. Traces appearing in the *labor market*;
4. Traces visible in *monetary aggregates*.

It is not surprising that these traces generated by the various kinds of behavior do not necessarily take into account the *same* aspect of submerged activities.

Traces in the Form of Discrepancies between Income and Expenditure

While some income earned by an individual may go unreported or under-reported as such, much of it will later show up as expenditure. If this is true, then the discrepancy between income and expenditure gives a clue to the size of the hidden economy. Moreover, looking at year-to-year changes in the relative size of these discrepancies, it may be argued that this is an indication of the trend of the hidden economy. The first approach considered deals with such a comparison between income and expenditure at the macro (national income) level. The second approach deals with the micro level and looks at the income-expenditure discrepancy of particular individuals or groups.

Comparisons of Various Ways of Estimating Income. National income is assessed by statistical offices in two ways, the measurement of aggregate expenditure and of income. The first method of tracking the size of the hidden economy is to compare national accounts estimates of income with income estimates built up from tax returns. The difference should represent an estimate of the income not reported to the tax authority.

Such comparisons have been undertaken for various countries.⁵ The most comprehensive study has been undertaken for the United States (Park 1979). It attempts to measure the "unexplained difference" or "residual error" between the estimate of personal income by the Bureau of Economic Analysis (BEA) and that of adjusted gross income on the basis of a sample of tax returns by the Internal Revenue Service (IRS). Due to the differences in the statistical coverage of national accounts data and tax data (for example, for some types of households and some minimal income no reporting to tax authorities is needed) as well as in the underlying income concepts, appropriate adjustments are required to make the estimates compatible. For 1977 the compatible estimate of adjusted gross income by BEA exceeds the IRS estimate by more than 82 billion (current) dollars or 4 percent in terms

of measured GNP. For earlier years, however, Park finds a significantly higher fraction of GNP, namely 5.5 percent for 1968 and 9.4 percent for 1948. If this discrepancy is taken to be a reflection of the size of the hidden economy, it seems to have *fallen* since World War II.

O'Higgins (1980) finds for the United Kingdom and the 1970s an opposite development of the discrepancy between the aggregate amount of income in the national accounts and the aggregate income estimates based on (adjusted) tax returns. While officially measured national income increased threefold between 1970 and 1978, the unexplained difference increased ninefold. However, in absolute size the submerged economy is estimated to amount to only 2.5 to 3.0 percent of GNP in 1978 (Macafee 1980). Sweden's Statistiska Centralbyrån estimates for the same year a residual error of 4.7 percent of officially measured GNP (Hansson 1980, p. 597 ff.), and the Danish Council of Economic Experts (Økonomiske Råd 1977, p. 118) estimates it to be 6 percent in 1974/1975. There are also estimates for other continental countries. Albers (1974) arrives at a discrepancy of 8.9 percent of GNP for the Federal Republic of Germany for 1968, while Frank (1972, 1976) arrives at somewhat less than 20 percent of GNP for Belgium in the years 1965, 1966, and 1970. Roze (1971) calculates an even larger size for France: The estimate of missing factor incomes is computed at roughly 23 percent of GNP for 1965.⁶

It may be noted that the estimates for the Central European countries are much larger and have a greater variance than those of Anglo-Saxon countries. They reflect at the same time the considerable differences according to which the tax authorities lay hands on individual incomes. The Anglo-Saxon countries and Germany aim at the most comprehensive grip of incomes as possible, while Latin countries rely more on the taxation of goods and services.

Survey and Sampling Methods. An "unexplained difference" also appears when expenditures and incomes of private households are considered. If the sample is representative, the survey results can be extrapolated to give an estimate of the hidden sector of the economy as a whole.

We are not aware of any study in which a comprehensive consumer survey has been used to extrapolate although research is underway in this direction in the United States. There have, however, been attempts to calculate expenditure-income discrepancies for specific types of households, occupational groups, and income classes and to compare them with the suitably disaggregated unexplained residuals on the macro level.⁷ Undertaking such a comparison, O'Higgins (1980) concludes for the United Kingdom and 1978 that private households headed by self-employed persons have not reported £2.10 billion in their answers to the consumer survey. This corresponds to some 2 percent of national income. For the same group of house-

holds the British Central Statistical Office (CSO) by disaggregating its macro estimates comes to an unexplained residual of £2.15 billion, thus coming close to the extrapolation of the expenditure-income discrepancy based on micro survey results. The two methods of estimation differ, however, in another respect: according to CSO the share of unreported income of the self-employed tripled in the 1970s, but the consumer survey study does not report any such trend.

