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THE SUPPLY OF HIDDEN LABOUR IN THE NETHERLANDS: A MODEL

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**Summary**

This paper presents a model of the supply of hidden labour in The Netherlands.
The data is from surveys on hidden labour by the Netherlands Central Bureau of
Statistics. According to these surveys over one million people (over 10 percent
of the population of 16 and older) has hidden income from labour.

Participation in the hidden labour market is governed by two categories of
factors: willingness (incentives, motives) and opportunities. Model estimates
show that the willingness to participate is mainly determined by the perceived
probability of detection. Other variables like the tax burden or financial
problems were found to be less important or even insignificant. The most
important opportunity variables are education, sex, age and work experience. In
this respect, the hidden labour market is similar to the formal labour market.

Model simulations show that the supply of hidden labour is not very
sensitive to cyclical fluctuations. A tax exempt of 1500 guilders for second
jobs and a higher probability of detection, however, may substantially decrease
the magnitude of the hidden labour market.

# Contents

## 1. __Perspective__

Hidden activities, such as the evasion of taxes and the illegitimate receipt of social benefits have an impact on various aspects of the economy. These activities necessarily affect public finance. They also have consequences for the labour market: supply and demand of formal labour may decrease if hidden activities grow. Another example of an area in which hidden activities have an impact is the distribution of income: gains from hidden activities may lead to deviations from the income distribution as envisaged by parliament.

In this paper we present a model of the supply of hidden labour in the Netherlands. The data used to estimate the model, is from surveys held in 1983 and 1984 by the Netherlands Central Bureau of Statistics. In total 8456 persons were sampled of which 3811 persons responded. Further we present some model simulations to study the effect of cyclical fluctuations and of structural changes in the (perceived) probability of detection.

The model presented fits into a class of models, originally developed by Heckman (1974) explaining the participation of women in the formal labour market in the United States. The hidden labour market is to some extent comparable to the labour market for married women. For example, married women often have part-time jobs, which implies a considerable variation in hours worked. This variation is much larger than for men, who more often are breadwinners and are committed to full-time jobs. For participants in the hidden labour market the variability in hours worked is found to be similar to that for women.

In Section 2 a definition is given of the particular 'hidden economy' that we studied. This section also briefly describes the method that was used to investigate the hidden economy. Section 3 describes the model of the hidden labour market. This model is estimated in section 4. In section 5 we present some model simulations to study the effect of cyclical fluctuations and the effect of structural changes like the introduction of a tax exempt and a higher probability of detection. Section 6 summarizes the main results.

## 2. Concepts and Survey Results

Numerous definitions of the 'hidden economy' or more generally the 'informal sector' exist. It is obvious that the results of research on informal activities are determined by the way in which these activities are defined. The literature on the subject contains a wide variety of concepts, which are frequently discontiguous. Many criteria aim to distinguish between formal and informal activities (Begeer and Van Tuinen, 1985). This diversity sometimes makes the results of various studies incomparable and therefore these concepts must be studied in greater detail (Van Eck, 1983).

In this paper a **fiscal criterion** is used[1]. The fiscal criterion limits the informal economy to activities which, in conflict with prevailing tax regulations, are not reported to the fiscal authorities (IMF, 1980; BIR, 1981; Frank, 1983). Such activities are described as **hidden**. Activities are hidden if for example a company conceals part of its sales from the fiscal authorities. Furthermore, only those activities are considered that are productive according to the (Dutch) system of national accounts. Therefore our definition of the hidden economy is *"all activities which are productive according to the (Dutch) system of national accounts and for which the obligation to report the income from these activities is not complied with."* For informal activities which are not subject to reporting requirements there can be no evasion of such requirements. For activities which are not covered by the system in which national income is measured it is difficult to define income. Therefore such activities are not examined.

For our study a method was selected which allows gaining an insight in not only the size, but also in the structure of (components of) the hidden economy at a national level. After comparing the strengths and the weaknesses of the methods available (see e.g. Carson, 1984; Barthelemy, 1988; Van Eck and Kazemier, 1988) various survey methods were selected. The advantages of surveys are that they can be directed at the hidden economy as defined above and that they also make it possible to obtain detailed information on the characteristics and motives of the participants. A limitation of survey research is that part of the wide range of activities covered in the hidden economy cannot be adequately measured. This applies for example to criminal

activities like fencing and the distribution of drugs, and to hidden activities of a primarily administrative nature, like saving without declaring interest.

One part of the hidden economy for which surveys may be succesful is the hidden labour market. Firstly, many people are involved. Secondly, making oneself available for work has such an impact on daily activities that it will be remembered afterwards much better than for example the receipt of interest. Thirdly, doing hidden jobs is considered by many people (in the Netherlands) as only a minor infringement and for this reason it is assumed that many people with hidden jobs are willing to report them in a survey. Therefore the surveys were directed at the part of the hidden economy which is described as the **hidden labour market**.

As hidden labour is still a delicate issue for at least part of the population, special attention was given to the structure of the questionnaires, the phrasing and order of the questions and the way in which the more sensitive topics are approached. Neutral questions were asked first followed by, for example, questions about opinions and attitudes towards the fiscal system. Once the direction of the interview had been determined in this way, several questions were asked about available skills and opportunities for having (second) jobs. Finally questions were asked about involvement in hidden work.

Altogether 8456 persons were sampled. The nonresponse rate was rather high: 55 percent (3811 persons responded). The difference with various other surveys on less delicate topics is not very large however; somewhere between 10 and 15 percent points. Indeed in Dutch surveys which use comparable nonresponse definitions, nonresponse rates of 35 to 40 percent are not at all unusual today (Mokken, 1987). In most household surveys 40 to 50 percent of the standard questions on (non-hidden) income remain unanswered due to overall and item-nonresponse.

Many of the observations in the survey are on hidden activities that only yield limited supplementary income. The observed participants operate on a small scale. However, a significant proportion of the population of 16 years and older is involved: over 10 percent have hidden income from labour[2]. This means that in a period of a year over one million people are engaged in hidden

