CENTRAL BUREAU OF STATISTICS
The Netherlands
Department of National Accounts

SECONDARY ACTIVITIES AND THE NATIONAL ACCOUNTS

ASPECTS OF THE DUTCH MEASUREMENT PRACTICE AND ITS EFFECTS ON THE UNOFFICIAL ECONOMY

Robert van Eck

NR. NA-003

SECONDARY ACTIVITIES AND THE NATIONAL ACCOUNTS

Summary

A large number of heterogeneous activities is mentioned in the context of the secondary economy. The heterogenity is caused by the different points of view from which the secondary economy is studied. Secondary activities are classified in more homogeneous groups according to their relevance for respectively the government budget, government control over society, the labour market and the national accounts. Activities that may affect the quality of the national accounts are separated for further discussion.

In considering secondary activities and the "fraud" distortion they cause in the national accounts, it is necessary to take into account the role of measurement methods. Not only are they a mediating factor in the generation of "fraud" distortion, but they also affect the size of the "statistical-technical" distortion. Fraud distortion and statistical distortion are related through the choice of the method of measurement: a change in the method of measurement may simultaneously cause a decrease in fraud distortion and an increase in statistical distortion or vice versa. Therefore it is undesirable to study fraud distortion separately from statistical distortion: these two components of distortion should be dealt with in their mutual connection.

In the process of estimating national product and other variables in the national accounts a number of methods is used to obtain initial estimates for each economic activity. These methods are described and for each method various possibilities for distortion are considered.

Finally the susceptibility of economic activities to fraud- and statistical distortion is studied and it does not come as a surprise that for example agriculture, construction, the retail and wholesale trade and services are found to be more sensitive to distortion than the various industrial activities or public utilities.

Contents

1. Introduction

The subject referred to as "the unobserved economy", "the underground economy", or "the unofficial economy" is studied from various points of view. From a large number of terms, which are described in section 2, "secondary economy" is used here as a neutral description, not reserved for any particular point of view. Section 3 considers four different ways of looking at the secondary economy and discusses which activities should and should not be considered "secondary" under the alternative definitions of that concept.

This paper focuses on the role of the method of measurement as a mediating factor between tax evasion, illegal activities and for example the attitude of the suppliers of statistical information as external causes of various kinds of distortion of national accounts. For the Dutch national accounts some conceptual clarification is given in a problem which Tanzi (1983) described as: "The estimates attempt to measure the incomes, that ..... were probably not reported to the tax authorities. Whether these incomes were or were not measured by the national accounts authorities cannot be determined". It is observed that (1) not all tax evasion, or more generally not all secondary activities, cause distortion in the national accounts and (2) not all distortion is caused by secondary activities.

Section 4 describes some general characteristics of estimation methods, while section 5 examines the specific Dutch practice. The possible distortions introduced by the latter are classified in section 6 and it is observed how underground activities may or may not lead to specific types of distortion, depending on the estimation method used.

In section 7 a switch is made from estimation methods to industries. Usually more than one single estimation method is employed in determining the contribution to GNP of an entire industry. Therefore, the picture painted in previous sections becomes less clear: the distortion in an industry is the result of several distortions arising from the use of several estimation methods. On the other hand, there are more possibilities for plausibility checks and distortion corrections at the industry level than at the level of subgroups which are homogeneous with respect to estimation method: some

distortion corrections can only be made at the industry level. The question is asked which factors make the estimated contribution to GNP of an industry more susceptible to distortion. After identification of several factors a crude, ordinal score is assigned to each industry. If we only consider those factors which may be considered relevant for the fraud bias, the scores do not seem to be inconsistent with results of a sensitivity analysis at the industry level; the latter can be inferred from data of Broesterhuizen (1983) or observations of Blades (1982) about the distribution of omitted hidden activities according to kind of economic activity.

In several publications about the secondary economy its size is determined as the difference between two GNP estimates, obtained via different methods of measurement (e.g. Feige, 1980 and MacAfee, 1980). In section 8 it is observed, that ignoring the statistical bias in one or both of these estimates may lead to incorrect conclusions, especially if a trade-off exists between the fraud bias and the statistical bias. It is possible to choose unobtrusive methods of measurement, which are not sensitive to fraud, but this may have to be paid for with a detoration in the statistical quality. This detoration may be caused by the wider distance between the actual observation and the intended subject of measurement.

2. Terminology

In the discussion about the secondary economy numerous expressions have been used to describe the subject matter. A summary of the sometimes imaginative descriptions originating in various languages seems indispensable for a better understanding of this relatively new area of research.

Table 1. Terminology

unofficial economy	occult economy
unrecorded economy	shadow economy
unmeasured economy	autonomous economy
unobserved economy	clandestine economy
unreported economy	moonlight economy
hidden economy	twilight economy
concealed economy	black economy
unexposed sector	grey economy
invisible sector	illegal economy
underwater economy	irregular economy
submerged economy	untaxed economy
subterranean economy	marginal economy
underground economy	peripheral economy
other economy	cash economy
second economy	counter economy
secondary economy	
parallel economy	
dual economy	
informal sector	
alternative economy	

One explanation for the wide variety of expressions is the difference in points of view from which authors approach the subject. Someone interested in the fiscal aspects might use the term "untaxed economy" and a jurist "illegal economy". If "moonlight economy" is used one is interested in employment, while a monetarist might write about "the cash economy". Descriptions like "hidden economy", "unofficial economy" and "unobserved economy" are generally reserved for studies concerned with the quality of official economic statistics (see for example Blades, 1982; MacAfee, 1980; Heertje en Cohen, 1980 and Feige, 1981).

3. Classifications in the Secondary Economy

The existence of a secondary economy has its effects in several areas of policy-making. For four of these areas relevant secondary activities will be classified. As Tanzi (1983, p. 303) points out, various definitions of the secondary economy are used. A definition which emphasizes for example the potentially recoverable tax revenues refers to a different set of activities than one which is concerned with distortion of the national accounts.

(1) The government budget

The government budget is affected on the income side by activities like tax evasion and tax avoidance[1)] and on the expenditure side by, for example, misuse or improper use of the social security system or subsidy regulations. In a definition of the secondary economy with the emphasis on the financial consequences for the public household, all tax resistance activities and abuses of government funds are relevant. These activities are not homogeneous: tax resistance, for example, covers a wide range of methods to resist to a variety of taxes. According to Van de Braak (1983) the usual distinction between legal (tax avoidance, improper use of funds) and illegal (tax evasion, misuse of funds) activities is not very relevant in a public household context. Activities in both categories "are contrary to the intention of the government and have the similar effect of bringing about an unintended and undesired redistribution of income".

Pen (1983) rightly notes that an x milliard guilder secondary economy (as defined above) does not cause an x milliard gap in the government budget. Indirect effects have to be taken into account as well: the government revenues foregone in consequence of an x milliard tax evasion may be less than the amount of the loss, if e.g. part of the income from evasion is spent on regular commodities, the production and sale of which are subject to taxation.

(2) Government social control

The government is not only supposed to collect equitable taxes, provide collective goods and redistribute income in a fair way, it is also considered to uphold just rules and laws. However, it is not completely succesful in doing so, nor does it always want to be. In this connection, we already mentioned the distinction between tax avoidance and tax evasion, which is simply a dichotomy between legal (white) and illegal (black) activities. If one considers juridical aspects of activities whose existence may undermine confidence in the government, a more sophisticated classification seems necessary.

(a) The first category contains illegal activities for which the government wants to uphold the law, but is not overly successful in doing so. Tax evasion, traffic violations and petty theft, e.g. by drug addicts, are elements of this category.

(b) The government does not only apply considerations of righteousness in determining its actions, but it also considers the effectiveness of legal norms in controlling society. The second category contains illegal activities for which the government chooses not to uphold the law, especially in situations where social unrest can be expected (Heertje, 1980, p. 270). Examples of activities in this category are squatting, abortion, euthanasia, the distribution of soft drugs, the organization of prostitution and various forms of vandalism.

(c) Other activities use the space between the intention and the formulation of the law. Activities like tax avoidance and improper use of social security funds have not been proven to be illegal. They must therefore be considered as legal, but are against the intention of the law.

The existence of such activities as described in (a), (b) and (c) diminishes confidence in the government as the maintainer of just rules and laws and has the same derogatory effect on standards of moral conduct, that Groenland and Van Veldhoven (1983, p. 129) attribute to tax evasion. The activities will increase if no action is taken. One scabby sheep infects the whole flock. Allaart (1981) illustrates how phenomena like tax avoidance and tax evasion will spread. If some people resist taxes, the tax base is smaller than it should be. Therefore the remaining taxpayers

have to pay higher taxes. They may lose trust in the government if it does not prevent tax resistance in the first place; or they may begin to believe that tax resistance is not really objectionable if it appears that no action is taken. In that situation they are asked to pay the bill. The higher taxes, the perceived consent or the distrust in the government are, for some of the remaining taxpayers, a reason to start resisting taxes. This again leads to an even smaller tax base, etcetera.