A more direct approach to estimating the hidden economy is to compare income and expenditures of private households relating to the underground economy. A survey of more than a thousand Jewish émigré families into Israel coming from cities of the European part of the Soviet Union indicates that between 10 and 12 percent of their total income came from private sources and some 18 percent of all consumption expenditures were made to private recipients. Taking into account various adjustments, the whole unofficial economy amounts to between 6 and 7 percent of GNP in 1973 (Ofer and Vinokur 1980, p. 51).

Shortcoming of the Discrepancy Approach. The two methods of estimation here discussed have various shortcomings. There are three major weaknesses of the comparison between incomes at the national accounting level (see for instance, Macafee 1980): (a) There are errors in *both* estimates of aggregate income; (b) there are errors due to differences in the statistical coverage; (c) the national income estimates are not always completely independent of the tax data based income estimates, that is, income not captured by tax authorities may also not appear in the national income data. This is, for example, the case in the United Kingdom which relies more strongly on tax statistics for estimating the national income compared to the United States and Germany which rely more on estimates on the output side. The small estimated size reported for the United Kingdom thus becomes well explicable.

According to many authors the discrepancies among the various income estimates must be regarded as the *lower* boundary for unreported income.⁸ Only that part of income is counted which is in principle detectable by the tax authorities. It must be presumed that there are many sorts of income-creating activities which escape this measurement, such as income from bartering, an activity which seems to be important in some European countries, especially in the Latin countries, but also in Sweden recently (Rydenfelt 1980).⁹

The main problem with the micro studies lies in the insufficient quality of the income data, especially with respect to the self-employed.

Evaluation. Table 1-1 shows the estimates in terms of national income for the size of the underground economy based on the traces left in the form of "unexplained residuals" for a number of countries.

Table 1-1
Unexplained Differences in National Income Measures, Various
Countries and Years
(percentage of GNP)

<i>Country</i>	<i>Year</i>	<i>Estimate of Size (percent)</i>	<i>Author</i>
United States	1948	9.4	} Park (1979)
	1958	6.8	
	1968	5.5	
	1977	4.0	
United Kingdom	1970	1.0	} O'Higgins (1980)
	1972	1.1	
	1975	1.8-2.4	
	1978	2.5-2.9	
Denmark	1964/65	12.4	} Økonomiske Råd (1967, 1977)
	1970/71	10.0	
	1974/75	6.0	
Sweden	1978	4.6	Hansson (1980)
Federal Republic of Germany	1968	8.9	Albers (1974)
Belgium	1965	18.6	} Frank (1972, 1976)
	1966	19.6	
	1970	18.9	
France	1965	23.2	Roze (1971)

As may be seen from table 1-1 there are sizable differences between the countries (for the late 1960s): in Anglo-Saxon and Scandinavian countries the discrepancy is relatively small (up to 10 percent of GNP). In Latin countries there are much larger discrepancies (around 20 percent of GNP and more). A very small "unexplained residual" such as that for the United Kingdom is dubious, however; it is partly due to the fact that national income is calculated to a large extent using tax statistics based data. Accordingly, O'Higgins (1980, p. 36) concludes that 5 percent of GNP is a lower boundary for the hidden sector of the United Kingdom in 1978.

For the United States the figures reported in table 1-1 suggest that the underground economy is of declining size in the postwar period. The same seems to be true for Denmark for the period 1965 to 1975. There is no trend visible for Belgium in the short period 1965 to 1970, while for the United Kingdom a slight increase for the 1970s is reported. All these estimates are based on the state of knowledge at a particular time. Over time this knowledge changes, resulting in the same phenomenon—the hidden economy—being accounted for with different intensity and scope.¹⁰ Thus, the implied declining trend of the hidden economy is put into doubt. Moreover, many surveys indicate that more and more people consider tax fraud to be only a minor offense,¹¹ which must be expected to be accompanied by increased tax cheating and a growing underground economy.