work from time to time. They earn on average over 2000 guilders a year at an average hidden wage rate of 15 guilders an hour[3]. Most of the participants work less than 200 hours a year in their hidden jobs, often unevenly distributed over the year. On a national level these small scale activities account for at least several billion guilders, or over one percent of national income. Many hidden jobs require technical skills (table 1). About two thirds of all hidden work was found via family and acquaintances. A more comprehensive description of the results can be found in Van Eck and Kazemier (1988, 1989)
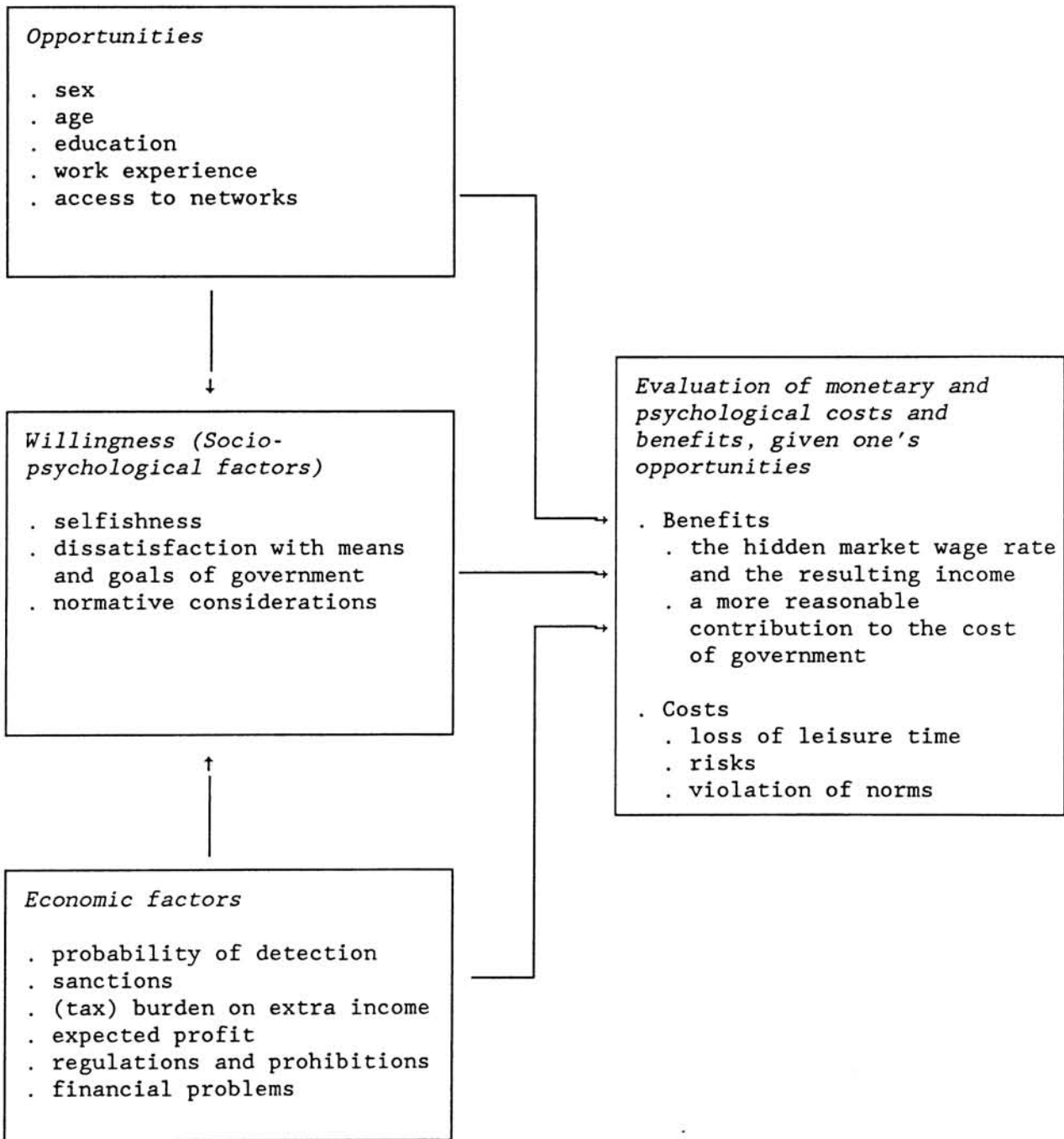
**Table 1.  Categories of Hidden Activities and Intermediairies for Hidden Work**

|  | Participation |
|---|---|
|  | column % |
| Categories of hidden activities[1] | |
| - Business and fiscal consulting, music and remedial teaching, designers, authors and typists. | 13 |
| - Home maintenance, repair of cars and consumer durables, construction work, factory and agricultural work. | 36 |
| - Household work and cleaning. | 9 |
| - Retail, hotels, cafes and restaurants. | 13 |
| - Personal care, child care, various and unknown. | 29 |
|  | 100 |
| | |
| Connection for finding hidden work | |
| - Employers, colleagues | 17 |
| - Family, acquaintances | 63 |
| - Unknown | 20 |
|  | 100 |

1) If more than one activity was reported only the activity on which most time was spent is included.

Participation in the hidden labour market is not only determined by economic factors, as is often suggested in economic literature on the subject. Non-economic motives and moral barriers may also play an important role in the decision to participate. Therefore, economic models based on a comparison of expected monetary costs and expected monetary benefits (e.g. Allingham and Sandmo, 1972) are at least incomplete. Figure 1 shows which factors may affect the decision to participate. This figure is an extension of the one by Weigel, Hessing and Elffers (1987).

