INTEREST, DISTRIBUTION OF VALUE ADDED AND INFLATION: INFLATION-INDUCED DIFFICULTIES IN THE INTERPRETATION OF DUTCH NATIONAL ACCOUNTS*

BY PAUL VAN DER LAAN AND HENK K. VAN TUINEN
(Netherlands Central Bureau of Statistics)

The present paper examines the inflationary bias of sectoral income transactions in national accounting data. An inconsistency of these data is pointed out. Alternative income measures are estimated by adjusting the standard national accounting data for inflationary gains and losses. These gains and losses arise from financing by loan capital. Several issues concerning income concepts and alternative methods for the measurement of inflationary gains and losses are discussed. It is concluded that an adjustment of sectoral income data for these gains and losses produces a very different picture of the sectoral distribution of income.

1. INTRODUCTION

The Netherlands' National Accounts[1] present annually, among other things, information on the distribution of income by distributive shares and by sector. This information is included in the so-called primary distribution of income account of the accounting system. In addition to the compensation of employees a residual called remaining income is distinguished in this account, of which the distribution among economic sectors[2] is shown. Recently also a further breakdown of the remaining income is given into the components interest, entrepreneurial income of private unincorporated enterprises, and other property income (consisting of dividends, profits of public unincorporated enterprises, rents and royalties).

The explicit introduction of interest transactions in Dutch National Accounts gave rise to further reflections on the explanation of interest flows within the framework of the System of National Accounts. The central topic in this respect is the question to what extent interest can be regarded as income during periods of persistent inflation. A simple inclusion of interest received in primary income and deduction of interest paid from primary income of a sector leads to conclusions about the macroeconomic distribution of income which fully ignore the loss in purchasing power of the claims on which this interest is paid. These purchasing-power losses can be substantial, and the effects they have on the distribution of income can influence distribution persistently in the same direction.

*Paper prepared for the Eighteenth General Conference of the International Association for Research in Income and Wealth, Luxembourg, August 1983. The appendices containing information on the computation of inflationary gains and losses by sector and two tables containing detailed data on the sectoral income transactions have been omitted. The authors wish to thank several colleagues of the Bureau for their valuable comments on an earlier draft of this paper and Annemarie Rijkers for research assistance. The views expressed in this paper are those of the authors and they need not necessarily reflect the views of the Netherlands Central Bureau of Statistics.

[1]See CBS (1982a).

[2]These sectors are "Enterprises," "Government," "Households" (including private non-profit institutions), "Banks," "Insurance" and "Rest of the world." See further CBS (1982a), chapter 3.

In the present paper these impacts of inflation on the macroeconomic distribution of income in the Netherlands are examined and estimated.[3] First the primary distribution of income as it can be derived from the present National Accounts of the Netherlands will be considered. Next attention will be paid to the implications of (chronic) inflation for the interpretation of the concept of income used in National Accounts and the role and significance of inflationary effects in the distribution of income. After some considerations about points of departure in the calculation of inflationary gains and losses an attempt is made at calculating the inflationary gains and losses for the various sectors of the Dutch economy for the years 1977-81. These inflationary gains and losses are then related to the macroeconomic sectoral distribution of income. Finally, an alternative estimation of the inflationary gains of the enterprise sector is presented and discussed.

2. Distribution of Income in Dutch National Accounts

2.1. *Primary Distribution of Income 1977-81*

The recent availability of more statistical information on primary income offered the possibility of improving the description of the primary distribution of income in Dutch National Accounts. This resulted in an extension of the number of economic sectors distinguished in the accounts, while the transactions concerning property and entrepreneurial income could also be further subdivided into income categories. Table 1 recapitulates the information on the primary distribution of income as it can be derived from the present National Accounts publication.[4] The table shows, for six sectors, the value added (net, at factor cost) and the primary income transactions by income category for the years 1977 and 1981. Table 1 also gives information on the imputed interest accruing to insurance policy holders, the net factor income receivable from the rest of the world, and the primary income resulting per sector. As a complement to Table 1, Table 2 shows the share of the various sectors in domestic product and primary income, respectively, for the years 1977 and 1981. Conspicuous in table 2 is the fairly constant share of the sectors in the domestic product for the two years and the fluctuating share they have in primary income. This points to shifts in the sectoral distribution of income.