*Traces Revealed by Tax Auditing
and Other Compliance Methods*

Approach and Some Results. This method considers information on the hidden economy based on active efforts of the tax authorities to detect concealed income, contrary to the voluntary responses in sample surveys. The main advantage of this approach is that detailed information is gained as to how far particular occupations and income groups underreport or do not report income. The extent to which tax auditing is used differs considerably among countries (OECD 1978a). In some countries, France in particular, various programs have been devised (such as randomly selected taxpayers in various departments, a national sample of taxpayer households) in order to gain detailed information on the size and distribution of income underreporting.¹² Moreover, discriminant analysis is used to develop an algorithm which helps to select those taxpayers who are expected to be the most worthwhile to audit.

As far as we know, only for Sweden and the United States are there attempts to extrapolate the tax audit results to the whole taxable population. The Swedish Riksskatteverk has estimated for 1978 that between 8 and 15 percent of declared income has been concealed (Hansson 1980, p. 598), using not only tax compliance data for detection but also additional information collected in various data banks.

A general problem with the normal tax compliance programs is that people not reporting at all very often are left out of account. For the United States the General Accounting Office (GAO 1979) has undertaken the interesting attempt to estimate the number of nonfilers of Federal income tax. Using a representative sample of 50,000 households it estimates that among the 65 million households required to file in 1972, between 4.1 and 5.3 million (6 to 7.8 percent) actually did not file. In comparison IRS found only 0.6 million nonfilers for the same year. Based on the GAO estimate IRS (1979a) has calculated unreported income for 1976, including both legal- and parts of illegal-source income. It was found that unreported income amounts to between 5.9 and 7.9 percent of official (legal) GNP. Even taking unreported legal-source income alone (4.4 to 5.9 percent of GNP) the estimated size is larger than the figure reached using the discrepancy approach (3.8 percent of GNP).

Evaluation. Tax auditing, however, does not allow estimation of the full size of unreported income for particular sectors, branches, and groups in which a high degree of tax fraud takes place. The extrapolations based on the results of compliance programs seem to be more reliable than those based on voluntary responses in the context of direct interviews and surveys due to the threat of legal sanctions for misreporting.¹³ It is therefore plausible that

the estimates of the hidden economy in Sweden and the United States using tax auditing results are higher than the corresponding estimates based on the "unexplained discrepancies."

Nor does tax auditing allow estimation of the full size of unreported income—but only that amount that could be detected if the same intensive audit techniques were applied to the tax population as a whole.¹⁴ It is thus doubtful whether this approach is able to give much information about the level and trend of the hidden economy. The estimates are easily affected by changes in detection methods, tax structure, and tax legislation.

Traces Appearing in the Labor Market

The underground economy may reveal itself in the form of a low official labor force participation rate compared to periods and countries in which the hidden economy is of less importance. The difference between the official and "actual" participation rates allows an estimate of the size of the irregular labor force, and therefore of the hidden sector. The irregular labor force can also be captured by subtle interviews asking about one's participation as a buyer or seller in the market for irregular labor services.

Comparison of Participation Rates. This approach has mainly been used for Italy. According to OECD statistics the official participation rate in 1975 was only 35.5 percent, whereas in France it was 42.3 percent, in Germany 42.7 percent, in the United States 44.4 percent, in the United Kingdom 46.4 percent, and in Japan 48.0 percent (Fuà 1976, p. 29 ff, 1977). Moreover, the official participation rate in Italy has been falling since the late 1950s: in 1959 it was 44 percent, in 1971 36.2 percent, and in 1977 only 33.7 percent (Contini 1981b, p. 6).

It is possible to take the participation rate of other countries or of the beginning of the period considered as an estimate of the actual participation rate. This allows one to derive an estimate of the *relative* size of the irregular work force compared to other countries and periods. In order to get a figure for the (relative) size of the underground economy in terms of GNP an assumption is needed about the labor productivities in the official and unofficial sectors.