**Figure 1.  The Decision to Participate in the Hidden Labour Market**

```
┌─────────────────────────────┐
│ Opportunities               │
│                             │
│ . sex                       │
│ . age                       │
│ . education                 │
│ . work experience           │
│ . access to networks        │
│                             │
└─────────────────────────────┘
               │
               ↓
                                      ┌──────────────────────────────────┐
┌─────────────────────────────┐      │ Evaluation of monetary and        │
│ Willingness (Socio-         │      │ psychological costs and           │
│ psychological factors)       │      │ benefits, given one's             │
│                             │      │ opportunities                     │
│ . selfishness               │      │                                   │
│ . dissatisfaction with means │─────▶│ . Benefits                        │
│   and goals of government    │      │   . the hidden market wage rate   │
│ . normative considerations   │      │     and the resulting income     │
│                             │      │   . a more reasonable             │
│                             │      │     contribution to the cost      │
│                             │      │     of government                 │
│                             │      │                                   │
│                             │      │ . Costs                           │
│                             │      │   . loss of leisure time          │
│                             │      │   . risks                         │
│                             │      │   . violation of norms            │
└─────────────────────────────┘      └──────────────────────────────────┘
               ↑
               │
┌─────────────────────────────┐
│ Economic factors            │
│                             │
│ . probability of detection  │
│ . sanctions                 │
│ . (tax) burden on extra income │
│ . expected profit           │
│ . regulations and prohibitions │
│ . financial problems        │
└─────────────────────────────┘
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The decision to participate depends on a person's **willingness** as well as his or her **opportunities** to participate and on **economic factors** like the (perceived) probability of detection, sanctions and expected profit. If motives are absent or moral barriers are too high, the hidden wage rate may be too low to compensate for these psychological costs. However, the survey results show that opportunities and economic factors tend to be more dominant than the factors which measure willingness.

## 3. The Model

As illustrated in figure 1 the decision to participate in the hidden labour market can be seen as the result of a 'cost-benefit analysis'. Only if the expected benefits exceed the perceived costs one will try to get a hidden job. In our analysis the expected benefits depend on the hidden wage rate. The costs reflect, for example, the loss of leisure time and the risk involved. The value of leisure time depends among other things on age and on the net wage rate on the formal labour market. So far it is a purely economic model. But here we will add a non-economic factor: the perceived costs of violating moral standards.

The cost-benefit analysis described above fits very well into a class of models, originally developed by Heckman (1974), and widely used in labour-econometrics (e.g. Hartog and Theeuwes, 1986). Therefore, a brief description will do. A detailed description of this class of models can be found in Heckman and MaCurdy (1986).

According to the Heckman model the decision to participate is based on a choice between income and leisure. The aim is to maximize a utility function with income and leisure as variables. But more time spent on getting income implies less time available for leisure. And with decreasing leisure time, the marginal utility of leisure becomes higher. It is assumed that people choose to do hidden work as long as the monetary income of one extra hour of work (hidden wage rate) contributes more to total utility than the psychological income (shadow or reservation wage rate) of one extra hour of leisure would.

For each individual (i) the wage rate (P) in the hidden labour market depends on his or her **opportunity**. Important determinants of opportunity are education, sex, age and work experience. If we represent these determinants in one symbol (E) the wage rate function can be written as

$$\ln(P_i) = b_0 + b_1 E_i + \mu_i .$$

As suggested above, the reservation wage rate reflects the value of leisure, the need for income and the willingness to sacrifice for this income. With some simplification we will interpret it as an indicator of **willingness**.

In this interpretation a high reservation wage rate means that one is not very willing to do hidden work. For example high moral standards may cause such an lack of willingness. But also economic factors like a high net formal wage rate or a perceived high risk may affect one's willingness. A low reservation wage, on the other hand, indicates a strong willingness to participate in the hidden labour market. One may have a low reservation rate due to 'flexible' moral standards, a low formal net wage rate, or to a low perceived risk. Finally, one's willingness depends on the amount of total leisure time, and therefore on the time one has already been working. The function for the reservation wage $(P°)$ is

$$\ln(P°_i) = \beta_0 + \beta_1 T_i + \beta_2 Z_i + \epsilon_i .$$

$T_i$ represents the time that person i has already been involved in hidden work and Z represents the other determinants which affect willingness. $T_i$ must be larger than or equal to zero and less than or equal to the maximum time available; $\beta_1$ should be positive. The stochastic terms in both the hidden wage rate function $(\mu_i)$ and the reservation wage rate function $(\epsilon_i)$ are assumed to be jointly normally distributed with zero means and a variance-covariance matrix equal to

$$V = \text{Var}(\epsilon, \mu) = \begin{bmatrix} \sigma_\epsilon 2 & \rho \sigma_\epsilon \sigma_\mu \\ \rho \sigma_\epsilon \sigma_\mu & \sigma_\mu 2 \end{bmatrix}$$

The disturbances in the observations are assumed to be mutually independent and $\rho$ is the correlation parameter.

The probability that a respondent is involved in hidden activities can be derived from the difference between the hidden wage rage and the reservation wage rate when $T_i = 0$. At that point one must decide to participate or not. If the hidden wage rate at that point is less than or equal to the reservation

wage rate, one does not participate; if the prevailing wage in the hidden labour market exceeds the reservation wage rate one does participate[4]. A respondent who decides to participate in the hidden labour market and who maximizes total utility of income and leisure, will keep on working as long as the hidden market wage rate exceeds the reservation wage rate. As soon as both rates are equal the participant will stop[5].

The maximum likelihood method was used to obtain consistent parameters. The likelihood function has three parts because of differences in the completeness of the information obtained from the respondents. The first part is the joint distribution function of the hidden wage rate and the reservation wage[6] rate for the respondents who reported to be involved in hidden activities and who did provide valid information on their hidden wage rates and the hours worked. The second part is the likelihood that the hidden wage rate exceeds the reservation wage rate in $T = 0$; this part only applies to the respondents who reported to participate, but who did not provide consistent information on total hidden income, hours worked and hourly wages, or who did not provide such information at all. The third part is the likelihood that the hidden wage rate is less than or equal to the reservation wage rate and applies to the respondents who reported not to have a hidden job. The likelihood function is

$$L = \prod_{i=1}^{K-W} n\{T_i, \ln(P_i)\} * \prod_{i=K-W+1}^{K} pr(P_i > P°_i \mid T_i = 0) *$$

$$\prod_{i=K+1}^{N} pr(P_i \geq P°_i \mid T_i = 0)$$

N is the total number of respondents, K the number of respondents who admitted participation, and W is the number respondents who admitted participation but, did not give (valid) information on hidden wage rate and hours worked.

We assumed that at least some of the determinants for participation, hidden wage rate and hours worked have a different impact on different groups of respondents. For people with a job, for example, other variables may play a

role than for people on social benefits. And for people on social benefits
other variables may be important than for people with no income of their own.
Therefore separate models are estimated for three different groups of
respondents. The first group covers the employed (people with a part-time or
full-time formal job). The second group includes people on social benefits and
the third group contains people with no income of their own (dependants),
mainly non-employed housewives. We excluded students and pensioners from the
analysis, because their position on the formal labour market differs too much
from the position of the other groups to combine them with one of these.
Students have not yet entered the formal labour market, pensioners statutorily
left it. Attempts to estimate a separate model for students did not yield
satisfactory results. The number of observations on pensioners who participate
in the hidden labour market is too small to estimate a separate model.

For each group the same basic set of variables was used. With respect to the
hidden market wage rate, this set consists of the variables 'education', 'sex'
and 'age'; with respect to the reservation wage rate, the set consists of