In the literature (government) regulations are frequently mentioned as a possible cause for the existence of a secondary economy (see for example: Frey, 1983). The role of regulations is quite clear in this context: in fact the boundaries of a secondary economy defined to handle the problem of social control are partly determined by these regulations. If regulations are tightened or the number of regulations is increased, then the area to operate legally becomes smaller and if nothing else changes more people will be on the other side of the law.

(3) Labour market

A third area of concern for policymakers is the situation in the labour market, which is statistically reflected by employment and unemployment data. The statistical information needed for employment policymaking may be distorted, e.g. by secondary activities, or may, because of definitional limitations, not be adequate. The distinction between definitional limitations and distortions of the official statistics is an important one. Definitions determine the framework in which measurements are made. If, given this framework, measurements are incorrect, one speaks of distortion. People who receive disability insurance payments are not considered to be unemployed according to the definition. However if the insurance scheme sometimes functions as a reservoir for lay-offs (Heertje en Cohen, 1980, p. 135-138), employment statistics do not adequately reflect the gap between the number of people available for work and the number of people actually working, although such statistics are not distorted. The definition of what constitutes employment is determined by the location of the "production boundary". Only productive activities give rise to employment; activities within the household like cooking or cleaning are not considered to be productive and persons involved in these activities do not contribute to employment.

Simon and Witte (1982), and also Pen (1983), distinguish the following three categories of productive activity. Within these categories seven types (a to g) of hidden employment are distinguished.

(i) Criminal production. Goods and services produced are illegal and consequently the productive unit is not registered as such, neither at a Chamber of Commerce nor in a company file of a statistical bureau.

(a) Productive criminal activities like the production and distribution of drugs, illegal gambling, prostitution, loansharking and fencing give rise to criminal employment.

(ii) Clandestine production. Production itself is legal, but the productive units are not registered as such. De Grazia (1983) distinguishes four subcategories of clandestine employment[2]:

(b) Work done by employees who are not eligible for employment and for that reason cannot declare salaries. Employees in this category are often illegal immigrants involved in unskilled work.

(c) Work done in a situation where both the clandestine employer and the employee, who is eligible for employment do not declare. This applies for example to textile sweatshops, work at home in the hosiery, textile, shoes or toys industry; mainly unskilled work done by women or the young and the aged of both sexes.

(d) Work done by self-employed who do not declare any income, for example in handicraft or home maintenance. In this category one will find housewives or unemployed who are earning some additional income.

(e) Second jobs by people who declare their regular income, but do not report their additional income. This applies to a wide range of activities, e.g. teachers giving extra lessons, or electricians who do some repairs in the evening. This category contains mainly prime-age males, doing skilled work.

(iii) Regular production. Production itself is legal and the production unit is registered. In this category De Grazia distinghuishes two types of hidden employment:

(f) the registered employer does not declare the employment of and the salary payments to some of his employees. This might happen for example in agriculture, hotels, restaurants, cafés and other services.

(g) The registered employer has an agreement with the employee to declare only part of the time worked and the salary paid.

Each of the types of employment (a)-(g) may distort employment statistics. It depends on the methods of estimation whether underestimation will actually occur.

(4) National accounts

Macro-economic policymakers rely heavily on national accounts statistics. In judging the relevance, usefulness and overall quality of the national accounts for economic policymaking the distinction between distortion and definitional limitations made before, still applies. In the national accounts household work, with the exception of subsistence agriculture, is not included in the set of productive activities: it lies outside the "production boundary". For some purposes this may be a disadvantage, but for other purposes (monetary analysis for example) it makes sense to focus on market production and ignore non-market activities. The definitions, which determine the framework of official statistics are taken as exogeneous in this paper. In fact they are exogeneous for the statistician in the short and the medium term, if one considers for example the time intervals between successive revisions of a measurement framework like the System of National Accounts. Its original version was published in 1953, revised in 1968 and has not yet been changed since then.

Starting from a given production boundary, the national accountant tries to measure what is defined as production and only if this is done incorrectly national accounts are distorted. Two categories of distortion can be distinguished: (1) the fraud bias, a distortion caused by non-reporting or underreporting due to the concealment of activities Tax evasion, clandestine and criminal activities may cause a fraud bias (2) the statistical bias, which is caused by a wide variety of technical imperfections. It is assumed here, that both distortions are negative on balance. In practice statistical underestimation is more likely than overestimation. This may be illustrated by a revision of the 1977 Dutch national accounts in which Gross Domestic Product increased by 5.2%, mainly as a consequence of the extension and statistical-technical

improvement of existing statistics. Illegal activities frequently imply or result in non-reporting or underreporting of income, production and value added. Therefore it is most likely that the fraud bias is also negative. The fraud bias is caused by different categories of producers in different situations of non- or underreporting:

(i) Criminal producers who do not report because production itself is illegal.

(ii) Clandestine producers. The clandestine production of legal goods and services is not reported, because fiscal or non-fiscal regulations (e.g. about labour conditions or immigration) are evaded.

(iii) Regular producers who underreport value added from the production of legal goods and services. Value added can be underreported by understating production or by exaggerating intermediate consumption. This situation occurs as a consequence of tax evasion and misuse or evasion of a variety of non-fiscal regulations.

(iv) Employee theft or non-reporting of income in kind. This is in fact a special case of the previous category, where the misreporting by the regular producer is caused by employees who use part of their company's production or intermediate consumption for private purposes; examples are claiming non-existent expenses, withholding commission on the company's acquisitions, or stealing from inventories of unfinished or finished goods.

Blades' (1982) definition of the hidden economy, which was made in a national accounts context, is based on the above categories, with categories (ii) and (iii) combined. According to Simon and Witte (1982) category (i) accounted for approximately 40% of the value added in the 1974 US underground economy, category (ii) for 5% and (iii) and (iv) together for some 55%. They also note that each of these subsets of the unobserved economy may have different policy implications (Simon and Witte, 1982, p. 293).

A fraud bias may appear in the national accounts if the producer misinforms the tax office, while the national accounts statistician uses fiscal data, or if the producer misinforms the statistician to be consistent with an incorrect tax return. Not only tax evasion, but also the evasion or misuse of non-fiscal regulations (e.g. environmental regulations about labour conditions, eligibility for employment or subsidy regulations) may be a reason for the producer to give incorrect information. Sometimes the producer underreports value added without knowing it, if employees obtain concealed income in kind by using company funds, goods or services for private purposes. A fraud bias will also appear if the statistician completely misses non-reported criminal or clandestine production, or if this production is inadequately (and conservatively) estimated.

A variety of reasons for the non-reporting or underreporting of production, income or value added have been mentioned. They include firstly criminal activities like the production and distribution of drugs, illegal gambling, prostitution, loan sharking and fencing. Secondly the evasion of a variety of production-related taxes like income taxes, dividend taxes, value-added taxes or excise duties. A third reason for underreporting or non-reporting is the evasion of regulations, for example regarding labour conditions, immigration eligibility for employment (age- or residential restrictions) or environmental protection. Other reasons are the misuse of subsidies, employee theft (which covers for example the claiming of non-existent expenses) and the use of company goods or services for private purposes. Not relevant are non-productive criminal activities like burglaries from households, murder, arson; non-productive illegal activities like euthanasia, vandalism or traffic offenses; evasion of taxes not related to production like wealth taxes or property taxes; tax avoidance like private partnership constructions or back-to-back loans and the improper use or misuse of social security funds.

The usefulness of national accounts statistics for macro-economic policymaking is endangered if the statistics are distorted, or if they are based on inadequate definitions or classifications. For example, some critics mention the exclusion of household production or volunteer work. A major limitation of any uniform set of definitions is that they cannot be equally relevant for all purposes a policymaker may have.

Table 2 gives examples from the wide range of secondary activities and considers their relevance for the points of view discussed in this section. The activities described in the table are not mutually exclusive; they sometimes illustrate the same aspect from different angles. For example, dabbling by an unemployed electrician involves income tax evasion and may be coupled to benefit fraud. Relevant to all four areas of policy-making are the evasion of production related taxes, the production of illegal goods and services, the evasion of regulations and various forms of clandestine (self)employment. Other activities are only relevant for some definitions of the secondary economy and irrelevant for other. In the remainder of this paper the focus is on national accounts and on activities that are relevant to those accounts. Activities which are relevant in that respect will not always distort the national accounts; they have the potential to do so, but it depends on the method of measurement whether distortion actually occurs. The discussion on the role of the method of measurement is left to the next three sections.