More relevant are attempts to capture the size of the underground economy in absolute terms by evaluating the actual participation rate with the help of well-designed interview methods, in particular follow-up questioning and time-use surveys.¹⁵ The institute DOXA-ISFOL, for example, has estimated that the actual participation rate in Italy in 1975 amounted to 39.5 percent (see CENSIS 1976) which is 4 percentage points above the official rate of 35.5 percent.¹⁶ Somewhat more than 10 percent of the total

working population is thus attributed to the underground economy. For 1977 the Italian Istituto Centrale di Statistica (ISTAT) comes to 13 percent, and Contini (1981a, 1981b) to somewhat more than 17 percent, and if (part of) double job holders are included, 20 percent, and yet another institute (CERES, see Frey 1978) even to 25 percent of the total working population, including all multiple-job holders. If the more conservative of these estimates is taken, the size of the hidden economy is derived to be between 14 percent and 20 percent of officially measured GNP (Contini 1981c, p. 15). Using the higher CERES estimate for the actual participation rate, the underground economy amounts to between 25 percent and 33 percent (Martino 1980, p. 18).

Buyers and Sellers in the Market for Irregular Labor Services. A representative sample of the population is interviewed, asking whether they have actively participated in the hidden economy in their capacity as buyers or sellers of unregistered services.

A careful study, using a combined interview and postal-survey technique for a representative sample of about 900 persons was undertaken for Norway in 1980 (Isachsen, Klovland, and Strøm 1981). Not surprisingly, people were more willing to admit having bought irregular labor services (29 percent of persons interviewed) than having worked in that sector themselves (20 percent). Of the people interviewed, 9 percent were active in both capacities, so the overall participation can be calculated at 40 percent (29 percent + 20 percent - 9 percent) of the whole population. As it was also asked how many hours were worked in the past year, and what the hourly wage rate was, it was possible to compute the size of the hidden economy to be 0.9 percent of GNP (supply side). Using the expenditure on irregular labor services, the size rises to 1.5 percent of GNP (demand side). Taking the (higher) wage rates obtaining in the official economy the supply-side estimate rises to 2.3 percent of GNP.

Evaluation. Concentrating on the traces left by the hidden economy in the labor market has the advantage that both monetary and bartering income-creating activities are captured.¹⁷ As buying irregular labor services is less risky and the possible punishment is lower as compared to offering to work in the underground economy, one can expect a relatively less biased answer from those buying as compared to those selling labor in the hidden economy (see also Miller 1979). A major problem with the buying side lies in deducting the value-added figures from the turnover (expenditures) reported.

The comparison of participation rates is obviously quite a crude method. The estimate of the size of the hidden economy in terms of GNP is crucially dependent on the assumptions made concerning the labor produc-

tivities in the regular and irregular sectors. Both methods consider work-source income only, disregarding irregular income from capital.

Traces in the Monetary Sphere

People working in the hidden economy have an incentive to change their behavior when dealing with money in order to conceal their activity. The existence of the hidden economy thus leaves traces in the monetary sphere. Two approaches assume that currency transactions are less visible than transactions involving banks (for example, checks or credit cards) and thus look at the changes taking place with respect to currency. A third monetary method is quite different, assuming that there is a fixed relationship between total money and total income-creating activity.

Denomination of Currency. When the size of the underground economy increases and thus also the need for currency, the number of high denomination notes in circulation must be expected to rise in order to facilitate payment.

In the United States, between the end of 1966 and mid-1978, the value of \$100 bills in circulation rose by more than 250 percent while the total value of currency rose only by 125 percent (Ross 1978, p. 93). In the United Kingdom the ratio value of £10 and £20 bills to all other notes in circulation rose from 7 percent in 1967 to 47.6 percent in 1979 (Macafee 1980, p. 87; see also Freud 1979), an increase in £10 and £20 bills of 2,100 percent compared to 310 percent in other currency value.¹⁸

There is no need to go further into this particular measurement approach with its rather obvious shortcomings; indeed none of the authors mentioned derive therefrom an estimate of the numerical level or change of the hidden economy.

Currency/Demand Deposit Ratio. This method of measurement assumes that the size of the underground economy is reflected in an increase in the ratio of currency relative to demand deposits held with banking institutions. This approach was first used by Cagan (1956) but was made popular by Gutmann (1977). The relative increase in currency observed is transformed into a GNP estimate of the hidden economy by assuming that the velocity of currency circulation is the same in the hidden and in the official economy.

Gutmann takes 1937-1941 as the base period in which the currency-demand deposit ratio was "normal" and in which there existed no underground economy, an assumption that contradicts Cagan's findings and also commonsense knowledge that in war times (with controlled prices, other restrictions and high taxes) there always exists a sizable black market. Gutmann (1977, 1979a) reaches the widely publicized result that the hidden

economy comprised at least 10 percent of officially measured GNP in the United States in the years 1976 and 1979. A "more realistic" figure would be 13 percent to 14 percent of GNP (Gutmann 1979b).