From Table 1 it appears that these shifts do not stem from the development of wages and employers' contributions to social security. The macroeconomic wage share remained almost constant during the period 1977-1980 and even decreased slightly in 1981. The alteration in the sectoral distribution of income is the result of transactions concerning property and entrepreneurial income. It appears that interest payments especially are responsible for a declining share of the enterprise sector in national income and the increasing share of the banking sector. In addition to this an increase in other property incomes is conspicuous (mainly consisting of dividends, income from participations, and royalties), which

[3] An earlier article by the present authors on this matter was Van der Laan and Van Tuinen (1982).

[4] See CBS (1982a), chapter 9. The sectoral distribution of income is presented in Tables 9.1-9.7. A breakdown of property and entrepreneurial income is presented in Table 9.8.

TABLE 1

PRIMARY DISTRIBUTION OF INCOME 1977 AND 1981

	Enterprises				Government				Households[1]				Banks				Insurance				Rest of the World				Total			
	Disbursements		Receipts		Disbursements		Receipts		Disburesements		Receipts		Disbursements		Receipts		Disbursements		Receipts		Disbursements		Receipts		Disbursements		Receipts	
	'77	'81	'77	'81	'77	'81	'77	'81	'77	'81	'77	'81	'77	'81	'77	'81	'77	'81	'77	'81	'77	'81	'77	'81	'77	'81	'77	'81
	Thousand million guilders																											
Value added (net, at factor cost)			186	234			36	45			—	—			0	−1			3	5							225	283
Compensation of employees	116	146	—	—	36	45	—	—	—	—	158	200	4	6	—	—	2	3	—	—	1	1	1	1	159	201	159	201
Interest	21	42	2	6	8	15	3	4	1	2	7	16	14	44	22	57	—	1	11	20	6	22	5	23	50	126	50	126
Entrepreneurial income	24	21	—	—	—	—	—	—	—	—	24	21	—	—	—	—	—	—	—	—	—	—	—	—	24	21	24	21
Other property income	16	30	4	6	—	—	9	18	—	—	3	5	1	1	—	—	1	1	1	2	4	6	5	7	22	38	22	38
Imputed interest accruing to insurance policy holders	—	—	—	—	—	—	—	—	—	—	11	20	—	—	—	—	11	20	—	—	—	—	—	—	11	20	11	20
Factor income receivable from the rest of the world, net																							0	−2	—	—	0	−2
Primary income	15	7			4	7			202	260			3	5			1	2							225	281		

[1]Including private non-profit institutions.

TABLE 2
SHARE OF THE VARIOUS SECTORS IN DOMESTIC PRODUCT AND PRIMARY INCOME

Sectors	Percentage Share in Domestic Product (Net, at Factor Cost) 1977	1981	Percentage Share in Primary Income 1977	1981
Enterprises	83	83	7	2
Government	16	16	1	2
Households[1]	—	—	91	93
Banks	0	0	1	2
Insurance	1	1	0	1
Total	100	100	100	100

[1]Including private non-profit institutions.

is largely caused by the increasing natural gas revenues of the government. The natural gas revenues of the government consist of several components. The item other property income includes royalties and profits of participations. The receipts of corporation tax on natural gas profits are recorded under the redistribution of income.[5] The increase in natural gas revenues has more than compensated for the increasing interest disbursements of the government. As a result, the share of the government sector in the national income has increased somewhat.

TABLE 3
INCOME COMPONENTS OF THE ENTERPRISE SECTOR IN 1977 AND 1981

Income Category	1977	1981	1977	1981
	Thousand Million Guilders		%	
Wages and salaries	92	115	50	50
Employers' social security contributions	24	31	13	13
Interest payable, net	19	36	10	15
Entrepreneurial income	24	21	13	9
(ditto, exclusive of housing)	(24)	(24)	(13)	(10)
Other property income payable, net	12	24	6	10
Primary income	15	7	8	3
(of which: corporation tax)	(7)	(9)	(4)	(4)
(of which: retained profits)	(8)	(−2)	(4)	(−1)
Value added (net, at factor cost)	186	234	100	100

Another striking feature is the rapid growth of interest transactions with the rest of the world; this can be ascribed mainly to the developments on the international capital markets and the considerable foreign investments by the Netherlands in recent years. Returning to the enterprise sector more structural shifts attract attention. Table 3 illustrates this.

[5]See also Table 3 for the development of the corporation tax of the enterprise sector.

Table 3 shows that the wage share has remained fairly constant, but the share of net interest paid has risen sharply. Thus, a shift from remuneration of equity capital to loan capital has occurred which is connected with the existing capital structure of companies[6] in combination with the sharp rise in the rate of interest. Moreover the net distributed profits have also risen considerably. As a result there is a sharp fall in the share of entrepreneurial income of private unincorporated enterprises and corporate saving.