'age', 'the disapproval of tax evasion' and 'the perceived probability of
detection'. In addition to the variables in the basic set, various other
variables have been selected, some of which are only relevant to a specific
group. For example, a variable to discriminate between the self-employed and
employees is only relevant to the employed. And a variable to distinguish
between assistance benefits and unemployment or labour disablement allowances
only applies to people on social benefits. Other variables which have been
considered are, for example, the formal wage rate, the tax burden, the time
worked in the formal labour market, one's position in the household
(breadwinner or not), work experience, formal income, the financial position
(having debts or not), the role of religion, one's political preference,
opinions on the performance of the government, opinions on the fiscal system
and the degree of urbanization of the residence of the respondent. Of these,
variables which were not significant at about 85 percent (t-value $\geq$ 1) were
discarded.

The variable 'age' is used in both equations. In the equation for the hidden
wage rate 'age' is a proxy for unmeasured variables like 'labour productivity'
and 'quality of the work done'. It is assumed that for younger people age only

has a positive effect on productivity and quality. For older people, however, there are also important negative effects, like outdated knowledge and a slower work tempo. The overall effect of age is modeled by a parabolic relation between age and (the logarithm of) the hidden wage rate. In the equation of the reservation wage rate, the variable 'age' is considered as a proxy for variables like 'physical condition' and 'family obligations'. Because of problems with the identification of the model we assumed a log-multiplicative relationship between age and reservation wage rate.

## 4. Estimates

Tables 2a to 2c summarize the model estimates. The results for people with no income of their own are the strongest, those for people on social benefits are the weakest. In order to verify that we correctly distinguished between the three different socio-economic categories, a likelihood ratio test was performed. This test actually tests the hypothesis that the models of the three different groups do not differ. The test value

$$LRT = 2 * \{ \ln(L_{employed}) + \ln(L_{soc.benefits}) + \ln(L_{dependants}) - Ln(L_{total}) \}$$

has a chi-squared distribution with 22 degrees of freedom. At a significance level of 10% the critical value is 30.8. The test value is 67.7, which exceeds the critical value. This means that the hypothesis of no differences must be rejected and that one may assume that the three distinguished groups differ.

**Table 2a. Model Estimates of the Hidden Wage Rate[1]**

| Variable | Type[2] | Employed | | People on social benefits | | Dependants | | Total | |
|---|---|---|---|---|---|---|---|---|---|
| Education | | | | | | | | | |
| - primary | d | -0.40 | (-1.9) | 0.07 | (0.6) | -0.54 | (-2.1) | -0.36 | (-2.8) |
| - secondary | R | | | | | | | | |
| - tertiary | d | 0.09 | (0.9) | 0.14 | (0.9) | 0.54 | (3.1) | 0.24 | (2.5) |
| Sex | | | | | | | | | |
| - man | R | | | | | | | | |
| - woman | d | -0.24 | (-2.2) | -0.23 | (-1.9) | -0.61 | (-3.1) | -0.27 | (-3.3) |
| Age/100 | | | | | | | | | |
| - linear term | c | 3.32 | (1.2) | 0.85 | (0.2) | 8.64 | (2.2) | 5.24 | (2.3) |
| - squared term | c | -3.99 | (-1.2) | -2.29 | (-0.6) | -9.34 | (-1.8) | -6.18 | (-2.2) |
| Work experience | | | | | | | | | |
| - yes | d | | | 0.48 | (2.1) | | | 0.23 | (1.6) |
| - no | R | | | | | | | | |
| Constant | | 2.28 | (4.0) | 1.90 | (2.4) | 1.12 | (1.5) | 1.48 | (3.3) |

1) Students and pensioners excluded. T-values between brackets.
2) d: dummy variable; c: continuous variable; R: reference group.

## Table 2b. Model Estimates of the Reservation Wage Rate[1]

| Variable | Type[2] | Employed | | People on social benefits | | Dependants | | Total | |
|---|---|---|---|---|---|---|---|---|---|
| Hours worked: T (hours/week) | c | 0.23 | (1.8) | 0.10 | (1.7) | 0.27 | (2.3) | 0.27 | (3.0) |
| Disapproval of tax evasion | | | | | | | | | |
| - relatively strong | d | 0.35 | (1.7) | 0.04 | (0.4) | 0.82 | (1.7) | 0.45 | (2.4) |
| - not very strong or unknown | R | | | | | | | | |
| Probability of detection | | | | | | | | | |
| - very low | d | -0.65 | (-1.7) | -0.39 | (-1.5) | -0.89 | (-1.5) | -0.88 | (-2.6) |
| - low | d | 0.43 | (1.7) | -0.21 | (-1.4) | 1.06 | (1.9) | 0.50 | (2.5) |
| - neutral | d | 0.61 | (1.7) | 0.25 | (1.1) | 0.84 | (1.5) | 0.79 | (2.5) |
| - (very) high | d | 1.10 | (1.9) | 0.71 | (1.6) | 2.23 | (2.2) | 1.65 | (2.9) |
| - not asked | R | | | | | | | | |
| Age: ln[ln(years)] | c | 1.83 | (1.5) | 0.53 | (0.3) | 3.58 | (1.7) | 3.02 | (2.5) |
| Position in the family | | | | | | | | | |
| - breadwinner | R | | | | | | | | |
| - not breadwinner | d | | | 0.18 | (1.1) | | | 0.18 | (1.2) |
| Work experience | | | | | | | | | |
| - office jobs | d | 0.38 | (1.7) | 0.18 | (1.2) | | | 0.46 | (2.7) |
| - other jobs or no experience | R | | | | | | | | |
| Financial position | | | | | | | | | |
| - debts | d | | | | | -0.67 | (-1.6) | -0.05 | (-0.4) |
| - no debts | R | | | | | | | | |
| Socio-economic category | | | | | | | | | |
| - assistance benefit | d | | | -0.35 | (-2.1) | | | -0.51 | (-1.8) |
| - other social benefit | Rd | | | | | | | -0.20 | (-0.9) |
| - self-employed | d | -0.41 | (-1.6) | | | | | -0.39 | (-1.4) |
| - employee | Rd | | | | | | | 0.27 | (1.7) |
| - dependants | R | | | | | | | | |
| Constant | | 1.22 | (0.9) | 2.01 | (1.0) | -0.39 | (-0.2) | -0.32 | (-0.2) |

1) Students and pensioners excluded. T-values between brackets.
2) d: dummy variable; c: continuous variable; R: reference group.

**Table 2c.   Distribution Parameters of the Model Estimates[1]**

| Variable | Employed | | People on social benefits | | Dependants | | Total | |
|---|---|---|---|---|---|---|---|---|
| **Variance** | | | | | | | | |
| - hidden wage rate: $\sigma_\mu$ | 0.60 | (13.0) | 0.56 | (7.5) | 0.40 | (8.0) | 0.56 | (17.7) |
| - reservation wage rate: $\sigma_\epsilon$ | 1.16 | (3.0) | 0.64 | (3.9) | 1.70 | (2.6) | 1.43 | (3.8) |
| Correlation parameter: $\rho$ | 0.69 | (4.0) | 0.74 | (3.3) | 0.34 | (1.2) | 0.48 | (3.5) |
| Log likelihood: | -612.53 | | -179.71 | | -239.90 | | -1065.99 | |
| Number of observations | 1557 | | 338 | | 951 | | 2846 | |
| of which: | | | | | | | | |
| - participants who provided | | | | | | | | |
| complete information | 94 | | 31 | | 36 | | 161 | |
| - participants with | | | | | | | | |
| incomplete information | 45 | | 13 | | 12 | | 70 | |
| - non-participants | 1418 | | 294 | | 903 | | 2615 | |

1) Students and pensioners excluded. T-values between brackets.

A very important variable in the equation for the hidden wage rate is 'education'. The differences between the various levels of education are very large and are highly significant. On average a person with tertiary education gets a wage rate which is almost twice as high as that of a person with only primary education (exp[0.24 - -0.36] = 1.82). For dependants this difference is even greater and equals a factor three. For people on social benefits, however, education has no significant effect on the hidden wage rate. For those people work experience plays an important role. The 'sex' variable is also important, especially for persons without income. In this group of dependent persons, women receive only half the hidden wage rate of men. For the employed and for people on social benefits this difference between the two sexes is considerably smaller. The estimates for the variable 'age' are conform the expectations: for younger people a positive relation between wage rate and age, for older people a negative relation. The employed reach their highest hidden wage rate at an age of 42; for dependants the top is at 46. In this group a 46 years old person gets more than twice as much as a person of 18 years old.

The variables in the equation for the reservation wage represent a mixture of **willingness** to participate in the hidden labour market, **urgency** to earn additional income and **expectations** with respect to the compensation for hidden

work. As mentioned above, the term willingness will, for the sake of simplicity, be used in the interpretation of the model estimates.

The perceived risk[7] is the most important variable for willingness. Employed persons and people on social benefits who perceive the probability of detection as high have a reservation wage rate which is three to six times higher than persons who consider the probability of detection (very) low. For the dependants this factor is even over twenty. The second most important variable is 'disapproval of tax evasion', especially for employed persons and people without income. For the latter group a strong disapproval results in a wage rate which is twice as high.

People on social benefits have a different attitude towards accepting hidden work compared to people from other groups. They accept hidden jobs even if they disapprove of tax evasion and the probability of detection has to be higher than for other groups before it keeps them from doing hidden work. Moral disincentives and risk seem to be less discouraging for people on social benefits than for the employed or for non-earning partners (dependants).

In general, however, moral barriers to hidden work do not seem to be very high. Variables like 'political preference' and 'the role of religion' had no significant influence on the hidden wage rate. The same applies to opinions on the fiscal system and the performance of the government. And although 'disapproval of tax evasion' has a significant influence on the reservation wage rate, hardly anyone condemns tax evasion very harshly. On average people consider hidden work as serious as cycling without proper lights, squatting or selling pornografy. However, fraud with social security payments is rated far more serious, and at the same level as heroin consumption or hit-and-run accidents.[8]