Table 2. The relevance of secondary activities to four points of view

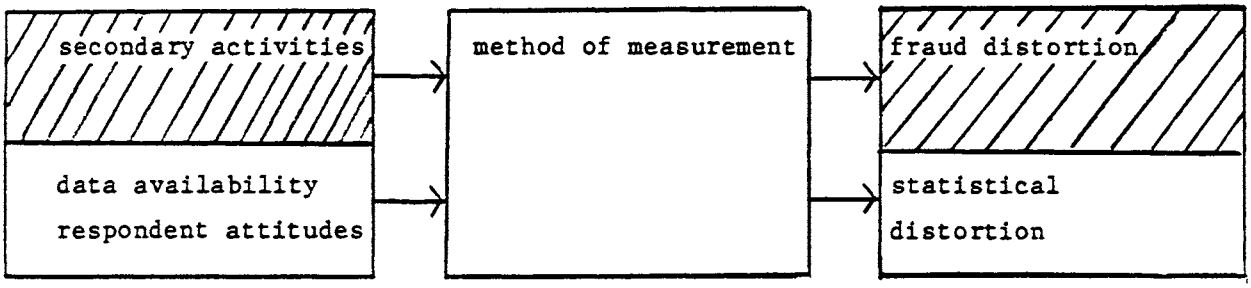
	Government-budget	Social control	Employment statistics	National accounts, GDP
Legal activities				
- do-it-yourself houshold production volunteer work			d	d
- tax avoidance	x	x		
- improper use of disability insurance scheme	x	x	d	
- improper use of other social security schemes	x	x		
Illegal activities				
- squatting, euthanasia		x		
- vandalism, burglary directed at households		x		
- free riding on public transport	x	x		
- misuse of unemployment benefits	x	x	x	
- misuse of other social security funds (benefit fraud)	x	x		
- evasion of wealth tax, property tax	x	x		
- evasion of income taxes, value added taxes by self employed or enterprises	x	x	x	x
- evasion of environment regulations, immigration regulations, labour regulations causing hidden production/ employment	x	x	x	x
- distribution of drugs, loan sharking, fencing	x	x	x	x
- clandestine production and employment e.g. in textile sweatshops, dabbling in home maintenance, car repair etc.	x	x	x	x
- employee theft		x		x

d = excluded by definitions
x = relevant to point of view

4. Methods of Measurement - General Description

Diagram 1 shows how the method of measurement is a mediating factor between secondary activities, availability of information and informant attitude on one side, and distortion of Gross Domestic Product (GDP) on the other. Secondary activities may, depending on the method of measurement, lead to fraud distortion, while data availability together with estimation practice affects the statistical distortion.

Diagram 1. Causes and media for distortion



In the preceding section the secondary activities, which are relevant to the national accounts were singled out. In this section some general characteristics of methods of measurement will be discussed.

One very important aspect of a method of measurement is its dependence on informants. Often information about production is obtained directly from the producer or from a party, which is involved in transactions with the producer. Some methods, however are independent of such respondent information; they are unobtrusive methods of measurement, that deduce the size of economic activity from objectively observable factors. For example, part of the production of agriculture in The Netherlands is estimated from information about agricultural land use, which is measured annually, and Feige (1979) estimates the entire national income from current monetary transactions.

In respondent-dependent methods information can, purposely or not, be distorted by the respondent. Such information distortion may be unrelated to secondary activities if the respondent does not interpret questions correctly, or if he does not want to spend too much time on a questionaire or interview and gives quick, but not necessarily correct answers. These situations may cause a statistical bias. If the information distortion is related to secondary activities it may be the direct consequence of these activities: when a producer evades taxes he has to misinform the tax office and if the statistician uses fiscal data he is misinformed too. Intentional information distortion can also be an indirect consequence of secondary activities. This occurs when a producer directly misinforms the national accounts statistician only in order to be consistent with an incorrect tax return. Both forms of misinformation may cause a fraud bias, which will be systematically negative because the purpose of respondents generally is to underreport income, production or value added. Unobtrusive methods of measurement have the advantage of being insensitive to fraud, but are not infrequently less precise stastistically: it may be like counting the number of cigarette butts after a game in a soccer stadium to estimate the number of visitors instead of asking the treasurer of the soccer club.

Internationally, several methods are used to determine GDP. Differences between countries exist because of historically determined availability of data and of funds available to statistical bureaus. Three methods will be distinghuished here: the production method, the income method and the expenditure method. They differ with respect to the quantities measured and the choice of informants.

(1) In the production method the gross value added of all producing units is estimated. The subject of measurement is the producer.
(2) In the income method the incomes received are measured and theoretically the subject of information is the receiver of an income. In practice the statistician quite often uses fiscal information, information from social insurance intstitutions and other government institutions.
(3) The expenditure method determines GDP via measurements of the final expenditures. The subjects of measurement are the consumers of final goods or services. Information is obtained via budget surveys of households, investment surveys of enteprises, government statistics and balance of payment statistics.

Each of the three methods is in principle informant-dependent and therefore sensitive to fraud. But it depends on the method of measurement whether a specific secondary activity actually will cause a fraud bias: the same activity may for example cause distortion via the income method, while it does not have any effect if the expenditure method is used. Because there are at least two transactors involved in any transaction, it is sometimes possible to obtain correct information about a transaction which one of the transactors wants to hide, viz. if the other transactor does not consider it necessary to hide it. If a producer evades taxes by hiding part of his production, he still has to sell the hidden production to a buyer, who may give correct information about his purchase. The income from hidden production may be used for final luxury consumption, e.g. a Rolls Royce, by his family. This consumption may also be not hidden by any of the two transactors involved.

Table 3 describes the case in which income from hidden production is not reinvested in illegal or informal productive activities, but spent legally on luxury consumption. For each of the three transactors involved in the example, we consider the possibility of obtaining correct information by using each of the three methods of measurement. It is assumed that there is only one tax-evading producer.

Table 3. Method of measurement and fraud distortion; an example

	informant:			effect on GDP
method of measurement:	(1) purchaser of tax evaded production	(2) tax evading producer	(3) cardealer (Rolls Royce)	
income	ok	distorted	ok	distorted
production	ok	distorted	ok	possibly ok
expenditure	ok	possibly ok	ok	possibly ok

GDP will be distorted if it is determined by the "income method", because the tax evading producer misinforms the tax office about his income and this cannot be compensated for. If the production method is used, the underreported sales by the tax-evading producer can be compared with the correct information from his transaction partner. This confrontation may lead to a correction in the originally underreported value added information by producer 2. The expenditure method will result in a correct estimate if producer 2 does not hide from the interviewer of the statistical bureau that he bought a Rolls Royce. In practice estimates using the production- and expenditure method tend to be higher than those which use the income method. MacAfee (1980) reports for 1978 in Great Britain a difference of 3.3% between the initial estimates via expenditure- and income method. He considers this as an indication for the existence of a hidden economy. Preliminary calculations for The Netherlands arrive at a difference between production method and income method of approximately 7% in estimates of disposable income of households for 1977. One explanation for the lower estimate with the income method is incorrect tax returns, which directly affect fiscal income statistics but seem to have a smaller effect on the national accounts statistics.

5. Methods of Measurement: Dutch Practice

Essentially, the Netherlands Central Bureau of Statistics uses the production method to estimate GDP. Information obtained via surveys of enterprises and the government institutions is integrated annually in the framework of an input-output table, where inconsistencies are discovered and have to be corrected for. The input-outputtable is the basis for the national accounts. The advantage of this procedure is, that all sales and purchases of the various industries can be compared in an integrated framework. This gives opportunities to detect inconsistencies, implausibilities and possible misinformation by respondents.

Two stages can be distinghuished in the estimation process: in the first stage industry specialists collect data on the inputs and outputs of each industry. The resulting value-added estimate will be called the initial estimate. The initial estimate is sometimes, especially in the services sector, raised to account for fraud. In the second stage of the estimation process the initial estimates will be further improved and made consistent during the integration of all individual industry information in the framework of an input-output table. The initial estimates, which in some cases were already raised by explicit fraud margins, are revised by integration corrections and the resulting figure will be called the final estimate. In the next sections only the methods of measurement and distortion up to the first stage of the estimation process will be discussed.

5.1. The ideal measurement wih the production method

In an ideal application of the production method, the statistician obtains, for every producer, data on production and intermediate consumption from which he derives a value added figure. By definition, the value added of the government and of some government-related institutions is calculated in a different way: as the sum of all compensations of employees. Data on production and intermediate consumption should be based on observations of commodity transaction (commodities having a wide intepretation, including services). Production is composed of transactions regarding sales and the change in inventory

of finished good, while consumption consists of purchases and the change of inventory of goods to be used in the production process. Direct physical observation by the statistician is the ideal, but generally not feasible way to obtain this information and surveys are the more practical solution.

In principle transactions between domestic producers are measured twice: at the buyer's end and at the seller's end. These measurements can be compared, especially if all information is classified and specified in the same, well defined way, if both value- and quantity information is available and if the origins of purchased goods and the destinations of sold goods are known. Information in the surveys of domestic producers about goods purchased abroad or delivered to categories of final expenditure can also be compared, if additional correctly classified and specified data about foreign trade, consumption of households, government expenditure and investment of enterprises is available.