The method was exactly replicated for Australia (Commercial Bank of Australia 1980), except that it was simply assumed that in the base period the normal ratio of currency to current deposits in checking accounts was 30 percent (in Gutmann's estimate for the United States it was 21.7 percent in 1937-1941). The ratio fluctuated around this level from the late 1950s to the late 1960s, and increased only at the beginning of the 1970s (it actually decreased from 1962 to 1966). It is therefore estimated that in 1978/79 the underground economy in Australia amounted to 10 percent of GNP.

Feige (1980b) uses the method for the United States but makes four changes compared to Gutmann: the base year is shifted to 1964, the hidden economy is taken to comprise 5 percent of GNP in that year, only two-thirds of observed monetary activities use currency as the medium of exchange whereas the remaining third is paid through demand deposits, and that income generated per dollar in the hidden economy is 10 percent higher than income generated in the observed sector. Feige reaches an estimate for the underground economy of 28 percent for 1979.

The currency-demand deposit ratio is very sensitive to the choice of the base period and the assumption made with regard to the currency velocity in the shadow and the official sectors. Most authors (such as Gutmann, Tanzi 1980b, Commercial Bank of Australia 1980) take the velocity to be the same—probably on the basis of the principle of insufficient reason. Klovland (1980, table 9) makes an effort to test the sensitivity of this method to varying assumptions: For Norway and the year 1978, the estimated share of the hidden economy rises from 6.4 percent to 16 percent of GNP when the velocity of currency V is increased from 4.7 to 11.7; the corresponding estimate for Sweden is 6.9 percent (for $V = 4.7$) and 17.2 percent of GNP (for $V = 11.7$).

Calculations for the United Kingdom reveal that the choice of the base year crucially determines the size of the hidden economy. The currency ratio declined in the late 1960s and 1970s and was by 1974 only about two-thirds as great as it was in 1963, suggesting a falling hidden economy. If 1963 instead of 1974 is taken as a base year this would mean a *negative* hidden economy for 1974 (O'Higgins 1980, table 3).

Transactions Approach. The third method of deriving estimates of the size of the hidden economy from traces left in the monetary sphere starts from the proposition that all GNP—whether official or underground—must be transacted by money and that the relationship is constant. As the size of the total stock of money M (both currency and demand deposits) is easily observable it is possible to deduce the size of *total* GNP. Deducting from total

GNP the official estimate of GNP gives the size of the underground economy as a residual in terms of GNP. The method is based on the quantity equation $MV = PT$ (where V = velocity of money, P = price level, and T = volume of transactions). An assumption is needed concerning the relation of the value of transaction PT and nominal GNP, as well as about the velocity of money V .

This approach is due to Feige (1979) who takes 1939 as the base year for the United States in which there was no underground economy and in which the ratio of PT to nominal GNP was "normal" (it equals 10.3). He therefore derives an estimate for the hidden economy of 22 percent of official GNP for 1976, and of 33 percent for 1979. Over these two years the resulting increase of the underground economy amounts to 91 percent compared to a nominal growth rate of the official economy of only 23 percent.

The author himself notes (Feige 1980a, 1980b) that the results are not reasonable on various grounds. The transactions method as applied gives a *negative* hidden economy for the whole period from 1939 to 1968, and the unobserved sector seems to decline during World War II. He therefore modifies the transactions approach in various ways, in particular providing new estimates for the velocity of money based on an analysis of the life of paper currency. The modified estimate shows a dramatic growth in the hidden economy during World War II, followed by an absolute decline until 1968. Thereafter it shows a very rapidly increasing trend (Feige 1980b, figure 4). By 1979, its size is estimated to amount to 27 percent of official GNP.

Overcoming the Residual Approach. All three methods discussed that seek to estimate the size of the hidden economy from traces in the monetary sphere have one basic shortcoming: *all* changes in the ratio held to be crucial are attributed to changes in the underground economy.¹⁹ Such a residual approach is reasonable only if there are no other factors influencing the ratio. It is well known from economic theory, however, that the monetary ratios used to estimate the hidden economy are subject to a great many factors. These are:

1. the relative price effects brought about by changes in the cost of holding currency and money, that is, changes in interest rates, in the rate of inflation, and in the risk involved in holding currency. When, for example, crime rates are high people will carry less cash, and in smaller denominations;
2. income effects;
3. change in institutional arrangements, in particular the increased use of checks and credit cards;
4. change in tastes concerning the use of currency and money.