Work experience does not only affect the hidden wage rate, it also influences the reservation wage rate. Except for the group of people without income, persons with experience in an office job expect a higher wage rate than others. Here, perhaps an imperfection of the model becomes manifest. Perhaps, the higher reservation wage rate for persons with experience in white collar jobs does not only reflect a greater unwillingness to participate, but has

something to do with difficulties in finding suitable hidden work as well. So the high reservation wage may partly be caused by the rather rigid assumption of infinite demand.

Persons on assistance benefits (the lowest social benefit in the Netherlands) are more willing to participate in the hidden labour market than people on other, higher, benefits. Further the self-employed seem to need hidden work more urgently than other people with a formal job. The positive coefficient for non-breadwinners among the people on social benefits might indicate that the breadwinners in this group are more willing to accept hidden work than other members of the household who receive social benefits.

Respondents themselves often mentioned financial motives to participate in the hidden labour market. Some of these are related to financial problems, but most of them are not. In general, financial motives do not play an important role. Only for dependants debts appear to be an incentive to accept a hidden job. Apparently, if a household cannot manage with the formal income of the breadwinner, the non-earning partner assists and looks for a hidden job. In that case one is remarkably less demanding with regards to the hidden wage rate than in a situation without debts: the reservation wage rate is 50 percent lower. Finally, it is remarkable that with the available information no relationship between tax burden and willingness was found. This is in contrast with many theoretical studies in which the presumption is that the tax burden is a main factor for the existence of a hidden economy.

Table 3.  Background Characteristics for Participation and Hourly Wages
         in the Hidden Labour Market; generated observations[1,2]

| Variable | Partici-<br>pation | Average<br>hourly<br>wage |
|---|---|---|
|  | % | Guilders |
| Work experience |  |  |
| - has a job | 8 | 17 |
| - has no job, but has experience | 6 | 12 |
| - has no experience | 4½ | 8 |
| Education |  |  |
| - primary | 4½ | 10 |
| - secondary | 8½ | 16 |
| - tertiary | 9 | 19 |
| Sex |  |  |
| - male | 9½ | 17 |
| - female | 4 | 11 |
| Age |  |  |
| - 16-25 years | 9 | 13 |
| - 26-45 years | 8 | 16 |
| - 46 years and more | 3½ | 13 |
| Socio-economic category |  |  |
| - employed | 8 | 17 |
| - on social benefits | 10½ | 10 |
| - dependants | 4 | 12 |

1) Observations were generated using the estimated model, presented in table 2
2) Students and pensioners are excluded.

In general the same factors which determine opportunities on the formal labour market seem to apply to the hidden labour market. To illustrate this point we generated 'estimated observations' for incidence and hourly wage for each respondent, using the estimated model in tabel 2[9]. Unlike the original observations, these generated observations are only determined by the structural factors which are distinguished in the model. Therefore these new observations give a better description of the structural features of the hidden labour market than the original ones. Moreover, the generated hidden wage rates include estimates of the market wage rates which were not realized and therefore not observed. The results are summarized in table 3. A high participation rate and a high hidden wage rate indicate a strong position on

the hidden labour market. A low participation and a low hidden wage rate indicate a weak position.

Two groups can be distinguished. The first group consists of people with a strong position on the formal labour market ('*the priviliged*'). They often have work experience, a high education, are relatively young and predominantly male. People in this group also have a strong position on the hidden labour market, which is reflected by a relatively high hidden wage rate and a high participation rate. The hidden income is an addition to income from a formal job. Therefore these people can be described as 'second jobbers'. An important factor in securing hidden jobs and high wages is accessibility of such jobs via (formal) employers or colleagues. Priviliged people often have access to such networks.

The second group consists of '*less priviliged*' people with an unfavourable position with repect to the formal labour market. It includes housewives and people on social benefits. For these people the objective is often to find a job, either formal or hidden; they can be characterized as 'job searchers'. They generally do not have a very high education, are unemployed and are old compared to the people in the priviliged group. For this reason they also have fewer opportunities in the hidden labour market. Their jobs are found via family or acquaintances. This strongly determines the type of work they have access to: it competes with unpaid work in the household economy, often requires no qualifications and it pays low wages. Their participation rate is relatively low. The participation of people with only primary education is only half that of those with tertiairy education and women's participation rate is not even half that of men.

## 5. Simulations

It is sometimes suggested that the size of the informal economy is related to the phase of the business cycle. According to this theory, people drop out of the formal economy and are pushed into the informal economy during an economic recession. During expansion things reverse and people in the reservoir of the informal economy are redeployed in the formal economy. The model described in the previous sections allows some exercises to study the sensitivity of the hidden labour market for cyclical variations in the economy.

Because the model is static, no direct conclusions on the growth of the hidden economy can be drawn. However, the fact that different models were estimated for three socio-economic categories, gives some starting point for indirect conclusions. One indicator for economic recession is an increasing number of unemployed and thus an increase in the number of people on social benefits. Such an increase can be simulated. We assumed that 10 percent of the employed in our survey lost their job. For the Netherlands as a whole this corresponds to about half a million newly unemployed. Such an increase in unemployment actually occurred in the first half of the eighties[10]. Further it is assumed that employees who loose their job will get an unemployment benefit and that self-employed only get assistance benefits. Finally it is assumed that people who loose their job behave according to the model estimates for people on social benefits.

Another effect of an economic recession is an increasing number of people who cannot manage which their regular income. This can be simulated as well. In a second simulation we assumed that not only 10 percent of all employed lost their jobs, but also that 10 percent of all families without debts got into financial trouble because of the economic recession.

Besides the simulation of an economic recession, an economic improvement is simulated. For this simulation it was assumed that 25 percent of all people on social benefits younger than 65 found a formal job. This 25 percent almost equals the target of the Dutch government in the second half of the eighties. For people with work experience, it was assumed that the new job is in line

with their previous job experience. People without experience were assumed to find an office job.

The results of the simulations are presented in table 4. For easier interpretation this table also includes the survey estimates of the total size of the hidden labour market: 1 million participants, 100,000 labour-years and 3 billion guilders.

Table 4.  Changes in the Size of the Hidden Labour Market Because of Cyclical Fluctuations[1,2]

|  | Number of participants | Hidden labour volume | Total hidden income |
|---|---|---|---|
|  | thousands | thousand working-years | million guilders |
| Size according to the survey results | 1000 | 100 | 3000 |
| Changes due to a 10 percent decrease in employment | 44 (8) | 10 (1.2) | 150 (27) |
| Changes due to a 10 percent decrease in employment and 10 percent of the families without debts getting into financial problems. | 59 (8) | 11 (1.2) | 185 (28) |
| Changes if 25 percent of the people on social benefit will find a job | -23 (5) | -5 (0.7) | -72 (14) |

1) Students and pensioners excluded.
2) Averages of 1000 simulation runs. Standard error between brackets.

The results of the three analyses do not indicate that cyclical fluctuations strongly affect the size of the hidden labour market. Even during a serious recession in which half a million persons loose their jobs and 10 percent of the families without debt get into financial problems, the hidden labour market will grow with only by 10½ percent if measured in working years, or by about 6½ percent if measured in guilders. In a period with vastly growing employment the effect is also marginal. If the number of people on social benefits decreases by 25 percent, which requires the availability of about 200,000 extra full-time

jobs, then the hidden labour volume decreases with only 5 percent or 5,000 working years.