5.2. Deviations from the ideal: aspects of Dutch measurement practice

The ideal described above does not exist in practice. Not all Dutch producers are covered by surveys or by physical observations. In addition to the survey method a variety of procedures is used to estimate value added. Rather than one general production method there exist several measurement methods within the framework of the production method.
Three criteria are used to distinguish between these measurement methods:

(a) From which variables are the value added figures derived? Generally transactions of goods are observed, which leads via estimates of production and intermediate consumption to a value added estimate. If this is not feasible value added is estimated from income transactions.
(b) Who is the source of information? Especially information about the transaction of goods can be obtained from various sources: directly from the producer, or indirectly from other parties in the transaction. In exceptional cases the statistician does not have to depend on written information from producers: estimates of the agricultural land use are an example of physical observations by the statistician about (potential) transactions of goods.

(c) Do the observations fit in the framework of the national accounts? Observations which are made for some other purpose than the national accounts may be classified and specified in a way which makes them difficult to compare with national accounts classifications or specifications.

The following methods of measurement are distinghuished:

(1) Physical measurement. The statistician makes physical observations directly related to the transaction of goods. This is in some respects an ideal measurement, because the right variable is measured, while distortion in the chain between informant and statistician is prevented. In practice, value added is never measured entirely via this method, that is, via physical observations of both production and intermediate consumption. Only part of the agricultural production is estimated by means of physical observations of land use, while physical observations on the progress of building activities are used to estimate production in the building industry.

(2) Direct measurement, full information. The statistician receives written information about the transaction of goods directly from the producer-informant. There is an extra chain in the measurement process in comparison with physical measurement. Surveys are however applicable to a wider range of producers: the majority of productive activities do not, like agriculture and building, take place in the open air, visible for anyone; they are hidden from convenient physical observation. Direct measurements in this category have the advantage of measuring the transaction of goods at the producer, who is the best informed party, while the classifications and specifications satisfy the requirements from the input-output table and the national accounts. They take place via "production surveys" of many of the larger industrial enterprises and recently also with the trade sector and various service activities.

(3) Direct measurement, limited information. In comparison with the previous category, the information about the transaction of goods obtained from the producer is less detailed and not suitably classified or specified. The information obtained from enterprises in the petroleum industry, for example, is only in volumes and not in values.

(4) Sample-based estimates. Sometimes not all enterprises in an industry group are covered by a survey. Only the enterprises in a sample of the population in the industry group are surveyed and the value added of the other enterprises is estimated on the basis of sample information. In the building industry and for hotels, restaurants and cafes, the value added of producers which are not in the survey is determined in this way.

(5) Indirect measurements. Information regarding the transaction of goods is not obtained directly from the producer concerned, but from another party with knowledge of the transaction. This party can be another producer, who sold to or purchased from the producer concerned. It can also be involved in the transaction in a different way, like the customs office, which controls imports and exports. Export data obtained from the customs office are for example used to estimate the value added of natural gas production. Indirect measurements, which often combine information on quantities available or traded with separate price information, will not infrequently be subject to specification and classification problems. Production of the retail and wholesale trade and part of the intermediate consumption of the building industry and the mixed feed industry are measured indirectly.

(6) Remaining estimates which are not based on observations of the transaction of goods. There are two groups of producers for which observations on the transaction of goods are not available. Firstly the small industrial producers: enterprises with fewer than 10 employees and the self-employed in industry. These producers are, with some minor exceptions, not in a "production survey". Their production is estimated from data on larger producers in the same industry group and data on the number of employees and the compensation of employees; the latter are available for the small producers. Secondly there is a group of producers for which fiscal data is used to estimate the value added. This applies to various producers in the service sector.

The practical possibilities of confrontation of data are fewer than described in the ideal framework of the production method. Firstly, little information is available about the origin and the destination of goods, respectively purchased or sold, even in direct measurements. A further reduction in the possibilities of confrontation arises, because the classifications and specifications of data from external sources are often not fully comparable to the ones used in the national accounts.

Confrontations may even become impossible if a transaction is only measured at one end. This situation arises, for example, if data on the purchases of one group of producers (obtained via direct measurement) is used at the same time to estimate (part of) the production of the supplying group of producers (this would be an indirect measurement).

The consumption of households and the capital formation of enterprises are determined as a residue in the input-output framework: the part of total production which is not used as intermediate consumption, not exported or not consumed by the government must become available for final consumption of households or capital formation of enterprises. This implies that only limited confrontation possibilities can exist for the production of enterprises, which produce consumption- or investment goods. This limitation applies, for example, to the service sector, because it often sells final goods directly to the consumer.

6. Categories of Distortion

In respondent-dependent methods of measurement two information flows can generally be distinguished: firstly a flow within the enterprise, in which the producer-respondent is informed by his employees and secondly a flow between the producer-respondent and the statistician. To bring about an information flow two actions are necessary: (1) the observation, to obtain information and (2) the description, to report the information. In each stage distortion is possible. The observation can be wrong when perception does not conform to reality: a transaction may be incorrectly observed, or written information may be misread. In these cases it is not the intention of the informant to distort information and therefore such distortion is referred to as statistical distortion. Statistical distortion can also arise in the descriptive stage, for example by a slip of the pen in writing down the information. But the discrepancy between observation and description can also be brought about intentionally: an employee exaggerates his expenses for the firm, or a producer does not report hidden production. These are examples of fraud distortion.

The distortion which may arise in initial estimates of Dutch measurement practice i.e. prior to balancing calculations within the input-output framework, will be classified into a number of categories. The distinctions in the categories of fraud distortion are based on two observations: who supplied intentionally incorrect information and which variable was consequently distorted. Fraud distortion is caused by:

(a) intentional misinformation by employees to the producer-informant about production or intermediate consumption. This occurs as a consequence of employee theft
(b) intentional misinformation by the producer-informant about production or intermediate consumption. Secondary activities like evasion of taxes or regulations may lead to this behaviour
(c) intentional misinformation by a third party (usually another producer) about (part of) the production or intermediate consumption of the producer concerned. This misinformation by third-party producers is caused by the same secondary activities as mentioned in category (b) above

(d) intentional misinformation by the producer about variables other than production or intermediate consumption, such as the number of persons employed, or taxable income. The reason for such misinformation may be clandestine employment, evasion of regulations, or tax evasion
(e) intentional misinformation by a third party about variables other than production or intermediate consumption. The same secondary activities as mentioned under (d) may cause this behaviour
(f) lack for information. This applies to criminal activities like fencing, or the production and distribution of drugs, but it may also apply to hidden clandestine activities in the service sector.

Distortion is considered to be of a statistical-technical nature, if it is caused by:
(g) the exclusion of productive legal activities, in regard to which no fiscal or non-fiscal regulations are evaded
(h) inadvertent misinformation by the respondent, e.g. due to incorrect interpretation or formulation of survey questions, or to lack of time or interest of the respondent
(i) population projections on the basis of representative sample information enteiling estimation errors
(j) errors in other estimates than those obtained via complete coverage or population projections based on statistical inference. These errors occur, for example, with the estimation of very small industrial enterprises not covered by a survey and not fully comparable to larger enterprises in the same industry. If the estimation is based on these larger enterprises a statistical error will arise
(k) incomparability between the classifications or specifications used in different sources
(l) differences with respect to the time of observation. Thus, agricultural information is usually available per harvest year, while the national accounts are on a calendar year basis.

In section 5 several methods of measurement were distinguished and in this section we discussed various types of distortion. Because not all distortion categories apply to each method of measurement, table 4 describes which distortions may occur for each method. The table also indicates which of the secondary activities mentioned in section 3 may be responsible for a specific fraud distortion.