2.2. *Some Concepts and Recordings in Dutch National Accounts*

Before passing on to a further exposition of the developments in the macroeconomic distribution of income discussed in the last section, some technical explanation of the Dutch System of National Accounts is inevitable. In this connection the composition of the sectors, the definition of some income categories and the recording of some income transactions in the accounts are discussed.

The sectoral distribution in Dutch National Accounts is based principally upon the economic functions of the subjects involved in economic life. This means that persons or institutions can belong to different sectors according to the kind of their transactions. Thus, for instance, the own-account workers and their unpaid family workers are classed in the household sector with respect to their transactions relating to the distribution and consumption of income, whereas their transactions relating to production and capital formation are classed in the enterprise sector. Likewise, owner-occupied housing forms part of the enterprise sector. So the sectoral classification used at present is developed particularly to describe the (cycle of) transactions in goods and services (including generation of income) and not in the first instance to describe the distribution of income and financial transactions. However, we are working on a revision of the sectoral classification in the accounts, which will enable us to improve the description of the distribution of income and financing of the various sectors.[7]

The definitions of the primary income categories follow the international recommendations on National Accounts.[8] This means, for instance, that the definition of interest does not include any kind of imputed interest, like interest on reserves or provisions of companies. Neither does it include any reimbursements paid by unincorporated public enterprises on loans provided by the government agency itself. The latter payments are regarded as withdrawn profits and not as interest. The interest payments in the National Accounts are recorded on a transaction basis just like the other transactions. Consequently, the payments are entered at the moment payment becomes due, unless there are statistical or technical obstructions. The latter is the case with the interest transactions with the rest of the world, which are recorded on a cash basis. In a certain sense the same also holds for other primary income transactions such as dividend payments. Because the income transactions of households are largely determined as a residual item, these data should be used with caution.

[6]See e.g. for this Gans (1976) and Keus (1980).
[7]See CBS (1982a), p. 89.
[8]See UNSO (1968) and Eurostat (1979).

It should be pointed out that the primary distribution of income account of the enterprise sector is not to be identified with a commercial profit and loss account. This results from the way in which value added in National Accounts is measured, which differs from the various commercial concepts of profit. Therefore the term "profits" is not used as such in the National Accounts.[9]

Finally it is useful to point out the specific treatment of the pension and life insurance transactions in National Accounts. Because savings resulting from pension and life insurance transactions are looked upon as savings of households, property income of life insurance companies and pension funds is imputed to households.[10] Given this recording it will be useful to consolidate the sectors "Households" and "Insurance" in the further analysis.

3. Inflation and the Concept of Income in National Accounts

3.1. *Defining the Problem*

Income distribution is a result of a complicated process in which many factors play a part. One of these factors is inflation,[11] to be defined as a process of continuously rising prices. Often the distinction is made between perfectly anticipated and not or imperfectly anticipated inflation. The redistributive effects of perfectly anticipated inflation are limited and can be dealt with in conventional microeconomic theory. In the case of imperfectly anticipated inflation the economist has little to offer. However, National Accounts are not concerned with the analysis of how the distribution of income is brought about, but with a statistical description of the outcome of the process. Thus in the present paper the purpose is not to analyse the influence of inflation on the distribution of income, but to uncover the actual distribution of income that is biased in traditional national accounting as a consequence of inflation. No attention is paid to the problem of the estimation of real incomes. We are concerned with the distribution of nominal incomes as given in the foregoing section. The central questions are: are these National Accounts data sufficiently useful for the analysis of the sectoral distribution of income and are effects of (persistent) inflation to be taken into account? It is tempting to ask this question not only for the primary distribution of income, but also for the redistribution of income. This certainly is necessary in order to analyse the distribution of real disposable incomes and the effects on expenditure. But as a first step we limit our analysis to the primary distribution, with one exception.