One might conclude that changes in the number of unemployed, for example due to an economic recession, hardly affects the size of the hidden labour market: there are no indications that the *'buffer theory'*, referred to in the beginning of this section, is valid for the hidden labour market. However, we must note that only two aspects of cyclical fluctuations could be simulated and that other aspects were not taken into account.

Table 5. **Changes in the Size of the Hidden Labour Market due to a Tax Exempt of 1500 Guilders and an Increase in the Perceived Probability of Detection[1]**

| | Number of participants | Hidden labour volume | Total hidden income |
|---|---|---|---|
| | thousands | thousand working years | million guilders |
| Size according to the survey results | 1000 | 100 | 3000 |
| Changes because of the introduction of a tax exempt of 1500 guilders | -555 | -35 | -890 |
| Changes because of an increase in the perceived probability of detection and a tax exempt of 1500 guilders | -715 | -60 | -1630 |

1) Students and pensioners excluded.

Although cyclical changes hardly affect the size of the hidden labour market, structural factors may have a substantial impact. In 1985, a governmental committee (ISMO, 1985) which studied the hidden economy, published its final report. In that report, it was emphasized that government should not make or maintain laws and regulations which are not observed, or of which the observance is not, or cannot be properly checked. Therefore it was recommended to create a limited tax exempt for secondary income since income from an occasional hidden job is seldom detected and the costs of detection would often exceed the revenues. We simulated a tax exempt of 1500 guilders. As the results

show (table 5) less than half the present number of participants would, according to the model, remain in the hidden labour market.

In a study on hidden work by the unemployed Hessing, Elffers and Robben (1990) distinguish two categories of (unemployed) participants in the hidden labour market. The 'convinced participant' would **always** try to get more money, even if it needs fraudulent behaviour. He has a job, but still receives unemployment benefit, rather than being unemployed and earning some additional income. The 'occasional participant', on the other hand, acts out of necessity. He does the odd hidden job because he cannot find a regular job and because the resulting financial and psychological problems make it more urgent to accept hidden work.

A similar distinction can be made for all participants in the hidden labour market. The 'convinced participant' does not want to contribute at all to the tax or social security system and evades such contributions whenever he can. The hidden income which he earns may be considerable. The 'occasional participant' is willing to support the tax and social security systems and fulfills most of his obligations. Beyond a certain point, however, he considers it acceptable to evade the tax laws. This applies for example to having an occasional job besides a regular source of income. His hidden income is usually small.

If policy makers wanted to make a distinction between the two categories of participants, the tax exempt described above would make it possible to focus the attention on the 'convinced participants'. The proposed tax exempt would also be the cheapest way to significantly reduce the number of participants in the hidden labour market.

In addition to other measures, ISMO repeated a recommendation of an earlier governmental committee on evasion and avoidance (Van Bijsterveld, 1980): increase the probability of detection. Both committees considered an increase in the probability of detection to be very effective in reducing the size of the hidden economy; none of them, however, estimated its effect. The model estimates in section 4 also suggest that an increase in the probability of detection might be very effective. We tried to quantify the combined effect of

a 1500 guilder tax exempt and an increase in the perceived probability of detection.

The question in the survey on the probability of detecting hidden income by the tax authorities, allowed for five different answer categories: detection is 'very likely', 'likely', 'in between or don't know', 'unlikely' and 'very unlikely'. To simulate an increase in the perceived probability, it is assumed that each respondent's answer on this question would change by one answer category, unless one already thought the probability to be very high. In the latter case the answer was not altered. Also, the observations on people who were not asked about their perception, remained unknown. In total the perceived probability of detection was increased for about two third of all respondents. The results of the simulation are summarized in the third row of table 5.

The effect of a combined 1500 guilder tax exempt and an increase in the perceived probability of detection is very significant. According to our model estimates the total number of participants will probably decrease by 70 percent; the total amount of hidden income will be reduced by over 50 percent. On average, the higher perceived probability of detection further reduced the size of the hidden labour market remaining after a 1500 guilder tax exempt by 25 to 35 percent[11].

## 6. Conclusions

Participation in the hidden labour market is governed by two main factors: **willingness** and **opportunities**. Model estimates show that the willingness to participate is mainly determined by the perceived probability of detection. Other factors like a high tax burden or financial problems are less important or even insignificant. Financial problems are only an incentive for people with no income of their own, for example for the non-earning partner of a breadwinner. The main variables measuring the opportunity to participate are 'education', 'sex' and 'work experience'.

The main conclusion pertains to the great similarity between the formal and the hidden labour markets. Factors which determine the possibility of success in the formal labour market, also determine the opportunities in the hidden labour market.

The hidden labour market is quite insensitive to cyclical fluctuations. Participation, wages and the extent of the involvement in the hidden labour market are mainly determined by structural factors like education, work experience, sex and age. An analysis in which the effect of a serious economic depression is simulated does not indicate a significant movement from the regular labour market to the hidden labour market[12].

Many participants in the hidden labour market only have small hidden incomes. For the government, the loss of these revenues due to tax evasion is limited, because these small incomes account for only a minor part of the total hidden economy. So from a financial point of view it is not essential for the government to trace these hidden incomes, also because the costs involved often exceed the revenus. The existence of a large number of participants, a low treshold for law infringement and a low probability of detection, however, may affect moral cohesion in society and therefore the scope for government action (Sandmo, 1990). For this reason ISMO (1985) recommended that government should not make or maintain laws and regulations which are not observed, or for which the observance is not, or cannot be properly checked. According to our model simulations, legalizing hidden work up to income supplements of 1500 guilders a

year, will probably reduce the number of participants in the hidden labour market by half.

Of all variables considered, the magnitude of the hidden labour market is most strongly affected by the perceived probability of detection. Therefore, this variable is a good starting point for a policy to reduce the size of the hidden labour market. A model simulation shows that measures to increase the perceived probability of detection can be very effective in this respect. Combined with a 1500 guilder tax exempt it may reduce the participation rate by 70 percent and hidden income by over 50 percent or one and a half billion guilders.

# Notes

1) Other criteria are for example the statistical criterion, the economic market criterion and the juridical criterion. The statistical criterion distinguishes activities which should be, but are not, covered by official statistics (Blades, 1982; Frey and Weck, 1983; Broesterhuizen, 1985). These 'unofficial' activities, however, do not necessarilly coincide with hidden activities. Researchers who apply the economic market criterion emphasize the distinction between paid and unpaid activities (Hawrylyshyn, 1977). In this criterion the informal sector covers household activities, do-it-yourself and voluntary work. In the juridical criterion the term 'illegal' is used to describe activities which are in conflict with the law (Henry, 1981). Illegal activities cover for example the distribution of drugs.

2) In fact eight survey variants were used, which differed on characteristics for which systematic survey errors can occur, but which were similar in the scope of the variables measured. The eight variants differed in medium of communication between researcher and respondent (face-to-face, mail and telephone) and in interview design (direct approach, gradual approach and 'free form' conversation. The estimates of the magnitude of the hidden labour market are based on the survey variant with the highest reported participation. With respect to the structure of the hidden labour market, there was no significant difference between the eight survey variants (Van Eck and Kazemier, 1989).

3) At the time of the survey 1 guilder was approximately 0.40 U.S. dollar.

4) The probability that a respondent does hidden work is

$$\Pr(p_i > P°_i \mid T_i = 0) = \int_{-\infty}^{U_i} (2\pi)^{-\frac{1}{2}} \exp(-r^2/2) \, dr = \Phi(U_i)$$

with $\Phi$ the cumulative density function of the standard normal distribution, $U_i = D_i/(\sigma_\epsilon^2 + \sigma_\mu^2 - 2\rho\sigma_\epsilon\sigma_\mu)^{\frac{1}{2}}$ and $D_i = (b_0 - \beta_0 + b_1 E_i - \beta_2 Z_i)$.