TABLE 4. SECONDARY ACTIVITIES, MEASUREMENT PROCEDURES AND DISTORTION

secondary activities[1]			measurement procedure	distortion[2]											
with the subject of measurement	elsewhere, with a: comparable producer	elsewhere, with a: third party in a transaction		fraud distortion						statistical distortion					
				a	b	c	d	e	f	g	h	i	j	k	l
CRI, CLA			non-measurement						1						
										1					
			physical observation										1	1	1
REG, TAX, ET			direct measurement, full information	1	1						1				1
REG, TAX, ET			direct measurement, limited information	1	1						1			1	1
	REG, TAX ET		sample-based estimation	2	2						2	1			2
		REG, TAX, ET	indirect measurement			1					1		1	1	1
REG,TAX, ET	REG, TAX, ET		remaining measurements	2	2	2	1,2	1,2			1,2		1	1,2	1,2

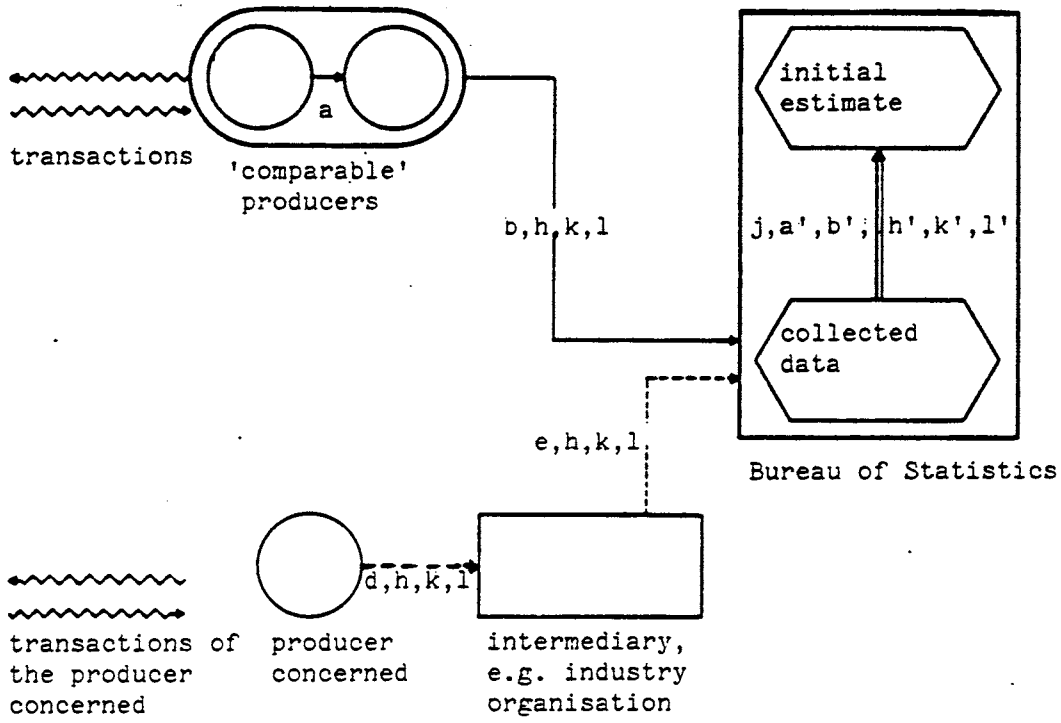
Notes: 1) illegal activities causing distortion in the initial estimates. The following main groups of activities distinguished:
CRI : criminal production
CLA : clandestine production
REG : evasion of non-fiscal regulations
TAX : tax evasion
ET : employee theft, non-reported income in kind

2) 1 = the category indicators a till l correspond with the distortion categories described previously in this section
2 = second order distortion caused by using distorted information of comparable producers

Some production is not measured at all, because the producers hide their productive activities for all observers (distortion category f). This situation occurs with criminal and clandestine producers. Exceptionally, fully legally acting producers are also not measured (category g), as is the case with buskers. They are not considered to be of quantitative significance to the national accounts. Insofar as value added is measured via physical observation, fraud distortion will not occur. In practice this only applies to part of the production measurements of value added estimates for agriculture. Stat-(-FOUT-)distortion in agriculture occurs through problems with respect to the timing of observations (categofy 1), the valuation of observed quantities (k) and other errors in estimating intermediate consumption (j). With direct measurements fraud distortion occurs through misinformation by the producer or his employees (distortion categories b and a). Such misinformation is caused by tax evasion, evasion or misuse of non-fiscal regulations, or employee theft. Statistical distortion may be caused by incorrect formulation or interpretation of survey questions (h), or by timing errors in observations (1). In direct measurements with limited information one additional possibility of distortion arises, because of specification and valuation errors (category k). This happens for example when volume information from oil refineries has to be combined with price- and value information from the Department of Economic Affairs and the Customs Office. Sample-based estimates carry the distortion introduced in the measurements of the sample survey over to the non-sample part of the population (a', b', h', k' and 1'). In addition there is an error due to the statistical inference (category i). In indirect measurements misinformation by a third party causes distortion for the producer who is the subject of measurement. Secondary activities of the subject of measurement do not affect the estimates of his value added. In this respect indirect measurements are not sensitive to fraud. But fraud distortion may arise as a consequence of secondary activities of the third party (categorie c). It is not very likely, that they will cause a systematically negative bias[3)]. Statistical distortion will occur via the same categories as in direct measurements (h, k and 1). Because the necessary information is obtained from third parties, the distortion by misspecifications and misclassifications (k) is often greater than with direct measurements. In practice other estimation errors (j) will also arise, because it is not possible to determine the entire production and intermediate consumption indirectly.

For the remaining estimates, information is used which is not based on the transaction of goods. Sometimes information is obtained from the producer, sometimes from other sources, for example industry organisations. Fraud distortion can be caused by secondary activities of the producer (d): if some employees are clandestinely employed, the employer will probably not report the number of employees in his enterprise correctly. It may also be caused by third party informants, particularly if they, like industry organisations, represent industry interests. Statistical distortion arises because of survey-communication problems (h), timing differences (l), or other errors due to estimations based on observations of not fully comparable producers (j). If more or less comparable producers are used to estimate value added, second-order errors will occur, just like in sample-based estimation (a', b', h', k' and l'). Other second-order errors might occur if the observations on the "comparable" producers are indirect, or not based on transaction of goods themselves. Diagram 2 shows as an example how and where distortion appears, if the value-added estimate is not based on data about the transactions of goods by the producer concerned. In this example information about comparable producers (e.g. the production per worker) is used in conjunction with non transaction-based data (e.g. the number of workers) obtained from the producer concerned.

Diagram 2. Distortion in estimates based on observations of comparable producers



a	caused by employee theft	a',b',h',k',l'	second-order errors caused by the use of distorted information from comparable producers
b,d,e	caused by fiscal or non-fiscal evasion or clandestine employment	⟶	information on the transaction of goods
k	misspecification, misclassification	⇢	other information
h	misinformation		
l	timing errors	⟹	processing of collected data by the statistician specialized on the industry concerned
j	other statistical estimation errors		

Summarizing the results of table 4, it is clear, that criminal and clandestine production cause underestimation of GDP due to non-measurement. Physical observations, indirect measurements and sample-based estimates do not use the producer concerned as a source of information and are therefore not sensitive to fraud by this producer. Sample-based estimates tend to have a negative bias, because of underreporting by producers in the sample, while indirect estimates are not likely to have such a negative bias. Secondary activities by third-party producers will generally make them overreport intermediate consumption or underreport production and this will certainly not cause a negative bias in the value added of the producer to be estimated via indirect measurement. For most categories of statistical distortion (except g) the direction of the bias is not clear. The impression exists that the overall statistical error tends to be negative.

7. Indicators for the Susceptibility to Distortion

In previous sections the focus was on methods of measurement. For each homogeneous method of measurement the distortion possibilities in the initial estimates were described in table 4. This table does not give a picture of the distortion possibilities of an entire industry, because generally there is no one-to-one link from measurement methods to industries. Measurements for industries are not homogeneous: more than one method of measurement is employed to estimate value added of the industry. This section focuses on distortion at the industry level. Firstly, we give factors which have the potential to affect the quality, and therefore the susceptibility to distortion, of the industry estimate. These factors are characteristics of the industry itself and of the methods of measurement used for that industry. They refer to the final estimates, which have come about after confrontations and corrections have been made in the framework of the input-output table. Secondly, for each industry a rough indication of the score per factor is provided. A minus-score indicates that the factor is a potential explanation for a possible distortion in the industry estimate; it does not indicate that the factor actually causes a distortion.

The following, sometimes overlapping factors for distortion sensitivity of the final industry estimates are distinguished:

(1) Controls and sanctions. Lack of control on physical transactions or on the written information about these transactions makes it easier to misinform the tax office or any other institution. Controls may be combined with sanctions on misinformation, as is for example the case with forwarding agents, who risk to lose their license if they supply the customs office with incorrect information. Government institutions and industries under direct control of the government, like public transport, communications and banks have a positive score on this factor. Apart from the possibilities for control, there is no real incentive for government institutions to get involved in activities like tax evasion, because they are not subject to direct taxation. Large private enterprises are controlled reasonably well, for example because of periodical audits of the books. Furthermore more people would have to be involved in irregular activities of large

enterprises, which increases the risk of detection. The activities of small producers selling directly to the consumer generally are difficult to control.

(2) Completeness. As the observations cover a larger part of all producers operating in an industry some of the distortion possibilities mentioned in section 6 are less likely to occur. Mark-up procedures to compensate for missing or even unregistered producers have a negative effect on the statistical quality of the industry estimate. Government and semigovernment institutions and large industrial enterprises are well covered, but especially in the trade and services sectors not all producers are observed.