The need to control for these influences has been recognized by some authors. They make an effort to evaluate the influence of these factors on the ratio in order to ascertain that the residual changes in the ratio are really due to the working of the hidden economy.

In two important papers, Tanzi (1980b) and Klovland (1980) have modified the currency demand method by estimating a demand function for currency.²⁰ The two authors use similar variables to explain currency demand such as real income, the interest rate on bank deposits and—most important in our context—the tax rate. Tanzi (1980b, table 2) estimates the equation over the period 1929 to 1976 for the United States and finds that the tax variable has a highly significant positive effect on currency holdings (relative to *M2*). Using the actual figures for the explanatory variables, currency demand is predicted with the help of the equation estimated. The predictions underestimate actual currency holdings, indicating that the difference may be due to the illegal money fueling the hidden economy. Assuming that the velocity of money in the underground economy is the same as that of *M1* in the legal economy, Tanzi reaches estimates of the U.S. hidden economy for 1976 of between 3.4 and 5.1 percent of GNP if the *increase* of taxes over the period is considered, and of between 8.1 and 11.7 percent of GNP if the *level* of taxes existing in 1976 is compared to no taxes at all.

Klovland's approach is very similar to Tanzi's, but he estimates a currency/demand deposit ratio equation. The results are, however, most puzzling because in the period 1952 to 1978 for Norway, taxes have a highly significant *positive* effect on this ratio, and only for Sweden is the effect significantly negative as theoretically expected. Only when currency demand is estimated directly (and not its ratio to demand deposits), is there a significantly positive effect of taxes on currency holdings for both Norway and Sweden. As in Tanzi's case, the estimated equation consistently underpredicts currency demand, and the difference between actual and predicted currency holdings are attributed to the hidden economy. Assuming equal velocity of currency in the official and underground economy, the hidden economy amounts in 1978 to 9.2 percent of GDP in Norway and to 13.2 percent of GDP in Sweden. This estimate is extremely sensitive to the velocity of currency assumed in the hidden economy.

Evaluation. The estimates of the underground economy based on the traces left in the monetary sphere are of a wide range, not only between countries but also for the *same* country and using the *same* variant of monetary approach, and being undertaken by the *same* author.

As can be seen from table 1-2, the estimates for the United States range from 3.5 percent (increase) or 8 percent (level) to around 30 percent, for Sweden between 7 and 17 percent, and for Norway between 6.5 and 16 percent. On the basis of these estimates it is not possible to say much about the

Table 1-2
Estimates of the Size of the Hidden Economy Using the Monetary Approach, Various Countries and Years
(percentage of GNP)

Country	Year	Estimate of Size (percent)	Method Used	Author
United States	1976	13-14	currency/demand deposit ratio	Gutmann (1977, 1979b)
	1976	22	transaction	Feige (1979)
	1976	3.4-5.1 (increase) 8.1-11.7 (level)	} modified currency/demand deposit ratio	Tanzi (1980b)
	1979	28		
	1979	33	modified currency/demand deposit ratio	Feige (1980b)
	1979	27	transaction	Feige (1979)
	1979	27	modified transaction	Feige (1980b)
Sweden*	1978	6.9-17.2	} modified currency-demand deposit ratio	Klovland (1980)
Norway*	1978	6.4-16		
Australia	1978/79	10	currency/demand deposit ratio	Commercial Bank of Australia (1980)

*Size measured as percentage of GDP.

development of the hidden economy over time, about the relative size of these sectors among countries, not to speak of the absolute size (in proportion to GNP) at a particular date. What table 1-2 *does* suggest is that the underground economy is of a noticeable size. It should be remembered, however, that the monetary method can yield estimates of a declining and negative hidden economy when the base year is changed.

Overall Evaluation of Approaches and Results

Four different approaches for estimating the unobserved sector have been discussed. *All* of these methods use the same methodological procedure. The hidden economy is taken to be a *residual*, but it is observed in different spheres:

1. as the difference between various income measures;
2. as the difference between declared income and what tax authorities find out to be income after auditing;
3. as the difference between the officially measured participation rate and the one deemed to be normal.
4. as the difference between currency normally needed and actually observed, or the difference between total and officially measured national income, given money supply.