5) The number of hours worked by a person who participates is

$$E\{h_i \mid h_i > 0\} = \frac{\phi(-U_i)}{[1 - \Phi(-U_i)]} * \frac{(\sigma_\epsilon^2 + \sigma_\mu^2 - \rho\sigma_\mu\sigma_\epsilon)^{\frac{1}{2}}}{\beta_1} + \frac{D_i}{\beta_1}$$

with $\phi$ and $\Phi$ being the density and the cumulative density function of the standard normal distribution.

6) The joint distribution function of the hidden wage rate and the reservation wage rate is $n\{T_i, \ln(P_i)\} = (2\pi\sqrt{|C|})^{-1}\exp(x_{it}C^{-1}x_i/2)$ with

$$x_i = \begin{bmatrix} T^*_i - D_i/\beta_1 \\ \ln(P_i) - b_0 - b_1E_i \end{bmatrix}$$

and

$$C = \beta_1^{-2} * Var\begin{bmatrix} \dfrac{\mu - \epsilon}{\beta_1}, & \mu \end{bmatrix} = \begin{bmatrix} \sigma_\mu^2 + \sigma_\epsilon^2 - 2\rho\sigma_\epsilon\sigma_\mu & b_1(\sigma_\mu^2 - \rho\sigma_\epsilon\sigma_\mu) \\ b_1(\sigma_\mu^2 - \rho\sigma_\epsilon\sigma_\mu) & \sigma_\mu^2\beta_1^2 \end{bmatrix}.$$

7) It is possible that respondents who participate in the hidden labour market know by experience that the probability of detection is rather low. It is not very likely, however, that experience is the only explanation for the strong relation between this variable and participation.

8) This can be deduced from answers on survey questions about the seriousness of ten controversial activities.

9) The generated average participation rate is only slightly less then the observed participation rate (7.9 versus 8:1 percent). The same applies to the gererated hidden wage rate and the observed hidden wage rate for people who admitted participation (15 versus 16 guilders). Generated hours worked were a little higher (130 versus 120 hours) and generated hidden incomes were on average 20 percent higher than the observed hidden incomes (1950 and 1650 guilders).

10) In 1980  248 thousand persons were registered as unemployed. In 1985 this figure was 761 thousand.

11) If the perceived probability of detection would be increased without the tax exempt, the reduction would also be between 25 and 35 percent.

12) Another indication that the hidden labour market is insensitive to cyclical fluctuations was found in the survey itself. On a question about the demand for hidden work in the early eighties, some participants had noticed an increased demand, because people used hidden instead of regular services in order to save money. But others had seen a reduction in demand, because consumers saved money by going from the hidden economy to the the unpaid or parallel economy. Combining both findings, one may conclude that during an economic recession more or less compensating movements exist, into and out of the hidden labour market: at one level people save money by using hidden instead of regular services and consumers on a smaller budget will 'do-it-themselves' instead of having it done 'hidden'.

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National Accounts Occasional Papers

NA/01 **Flexibility in the system of National Accounts**, Van Eck, R.,
C.N. Gorter and H.K. van Tuinen (1983).
This paper sets out some of the main ideas of what gradually developed
into the Dutch view on the fourth revision of the SNA. In particular
it focuses on the validity and even desirability of the inclusion of a
number of carefully chosen alternative definitions in the "Blue Book",
and the organization of a flexible system starting from a core that is
easier to understand than the 1968 SNA.

NA/02 **The unobserved economy and the National Accounts in the Netherlands,
a sensitivity analysis**, Broesterhuizen, G.A.A.M. (1983).
This paper studies the influence of fraud on macro-economic
statistics, especially GDP. The term "fraud" is used as meaning
unreporting or underreporting income (e.g. to the tax authorities).
The conclusion of the analysis of growth figures is that a bias in the
growth of GDP of more than 0.5% is very unlikely.

NA/03 **Secondary activities and the National Accounts: Aspects of the Dutch
measurement practice and its effects on the unofficial economy**,
Van Eck, R. (1985).
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.

NA/04 **Comparability of input-output tables in time**, Al, P.G. and
G.A.A.M. Broesterhuizen (1985).
It is argued that the comparability in time of statistics, and input-
output tables in particular, can be filled in in various ways. The
way in which it is filled depends on the structure and object of the
statistics concerned. In this respect it is important to differentiate
between coordinated input-output tables, in which groups of units
(industries) are divided into rows and columns, and analytical input-
output tables, in which the rows and columns refer to homogeneous
activities.

NA/05 **The use of chain indices for deflating the National Accounts**, Al,
P.G., B.M. Balk, S. de Boer and G.P. den Bakker (1985).
This paper is devoted to the problem of deflating National Accounts and
input-output tables. This problem is approached from the theoretical
as well as from the practical side. Although the theoretical argument
favors the use of chained Vartia-I indices, the current practice of
compilating National Accounts restricts to using chained Paasche and
Laspeyres indices. Various possible objections to the use of chained
indices are discussed and rejected.

NA/06 **Revision of the system of National Accounts: the case for
flexibility**, Van Bochove, C.A. and H.K. van Tuinen (1985).
It is argued that the structure of the SNA should be made more
flexible. This can be achieved by means of a system of a general
purpose core supplemented with special modules. This core is a fully
fledged, detailed system of National Accounts with a greater
institutional content than the present SNA and a more elaborate
description of the economy at the meso-level. The modules are more
analytic and reflect special purposes and specific theoretical views.
It is argued that future revisions will concentrate on the modules and
that the core is more durable than systems like present SNA.

NA/07 **Integration of input-output tables and sector accounts; a possible
solution**, Van den Bos, C. (1985).
The establishment-enterprise problem is tackled by taking the institu-
tional sectors to which the establishments belong into account during
the construction of input-output tables. The extra burden on the
construction of input-output tables resulting from this approach is
examined for the Dutch situation. An adapted sectoring of institu-
tional units is proposed for the construction of input-output tables.

NA/08 **A note on Dutch National Accounting data 1900-1984**, Van Bochove, C.A. (1985).
This note provides a brief survey of Dutch national accounting data for 1900-1984, concentrating on national income. It indicates where these data can be found and what the major discontinuities are. The note concludes that estimates of the level of national income may contain inaccuracies; that its growth rate is measured accurately for the period since 1948; and that the real income growth rate series for 1900-1984 may contain a systematic bias.

NA/09 **The structure of the next SNA: review of the basic options**, Van Bochove, C.A. and A.M. Bloem (1985).
There are two basic issues with respect to the structure of the next version the UN System of National Accounts. The first is its 'size ': reviewing this issue, it can be concluded that the next SNA must be 'large ' in the sense of containing an integrated meso-economic statistical system. It is essential that the next SNA contains an institutional system without the imputations and attributions that pollute present SNA. This can be achieved by distinguishing, in the central system of the next SNA, a core (the institutional system), a standard module for non-market production and a standard module describing attributed income and consumption of the household sector.

NA/10 **Dual sectoring in National Accounts**, Al, P.G. (1985).
Following a conceptual explanation of dual sectoring, an outline is given of a statistical system with complete dual sectoring in which the linkages are also defined and worked out. It is shown that the SNA 1968 is incomplete and obscure with respect to the links between the two sub-processes.

NA/11 **Backward and forward linkages with an application to the Dutch agro-industrial complex**, Harthoorn, R. (1985).
Some industries induce production in other industries. An elegant method is developed for calculating forward and backward linkages avoiding double counting. For 1981 these methods have been applied to determine the influence of Dutch agriculture in the Dutch economy in terms of value added and labour force.

NA/12 **Production chains**, Harthoorn, R. (1986).
This paper introduces the notion of production cains as a measure of the hierarchy of industries in the production process. Production chains are sequences of transformation of products by successive industries. It is possible to calculate forward transformations as well as backward ones.

NA/13 **The simultaneous compilation of current price and deflated input-output tables**, De Boer, S. and G.A.A.M. Broesterhuizen (1986).
A few years ago the method of compiling input-output tables underwent in the Netherlands an essential revision. The most significant improvement is that during the entire statistical process, from the processsing and analysis of the basic data up to and including the phase of balancing the tables, data in current prices and deflated data are obtained simultaneously and in consistency with each other.

NA/14 **A proposal for the synoptic structure of the next SNA**, Al, P.G. and C.A. van Bochove (1986).

NA/15 **Features of the hidden economy in the Netherlands**, Van Eck, R. and B. Kazemier (1986).
This paper presents survey results on the size and structure of the hidden labour market in the Netherlands.

NA/16 **Uncovering hidden income distributions: the Dutch approach**, Van Bochove, C.A. (1987).