(3) Comparability of data. The possibility of confrontation of reports on a transaction with other, independent reports on the same transaction gives the statistician a check on the validity of information and an opportunity to make corrections in the case of discrepancies. Comparability on the production side is treated separately from comparability on the consumption side. The possibilities for confrontation are good to very good for industrial producers of intermediate goods, because of the extensive survey coverage in this area. There are not many opportunities for comparison in for example the building sector, trade, services and the intermediate consumption side of agriculture.

(4) Volumes and values. The availability of both volume- and value data improves the possibility of confrontation of the production of the supplier with the intermediate consumption of the purchaser. Volume data are also useful to check the plausibility of value information and provide a better insight into the technical relations of the production process of a specific industry group. Especially in industry both value- and volume data are available.

(5) Specification. A more detailed specification of production and consumption data allows for confrontations on various levels. If, on the other hand, 25% of the intermediate consumption of a firm is allocated to a category "residual costs", it is difficult to check how real these costs are. They may harbour illegal activities, or may cause statistical distortion if investment activities were incorrectly classified as "residual costs". Information is relatively more detailed in electricity, gas and water enterprises, industry and agriculture.

(6) Representativity. If producers in an specific industry group have corresponding outputs via similar production processes, each producer can be considered to be representative for the entire industry group. If technical coefficients are fixed, the statistician can, in estimating the value added of a producer, take into account the information about other producers. He is able to determine what the "normal" pattern is; if information deviates from this normal pattern, the question should be asked whether it may be incorrect[4)].

(7) Measurement. Measurements of value added by the production method should preferably be made by observing the transactions which determine production and intermediate consumption of the producer concerned. Deviations occur when third parties are used to obtain data on production and consumption, or when income transactions instead of transactions of goods are observed, as is for example the case with fiscal data. In agriculture, the petroleum industry, trade, business- and other services observations do not refer to the transaction of goods or have not been obtained via the producer concerned.

The following criteria are specifically relevant to anticipate a possible fraud distortion:

(8) Dependence on the producer's bookkeeping. If the information needed to estimate the value added is extracted from the books of the producer concerned, then fraud distortion is more likely than with physical-, indirect- or even some remainig measurements.

(9) Concentration of very small firms. Hidden activities are easier and safer to organize if only a few people need to be involved. In small enterprises only a few people are involved in data collection, bookkeeping and reporting. The self-employed and small limited partnerships do not have much to fear from unwanted snoopers.

(10) Nature of engagement. Employees, who are temporarily engaged are more likely to be clandestinely employed than long serving employees on tenure. In general it may be stated, that a greater need for seasonal workers or temporary employees corresponds with a higher chance of misinformation about production, income or value added.

(11) Non-fiscal regulations. With a system of licenses, quotas and regulations on working conditions, environmental protection, etcetera the government imposes restrictions on the business sector, which may apply to some industries or are common, but perceived as being more severe to some industries. Tighter restrictions increase the probability of evasive activities (see proposition 1 of Frey and Weck, 1983) and this may increasingly lead to misreporting.

(12) The tax burden. Distortion is more likely in industries that have a more severe tax regime and do not have legal ways to avoid taxation. For specific industries excise duties may be an incentive for underground production as in the case of clandestine distilleries. Different value added taxes may cause some industries to hide production while others do not. Enterprises which operate internationally are likely to have more legal constructions available to reduce the tax burden than producers, which only buy and sell on the domestic market. Therefore one may expect less misinformation in industries dominated by large, internationally operating firms.

Table 5 indicates for all industries whether they score high (+), low (-) or neutral (0) on each factor. A negative score means, that the factor might explain a possibly present distortion. The table gives an indication of the relative quality of the information obtained and the estimation method used for each industry. The factors "non-fiscal regulations" and "tax burden" are not scored in the table, because there is no clear and significant distinction in the way they apply to the various industries.

One might apply a "naive" approach as in Frey and Weck (1983) to estimate fraud distortion per industry group, using relevant factors in table 5 as explanatory variables. The results would not be inconsistent with results of a sensitivity analysis at the industry level using data of Broesterhuizen (1983) or with the qualitative observations of Blades (1982) about the distribution of omitted hidden activities over the various industries. A general tendency emerges from the three approaches: fraud distortion is most prevalent in business- and other services, construction and hotels, cafes and restaurants. Table 5 and Blades give a slightly more negative picture of the trade sector than Broesterhuizen's sensitivity analysis. At the other end of the scale are the government sector, public utilities and mining and quarrying, which do not seem to be very sensitive to fraud distortion. The remaining economic activities occupy a position somewhere is the middle of the scale.

TABLE 5. INDUSTRY SCORES ON FACTORS FOR DISTORTION SENSITIVITY

Factors: / Industries:	Contribution to GDP 1978 %	Controls, sanctions	Completeness	Comparability: production	Comparability: intermediate consumption	Volumes and values	Specification	Representativity	Measurement	Dependence on books	Small firms	Temporary employees
0 - agriculture and fishing	4	0	0	+	-	-	+	0	-	+	-	-
20/21 - manufacture of food beverages etc.	3	0	+	0	+	+	+	+	-	0	-	-
22/24 - manufacture of textiles wearing apparel	1	+	+	+	+	+	+	+	+	-	+	
26/27 - manufacture of paper; printing etc.	2	+	+	+	+	+	+	+	+	-	0	
1, 28 - mining, petroleum industry	6	0	0	+	+	0	+	+	-	+	+	
29/31 - manufacture of chemicals, rubber, etc.	2	+	+	0	+	+	+	+	+	-	+	
25, 32 - wood, building materials	2	+	+	+	+	+	+	+	+	-	+	
33/39 - metal and other manufacturing industries	8	+	+	+	+	+	0	+	+	-	+	
4 - public utilities	2	+	+	+	+	0	+	+	+	-	+	
5 - construction	7	0	0	-	-	-	-	0	-	0	0	-
61/66 - whole sale and retail trade	13	-	0	-	-	0	0	+	-	+	-	-
67/68 - hotels, restaurants, cafes, etc.	3	0	0	-	0	-	-	-	-	0	-	-
7 - transport, storage and communication	6	+	+	-	0	-	-	0	+	0	0	
8 - banking, insurance, business services	13	+	+	-	0	-	-	+	0	0	0	
9 - other services	10	-	-	-	-	-	-	-	-	0	-	-
- government	14	+	+	n.a.	+	n.a.	+	0	+	0	+	
- value added tax on final expenditures and interest margins of banks	4											
	100											

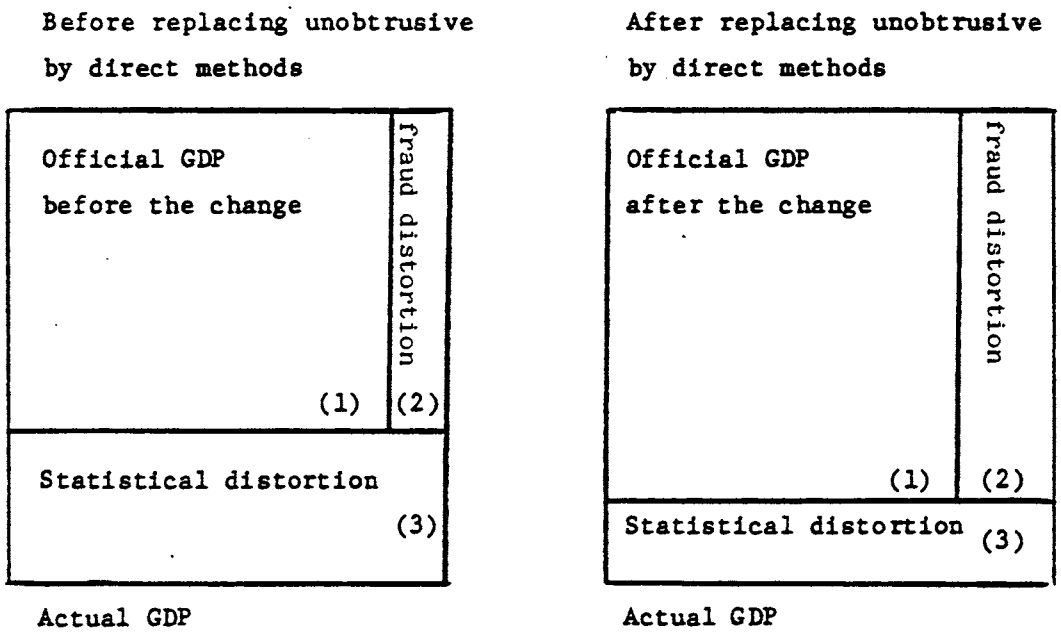
\- compared to other industries a bad score; the factor might cause distortion.
\+ a good score, compared to other industries and in an absolute sense; the factor does not cause distortion.
0 between - and +
n.a. not applicable

8. Trade-offs between Fraud Distortion and Statistical Distortion

The choice of measurement methods affects both the size of total distortion and its distribution over its main components: the fraud bias and the statistical bias. The fraud bias tends to be smaller with measurements that do not rely on respondents at all, or only use non-involved informants. Unobtrusive measurements completely eliminate fraud distortion; this applies for example when current monetary transactions are measured to estimate national income, as is the case in Feige's (1979) transaction method. Statistical errors tend to be smaller if measurements can be fitted directly into the definitions and classifications of the overall accounting framework. With respect to Dutch measurement practice this is more likely if the observations on value added relate to the transaction of goods and are made at the production unit concerned. In the recent history of Dutch practice there has been a tendency to replace "indirect" and "remaining measurements" by "direct measurements" in order to reduce the statistical bias. This is illustrated by the introduction of new production surveys of manufacturers of instruments and optical goods, in construction, trade, hotels, cafes and restaurants and in the car repair business. The switch from "indirect measurements" and unobtrusive "guesstimates" (which belong to the category "remaining estimates") to direct measurements introduces a systematic fraud distortion via the possible misinformation by producers or employees. In replacing methods, that do not rely on (directly involved) respondents by direct measurements the statistical quality may increase, but at the cost of newly introduced sensitivity to fraud.