The fact that the residual is observed in different spheres leads to a wide range of estimates even for the same country and the same year (and author). The discrepancy method (1) as well as the tax auditing method (2) will certainly estimate the *minimum size* of the hidden economy because concealed income either from legitimate or illegal activities and income from barter and in-kind activities are not fully counted. The participation rate approach (3) should be expected to be larger than approaches (1) and (2) because in principle it includes work bartering as well as concealed work income. However, it does not include concealed income and bartering from nonwork sources, and underestimates the size of the hidden economy, provided that work effort (productivity per man-hour) is larger in the submerged economy—which is likely to be the case. The monetary approach (4) is likely to lead to the relatively largest estimates, because in principle they include all money transactions in the hidden sector. The currency/demand deposit approach restricts itself to activities involving currency, and must therefore be expected to lead to smaller estimates than Feige's money transactions approach, which covers *all* monetary transactions. A comparison of the results given earlier in this chapter shows indeed that in general these expectations are borne out. To use the case of the United States, the only country to which three of the four approaches have been applied, the estimates for 1976 lie in the following range: The "unexplained income differences" approach yield an estimate of about 4 percent of GNP; the tax-auditing approach gives an estimate of between 6 and 8 percent of GNP; the currency/demand deposit ratio method leads to an estimate of between 8 and 14 percent of GNP; and the transactions method leads to an estimate of 22 percent of GNP.

As the hidden economy is not directly measurable, the residual approach is eminently reasonable. However, the quality of the estimates of the hidden economy depends on whether the difference can be attributed solely (or at least overwhelmingly) to the working of the hidden sector. If there are other important factors to which the residual can be attributed, the resulting estimate of the hidden economy is dubious. The most advanced studies (Tanzi 1980b, Klovland 1980) make an effort to control for other influences. They attribute the whole residual to the increase in tax burden. This step forward has encountered difficulties, however. Klovland (1980) finds no consistent negative relationship between the tax rate and the currency/demand deposit ratio, while Feige (1980b) finds a positive relationship between his estimates of the size of the underground economy and the rate of taxation. A cross-section analysis (Frey and Weck 1981b) for seventeen OECD countries shows that it is quite implausible that the tax rate is the *only* determinant of the size of the hidden economy. If the relative size of the shadow economy depends on the burden of taxation (including social security), Sweden, Norway, the Netherlands, and Denmark would have the largest hidden sector, while Canada, Italy, the United States, and Spain would be among those countries with the smallest. This

suggests that other crucial factors need to be taken into account.²¹ One such factor is identified by one of the present approaches, namely the labor market. It seems to be evident that in countries with low participation, low working hours, and high unemployment, people have particularly good opportunities to become active in the submerged economy. Psychological preparedness is certainly important; thus, tax morality and attitudes toward the public sector should also be considered.²²

Conclusion

Though many would feel that "this be Madness" to try to estimate the size of the underground economy, our survey has at least shown that "there is Method in it." It might even be argued that there are *too* many methods leading to incompatible estimates. We think such a line of reasoning is mistaken. Every method emphasizes a different aspect of the hidden economy, and thus has its strengths and weaknesses.

One aspect is, however, seriously deficient in all approaches existing so far: there is no theory behind the measurements which would explain the behavior of individuals acting in the regular and in the underground economy. Individuals choose rationally whether to work in the official or unofficial economy, comparing implicitly or explicitly the various benefits and costs associated with the particular choice of activity. Indeed, it is not sufficient to consider the private (official or unofficial) sector, but the public sector must be considered as well. One of the main reasons that seems to be causing people to switch to the underground economy is the burden of taxation, which in turn is determined by political decisions. A theoretical model explaining the size and development of the underground economy, thus, requires the analysis of the interdependencies among at least three sectors: the private official economy, the public sector, and the underground economy. (An initial attempt is made in Frey and Weck 1981a). From this point of view the estimation of the hidden economy is certainly not Madness but rather a fascinating research endeavor.

Notes

1. This figure is quoted by, among others, *Economist* (1979a, 1979b), Tanzi (1980a, (chapter 4, this volume), O'Higgins (1980), De Grazia (chapter 2, this volume), *OECD* (1980b), Macafee (1980), *Intersocial* (1980), Thurn (1980).