NA/17 **Main national accounting series 1900-1986**, Van Bochove, C.A. and T.A. Huitker (1987).
The main national accounting series for the Netherlands, 1900-1986, are provided, along with a brief explanation.

NA/18  The Dutch economy, 1921-1939 and 1969-1985. A comparison based on revised macro-economic data for the interwar period, Den Bakker, G.P., T.A. Huitker and C.A. van Bochove (1987).
A set of macro-economic time series for the Netherlands 1921-1939 is presented. The new series differ considerably from the data that had been published before. They are also more comprehensive, more detailed, and conceptually consistent with the modern National Accounts. The macro-economic developments that are shown by the new series are discussed. It turns out that the traditional economic-historical view of the Dutch economy has to be reversed.

NA/19  Constant wealth national income: accounting for war damage with an application to the Netherlands, 1940-1945, Van Bochove, C.A. and W. van Sorge (1987).

NA/20  The micro-meso-macro linkage for business in an SNA-compatible system of economic statistics, Van Bochove, C.A. (1987).

NA/21  Micro-macro link for government, Bloem, A.M. (1987).
This paper describes the way the link between the statistics on government finance and national accounts is provided for in the Dutch government finance statistics.

NA/22  Some extensions of the static open Leontief model, Harthoorn, R. (1987).
The results of input-output analysis are invariant for a transformation of the system of units. Such transformation can be used to derive the Leontief price model, for forecasting input-output tables and for the calculation of cumulative factor costs. Finally the series expansion of the Leontief inverse is used to describe how certain economic processes are spread out over time.

NA/23  Compilation of household sector accounts in the Netherlands National Accounts, Van der Laan, P. (1987).
This paper provides a concise description of the way in which household sector accounts are compiled within the Netherlands National Accounts. Special attention is paid to differences with the recommendations in the United Nations System of National Accounts (SNA).

NA/24  On the adjustment of tables with Lagrange multipliers, Harthoorn, R. and J. van Dalen (1987).
An efficient variant of the Lagrange method is given, which uses no more computer time and central memory then the widely used RAS method. Also some special cases are discussed: the adjustment of row sums and column sums, additional restraints, mutual connections between tables and three dimensional tables.

NA/25  The methodology of the Dutch system of quarterly accounts, Janssen, R.J.A. and S.B. Algera (1988).
In this paper a description is given of the Dutch system of quarterly national accounts. The backbone of the method is the compilation of a quarterly input-output table by integrating short-term economic statistics.

NA/26  Imputations and re-routeings in the National Accounts, Gorter, Cor N. (1988).
Starting out from a definition of 'actual' transactions an inventory of all imputations and re-routeings in the SNA is made. It is discussed which of those should be retained in the core of a flexible system of National Accounts. Conceptual and practical questions of presentation are brought up. Numerical examples are given.

NA/27  Registration of trade in services and market valuation of imports and exports in the National Accounts, Bos, Frits (1988).
The registration of external trade transactions in the main tables of the National Accounts should be based on invoice value; this is not only conceptually very attractive, but also suitable for data collection purposes.

NA/28  The institutional sector classification, Van den Bos, C. (1988).
A background paper on the conceptual side of the grouping of financing units. A limited number of criteria are formulated.

**NA/29** The concept of (transactor-)units in the National Accounts and in the basic system of economic statistics, Bloem, Adriaan M. (1989). Units in legal-administrative reality are often not suitable as statistical units in describing economic processes. Some transformation of legal-administrative units into economic statistical units is needed. This paper examines this transformation and furnishes definitions of economic statistical units. Proper definitions are especially important because of the forthcoming revision of the SNA.

**NA/30** Regional income concepts, Bloem, Adriaan M. and Bas De Vet (1989). In this paper, the conceptual and statistical problems involved in the regionalization of national accounting variables are discussed. Examples are the regionalization of Gross Domestic Product, Gross National Income, Disposable National Income and Total Income of the Population.

**NA/31** The use of tendency surveys in extrapolating National Accounts, Ouddeken, Frank and Gerrit Zijlmans (1989). This paper discusses the feasibility of the use of tendency survey data in the compilation of very timely Quarterly Accounts. Some preliminary estimates of relations between tendency survey data and regular Quarterly Accounts-indicators are also presented.

**NA/32** An economic core system and the socio-economic accounts module for the Netherlands, Gorter, Cor N. and Paul van der Laan (1989). A discussion of the core and various types of modules in an overall system of economy related statistics. Special attention is paid to the Dutch Socio-economic Accounts. Tables and figures for the Netherlands are added.

**NA/33** A systems view on concepts of income in the National Accounts, Bos, Frits (1989). In this paper, concepts of income are explicitly linked to the purposes of use and to actual circumstances. Main choices in defining income are presented in a general system. The National Accounts is a multi-purpose framework. It should therefore contain several concepts of income, e.g. differing with respect to the production boundary. Furthermore, concepts of national income do not necessarily constitute an aggregation of income at a micro-level.

**NA/34** How to treat borrowing and leasing in the next SNA, Keuning, Steven J. (1990). The use of services related to borrowing money, leasing capital goods, and renting land should not be considered as intermediate inputs into specific production processes. It is argued that the way of recording the use of financial services in the present SNA should remain largely intact.

**NA/35** A summary description of sources and methods used in compiling the final estimates of Dutch National Income 1986, Gorter, Cor N. and others (1990). Translation of the inventory report submitted to the GNP Management Committee of the European Communities.

**NA/36** The registration of processing in make and use tables and input-output tables, Bloem, Adriaan M., Sake De Boer and Pieter Wind (1990, forthcoming). The registration of processing is discussed primarily with regard to its effects on input-output-type tables and input-output quotes. Links between National Accounts and basic statistics, user demands and international guidelines are examined.

**NA/37** A proposal for a SAM which fits into the next System of National Accounts, Keuning, Steven J. (1990). This paper shows that all flow accounts which may become part of the next System of National Accounts can be embedded easily in a Social Accounting Matrix (SAM). In fact, for many purposes a SAM format may be preferred to the traditional T-accounts for the institutional sectors, since it allows for more flexibility in selecting relevant classifications and valuation principles.

**NA/38** Net versus gross National Income, Bos, Frits (1990). In practice, gross figures of Domestic Product, National Product and National Income are most often preferred to net figures. In this paper, this practice is challenged. Conceptual issues and the reliability of capital consumption estimates are discussed.

NA/39 **Concealed interest income of households in the Netherlands; 1977, 1979 and 1981**, Kazemier, Brugt (1990).
The major problem in estimating the size of hidden income is that total income, reported plus unreported, is unknown. However, this is not the case with total interest income of households in the Netherlands. This makes it possible to estimate at least the order of magnitude of this part of hidden income. In this paper it will be shown that in 1977, 1979 and 1981 almost 50% of total interest received by households was concealed.

NA/40 **Who came off worst: Structural change of Dutch value added and employment during the interwar period**, Den Bakker, Gert P. and Jan de Gijt (1990).
In this paper new data for the interwar period are presented. The distribution of value added over industries and a break-down of value added into components is given. Employment by industry is estimated as well. Moreover, structural changes during the interwar years and in the more recent past are juxtaposed.

NA/41 **The supply of hidden labour in the Netherlands: a model**, Brugt Kazemier and Rob van Eck (1990).
This paper presents a model of the supply of hidden labour in the Netherlands. Model simulations show that the supply of hidden labour is not very sensitive to cyclical fluctuations. A tax exempt of 1500 guilders for second jobs and a higher probability of detection, however, may substantially decrease the magnitude of the hidden labour market.

NA/42 **Benefits from productivity growth and the distribution of income**, Keuning, Steven J. (1990).
This paper contains a discussion on the measurement of multifactor productivity and sketches a framework for analyzing the relation between productivity changes and changes in the average factor remuneration rate by industry. Subsequently, the effects on the average wage rate by labour category and the household primary income distribution are studied.

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