In diagram 3 it is assumed, that the initial estimate of GDP is too low because of fraud and statistical errors which are negative on balance. The diagram illustrates how the size and the distribution of the distortion may be affected by a change in the set of measurement methods, which entails the replacement of unobtrusive methods by direct surveys.

Diagram 3. A change in the methods of measurement



The statistical and fraud bias together determine the total (negative) bias of the initial GDP estimate. Varying the methods of measurement changes both the size of the total bias and its distribution over a fraud- and a statistical component. In the right-hand rectangle more direct methods of measurement have been used: the total bias has been reduced compared to the original situation in the left-hand rectangle, but the fraud bias has increased. The replacement of inaccurate unobtrusive measurements by direct surveys improved the overall quality of the estimate but introduced a fraud bias, because the statistician became dependent on the books of the newly surveyed producer-informant (distortion categories a and b).

The GDP estimated via the present set of measurement methods is just one of the many possible GDP estimates which could have been made by selecting various combinations of measurement methods. The present set of measurement methods and its resulting GDP may be regarded as a point on a scale with two extremes. At one end GDP is determined totally unobtrusively, possibly with the purpose to eliminate all effects of secondary activities on the estimate. Maintaining maximum technical-statistical quality is not the first priority of

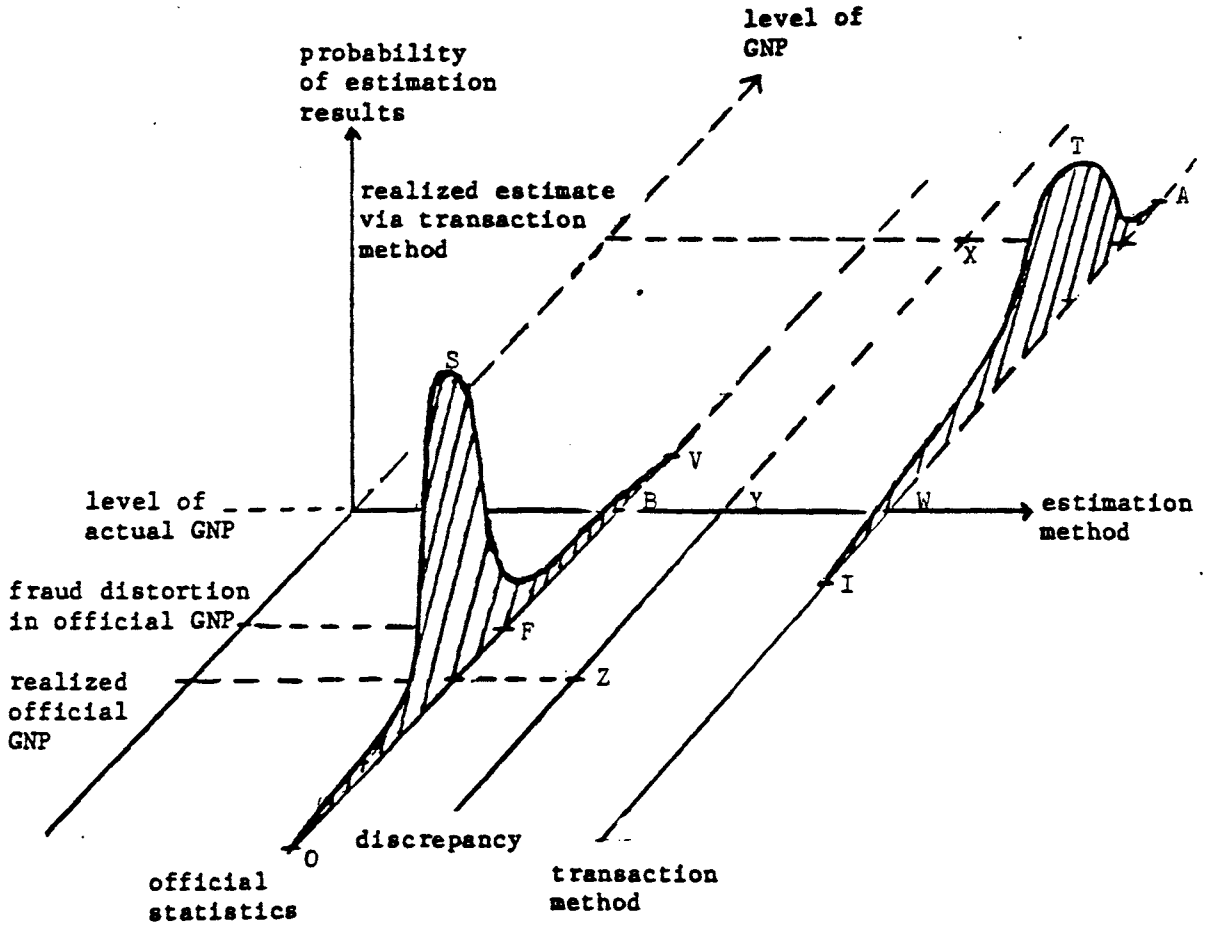
the researcher. In terms of diagram 3 element (2) disappears, but the bottom part of the rectangle may increase significantly. At the other extreme of the line GDP is determined without the statistical errors discussed in section 6 by getting as close as possible to an ideal application of the production method, for example by very extensive surveying with optimally designed questionnaires and an army of well trained interviewers: statistical distortion (element 3 in the diagram) is eliminated. However, the increased dependence on information by the producer means that the initial[5] estimates of the statistician become more sensitive to fraud. Going from one end of the scale to the other more misinformation due to fraud is introduced.

In several publications on the secondary economy (e.g. Feige, 1979; MacAfee, 1980) GNP estimates obtained via different methods of measurement are contrasted in order to judge the overall quality of one of these estimates, or to compare the fraud distortion of the two estimates. A thorough analysis of the direction and the size of the statistical component of the overall distortion is not always made. Such an analysis may be impossible, but if that is the case it must be concluded that meaningful comparisons cannot be made.

To illustrate the crucial role of assumptions about the statistical bias we discuss a method used by Feige (1979, 1980 and 1981) to estimate the unobserved economy. Feige compares US official GNP to an unobtrusive monetary estimate of GNP which results from an application of the "transaction method". The official estimate is distorted by both a fraud- and a statistical bias, where Feige's estimate only has a statistical bias; on the scale of possible measurement methods he has chosen a position at the end, where fraud distortion is non-existent. The monetary estimate exceeds the 1978 official US GNP by 33% and this difference has been interpreted as an estimate for the part of the economy not observed in official GNP. Feige discusses various factors contributing to the possible statistical bias in his estimate: some of them are causing a negative bias others a positive, but on balance the effect is assumed to be negative. Cramer (1980, 1981), for example, does not believe that the statistical bias in Feige's estimates is negative. He argues that Feige overestimates the current monetary transactions, because the purely financial transactions have not been sufficiently eliminated and because the level of cash payments has been seriously overestimated. Diagram 4 illustrates how the discrepancy between Feige's monetary estimate of GNP and official GNP

may be interpreted under alternative assumptions about the statistical bias of the estimates. For both methods a probability distribution of the statistical bias is assumed. The distribution of the statistical bias in official GNP is located around a fixed fraud distortion and skewed to the left. Feige's monetary estimate has no fraud distortion. The distribution of its statistical bias has a large variance, is skewed to the right and implies a high probability of overestimation. In the diagram X and Z are the realized estimates via respectively the transaction method and the "official" method. The major part of XZ represents now statistical inaccuracy in Feige's estimate (YZ). This leaves an unobserved economy which is considerably smaller than the 33% Feige estimated for 1978 in the US and which corresponds to the full length of XZ. The assumptions in the diagram are not unrealistic. Statistical margins in official GNP may be expected to be much smaller than those in the monetary estimate (OB<IA), because official methods draw upon decades of experience, quality control and improvement while the monetary method is still in an early stage of development. The location of the distribution for the monetary estimate reflects the views of many critics of the transaction method. We conclude that only a thorough analysis of the statistical distortion in the transaction method would make it possible to reach more conclusive results with respect to the discrepancy with official statistics. But this might prove to be even more difficult than analyzing the various categories of distortion in official measurement practice directly.