2. See Isachsen, Klovland, and Strøm, (chapter 13, this volume), Tanzi (chapter 4 this volume), Macafee (1980).

3. See for example, Hawrylyshyn (1976), Eisner (1978), Adler and Hawrylyshyn (1978), Hill (1979), Kendrick (1979).

4. There is an interesting analogy here to the early attempts in capturing the influence of technical progress—the “third factor” within growth theory, as first undertaken by Solow (1957).

5. For current attempts with yet unknown results see OECD (1978a).

6. Albers (1974, p. 89 ff.) suspects an even larger size of the discrepancy for Italy for the same year; this view is supported by a study by Campa and Visco (1972).

7. There are also some direct comparisons between the income reported in consumer surveys and income declared by the same persons to the tax authorities; for example see Mork (1975).

8. See for example, Albers (1974), Feige (1980a, 1980b), O'Higgins (1980).

9. In equilibrium, given the (differing) cost functions involved, the amount of bartering and the extent of evasion of taxes on goods and services will be positively related. For Italy Rey (1965) estimates that in the late 1950s the government was defrauded of at least 30 percent of the potential yield of the turnover tax; for Belgium the estimate for the mid-1960s was only slightly smaller (Frank, Delcourt, and Rosselle 1973, p. 236 ff.).

10. Before World War II, when national income was mainly or even exclusively calculated by extrapolating tax statistics, it was common practice to take into account that part of the income which is presumably concealed. See Jostock (1943, especially p. 43 ff.) for many examples.

11. For instance, a recent IRS (1979b) survey shows that between 1966 and 1979 the proportion of taxpayers who consider cheating a “very serious crime” has decreased. Similar observations have been made for other countries, such as the Federal Republic of Germany (Daeke 1978).

12. See OECD (1978a, 1980a) and the various “Rapports du Conseil des Impôts au Président de la République Française” (Conseil des Impôts 1972 to 1977).

13. This is also suggested by a recent taxpayer opinion survey on income tax evasion by the IRS (1979b) which uses both direct questions under assurance of anonymity, and a more subtle, randomized response technique. The latter yielded considerably higher figures for unreported income.

14. Tax experts from various industrialized countries (OECD 1978a, p. 5) agree “that the audit approach tends to be more successful in identifying overestimation of deductible expenses than the underreporting of income and particularly the nonreporting from certain sources.”

15. A short presentation in English of these interview techniques is given in OECD (1978b, 1979, 1980b).

16. Regional studies for northern Italy even arrive at differences of 15 to 20 percentage points between the official and the estimated actual par-

participation rates (Canullo and Montanari 1980, Coen 1980, p. 62 ff.). Other regional studies report that irregular work comprises up to 30 percent of total work *time*; in agricultural areas this rises to over 50 percent (Camera di Commercio, Industria, Artigianato di Torino 1978, Zanoni 1980).

17. The discussion has so far assumed the conditions holding for an industrialized country. The most natural way to approach the measurement of the underground economy of developing countries would seem to be the labor market. For evidence as to the role of the "informal sector" within the labor market in some developing countries in Latin America see, for example, Prealc (1978). Another promising approach is based on data on tax evasion, see, for example, Herschel (1978).

18. For similar computations see Veckans Affaerer (1978) and Klovland (1980) for Sweden and Norway, and Commercial Bank of Australia (chapter 18, this volume).

19. For a more extensive criticism of the large denomination bill method see Macafee (1980), O'Higgins (1980), and Klovland (1980); for criticism of the currency/demand deposit ratio method see, for example, Feige (1979), Garcia (1978), Laurent (1979), Bowsher (1980); for criticism of the transactions method see, for example, Tanzi (1980a).

20. See also Isachsen, Klovland, and Strøm, chapter 13, this volume.

21. A broad view of the hidden sector as part of the whole economy is presented also by studies arguing qualitatively, such as Charreyron (1979), Chassaing (1979), Capodaglio (1979), Kaltzmann (1979), Heertje and Cohen (1980), and Bulletin de la Bank de Paris et des Pays-Bas (1980).

22. See, for example, Schmoelders (1970), Vogel (1974), Song and Yarbrough (1978), Lewis (1979), Van Veldhoven and Groenland (1980), and Waerneryd (1980).

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