Diagram 4. The discrepancy between estimates with the transaction method and official GNP estimates



VF = the fixed fraud bias is official GNP.
OB = the range of potential official GNP-estimates, given a fraud distortion of VF and a probability distribution OSB for the statistical distortion.
IA = the range of potential estimates via the transaction method, given a probability distribution ITA for the statistical distortion.
XZ = the discrepancy between the realized estimate via the transaction method and realized official GNP.

9. Conclusions

In considering secondary activities and the fraud distortion they cause in the national accounts, it is necessary to take into account the role of measurement methods. Not only are they a mediating factor in the generation of fraud distortion, but they also affect the size of the statistical distortion. Fraud distortion and statistical distortion are related through the choice of the method of measurement: a change in the method of measurement may simultaneously cause a decrease in fraud distortion and an increase in statistical distortion or vice versa. Therefore it is undesirable to study fraud distortion separately from statistical distortion: these two components of distortion should be dealt with in their mutual connection.

The various categories of fraud- and statistical distortion each have different distortion charateristics, for both the level of GDP and the growth over time. The level of GDP may, on a specific point in time, be distorted in a certain direction and a distortion in either direction may be sizeable or small. A distortion may be constant over time, it may have random fluctuations, or it may increase or decrease systematically. Some of these possible distortion patterns are more undesirable from the point of view of the policymaker or the researcher than others. Because the types of distortion and their characteristics are dependent on the measurement method used, it is possible to influence both the type and the size of distortion. The distortion problem can be considered as a decision problem, where the statistician, given a number of exogeneous phenomena like the existence of secondary activities, selects methods of measurement in order to realize the least undesirable distortion pattern. Further research is needed to analyse characteristics of the various categories of statistical[6)] and fraud distortion and to formulate objectives with respect to the seriousness of alternative distortion patterns.

REFERENCES

Allaart, P.C., 1981, "Groeiscenario's: een schets van de economische ontwikkelingsmogelijkheden op langere termijn", PH.D. dissertation at the University of Tilburg, Stenfert Kroese, Leiden.

Algera, S.B., P.A.H.M. Mantelaers and H.K. van Tuinen, 1982, "Problems in the Compilation of Input-Output Tables in The Netherlands". In J. Skolka (ed.) Compilation of Input-Output Tables, Springer, Berlin/New York.

Blades, D., 1982, "The Hidden Economy and National Accounts", Economic Outlook: Occasional Studies, Paris, pp. 28-45.

Braak, H. van de, 1983, "Taxation and Tax Resistance", Journal of Economic Psychology, vol. 3, no. 2, pp. 95-111.

Broesterhuizen, G.A.A.M., 1983, "The Unobserved Economy and the National Accounts in The Netherlands", paper for the conference on The Economics of the Shadow Economy, University of Bielefeld, October 10-14.

Cramer, J.S., 1980, "The Regular and Irregular Circulation of Money in the United States", report of the University of Amsterdam, Amsterdam.

Cramer, J.S., 1981, "Comment on Feige's (1981) lecture Theory and Measurement of the Unobserved Economy", Openbare Uitgaven 13, pp. 173-175.

De Grazia, R., 1983, "Le Travail Clandestin", International Labour Organization, Geneva.

Feige, E.L., 1979, "How Big is the Irregular Economy?", Challenge 22, pp. 5-13.

Feige, E.L., 1980, "A New Perspective on Macroeconomic Phenomena: The Theory and Measurement of the Unobserved Sector of the United States Economy - Causes. Consequences and Implications", Netherlands Institute of Advanced Studies, Wassenaar.

Feige, E.L., 1981, "Theory and Measurement of the Unobserved Economy", Openbare Uitgaven 13, pp. 168-172.

Fiscal-Economic Institute of the University of Rotterdam, 1979, "International Tax Avoidance", Kluwer, Deventer.

Frey, B.S. and H. Weck, 1983, "Estimating the Shadow Economy: A "Naive" Approach", Oxford Economic Papers, no. 1, pp. 23-44.

Groenland, A.E.G. and G.M. van Veldhoven, 1983, "Tax Evasion Behaviour: A Psychological Framework", Journal of Economic Psychology, vol. 3, pp. 129-144.

Heertje, A. and H. Cohen, 1980, "Het Officieuze Circuit", Het Spectrum, Utrecht/Antwerp.

Isachsen, A.J., and S. Strom, 1982, "The Hidden Economy: The Labour Market and Tax Evasion", Scandinavian Journal of Economics, pp. 304-311.

MacAfee, K. 1980, "A Glimpse of the Hidden Economy in the National Accounts", Economic Trends, no. 316, pp. 81-87.

Pen, J., 1983, "Morfologie van het zwarte gebeuren", De Gids, vol. 146, no. 2/3, pp. 115-125.

Simon, C.P. and A.D. Witte, 1982, "Beating the System: The Underground Economy", Auburn House, Boston, Massachusetts.

Smith, A., 1981, "A Review of the Informal Economy in the European Community", report of the Commission of the European Communities, Brussels.

Tanzi, V. (ed.), 1982, "The Underground Economy in the United States and Abroad", Heath, Lexington, Massachusetts.

Tanzi, V., 1983, "The Underground Economy in the United States: Annual Estimates, 1930-80", IMF Staff Papers, vol. 30, no. 2, pp. 283-305.

Tuinen, H.K. van, 198. "Comment on Feige's (1981) lecture Theory and Measurement of the Unobserved Economy", Openbare Uitgaven 13, pp. 176-183.

NOTES

1) We follow Groenland and Van Veldhoven (1983) by considering social security premiums as a form of taxation, since they are perceived as such by many people.

2) Examples are taken from De Grazia (1983), Tanzi (1982) and other international publications; they do not necessarily apply to The Netherlands.

3) An essentially theoretical exception is formed by the situation in which each producer in a production-chain underreports both production and intermediate consumption by a fixed percentage. If the value added of a producer somewhere in the centre of the chain is measured indirectly via his suppliers and buyers it will be underestimated.

4) Fiscal authorities use this technical comparability too. The Fiscal Investigation Department has made some inquiries into the consumption of beer and coffee in hotels, cafés and restaurants and into the provision of dental services. Based on fixed technical relations like the number of sugar-bags needed for 1,000 cups of coffee, the number of carbondioxide cylinders per 1,000 glasses of draught beer, or the quantity of gold or amalgam needed to fill 100 teeth, the investigators checked whether the consumption of these inputs was significantly different from the expected pattern.

5) In the final estimates much of the initial distortion can be corrected for by utilizing the many confrontations in the framework of the input-output table which become possible with the extensive survey information.

6) Algera et al (1982) discuss the problems which occur in analyzing the statistical (im)precision of data in the input-output table.

Available Occasional Papers

		Author(s)
NA/01	Flexibility in the system of National accounts, 1983	R. van Eck, C.N. Gorter and H.K. van Tuinen
NA/02	The unobserved economy and the National Accounts in the Netherlands, a sensitivity analysis, 1983	G.A.A.M. Broesterhuizen
NA/03	Secondary activities and the National Accounts: Aspects of the Dutch measurement practice and its effects on the unofficial economy, 1985	R. van Eck
NA/04	Comparability of input-output tables in time, 1985	P.G. Al and G.A.A.M. Broesterhuizen
NA/05	The use of chain indices for deflating the National Accounts, 1985	P.G. Al, B.M. Balk, S. de Boer and G.P. den Bakker
NA/06	Revision of the system of National Accounts: the case for flexibility, 1985	C.A. van Bochove and H.K. van Tuinen
NA/07	Integration of input/output tables and sector accounts; a possible solution, 1985	C. v.d. Bos
NA/08	A note on Dutch National Accountory data 1900-1984, 1985	C.A. van Bochove
NA/09	The structure of the next SNA: review of the basic options, 1985	C.A. van Bochove and A.M. Bloem
NA/10	Dual sectoring in National Accounts, 1985	P.G. Al
NA/11	Backward and forward linkages with an application to the Dutch agro-industrial complex, 1985	R. Harthoorn
NA/12	Production chains, 1986	R. Harthoorn
NA/13	The simultaneous compilation of current price and deflated input-output tables, 1986	S. de Boer and G.A.A.M. Broesterhuizen
NA/14	A proposal for the synoptic structure of the next SNA	P.G. Al and C.A. van Bochove
NA/15	Features of the hidden economy in the Netherlands	R. van Eck and B. Kazemier
NA/16	Uncovering hidden income distributions: the Dutch approach	C.A. van Bochove