3.2. *The Concept of Income in National Accounting*

The National Accounts are a consistent system for the statistical description of the entire economic process. Consistency of concepts is an implication of that. The concept of income originates from the concept of production; the account for the primary distribution of income opens with the value added created in the production process. In this connection the concept of income is based on income

[9]See e.g. in this connection Hill (1979), pp. 87-89 and Pen (1980), pp. 285-291.
[10]Compare the item "imputed interest accruing to insurance policy holders" in Table 1.
[11]In the following a survey by Laidler and Parkin is used (Laidler and Parkin (1975)).

flows. Income is created in the production process and it flows from one sector to another. It is clear that *flow* concepts are eminently suitable for a coherent description of the total economic process. Nevertheless, stock variables are also included in National Accounts in a broader sense. The international recommendations[12] concerned are on sectoral balance sheets. These balance-sheet data are related to the flow data by means of reconciliation accounts in which revaluations of assets and liabilities are recorded. Revaluations are needed because changes in the economic value of assets and liabilities are not only the result of transactions as described by flow variables. But revaluations do not lead to corrections of income transactions in National Accounts. Income is not determined as a difference between values of stocks. It is defined on the basis of transactions leading to income flows.

The produced income (value added) is defined as the difference between production and intermediate consumption including capital consumption. Production is valued at average sales value of the reporting period, intermediate and capital consumption at current value. The resulting income concept is suitable for the analysis of the production process as it measures the creation of value at current (replacement) prices. It is to be noticed that provisions for maintaining the real value of fixed assets are not included in income. Depreciation at replacement value provides for that.[13] The same applies to provisions for repurchase of raw materials, semi-finished products and services consumed.

3.3. *Inflationary Effects and Distribution of Income*

The inflationary effect to be considered is known as the debtor-creditor hypothesis.[14] By the latter, creditors lose and debtors gain in case of inflation, provided the rate of interest on loans with fixed nominal values is not fully adjusted to the rate of inflation.[15] The speed of response of the interest rate to the rate of inflation and the role of inflationary expectations in that connection is not at stake. Unmistakably there is a certain tendency to adjustment. But it is also clear that especially in an open economy the interest rate is determined by a multitude of factors.[16] Here the essence is that the debtor-creditor hypothesis is directly related to inflationary effects on income distribution; the words "lose" and "gain" are to be taken literally.

The basic argument is as follows. Inflation influences the real value of financial assets and liabilities. If a creditor considers the total of received nominal interest consumable income,[17] he will find the real value of his claim diminished. The argument for the debtor is analogous. If the nominal interest paid is com-

[12]See UNSO (1968), p. 11.

[13]In case of a perfect composition regarding the structure of the stock of capital goods by vintages the real value of invested capital is exactly maintained by replacement-cost depreciation.

[14]See e.g. Laidler and Parkin (1975), pp. 788–800 and Bach and Stephenson (1974).

[15]In this section we assume for the simplicity of argumentation one rate of inflation. To this subject we return in section 4.

[16]See e.g. Fase (1972) and Prins (1983). Empirical research has demonstrated that the capital market interest rate in the Netherlands depends strongly on the rate of interest in the United States.

[17]When we call income "consumable," we renounce taxes and transfers to be paid out of this income. As a matter of fact we think in this connection of an accretion concept of income, related to the concept of income according to Haig, Simons and Hicks.

pletely considered negative income, the debtor will find the real value of his debt diminished. In the present paper reductions of the real value of claims are called *inflationary losses* and reductions of the real value of liabilities *inflationary gains.*[18]

In the case of complete and immediate adjustment of the interest rate to the rate of inflation the real rate of interest equals the nominal rate that would occur if inflation were absent.[19] The nominal rate of interest contains an *inflationary compensation*: the compensation of the creditor for his inflationary loss. If the adjustment of the interest rate to the rate of inflation is incomplete or lagged, the real rate of interest may differ from the interest rate that would have occurred in the case of a prolonged absence of inflation.[20] But for the following the essential point is that in theory interest can be considered to include a compensation or premium for inflation.

Clearly, if the creditor wants to maintain the purchasing power of his claims only real interest can be regarded as (consumable) income. The inflationary compensation component of interest received has to be added to his claims. In theory the level of the inflationary compensation of the rational creditor does not depend directly on the actual rate of inflation, but on the expected one. In the next section further attention will be paid to this point.

If the debtor's capital consumption is calculated at current value, only real interest is to be considered negative income. The inflationary compensation to be paid could be added to the debtor's liabilities, since the actual value of his fixed assets has increased; then the *real* value of his liabilities will by so doing not increase, nor the ratio of liabilities to equity capital. The foregoing section argues that no corrections for revaluation are applied to income measures in National Accounts. Thus inflationary compensation is considered income. It is important to take this into account when interpreting the primary distribution of income as given by the traditional National Accounts. A given flow of interest has a different meaning in an inflationary context than in a situation of stable prices. In the latter case interest can be considered consumable income. According to the argument given above this certainly is not the case in an inflationary context. If the distribution of consumable incomes is at stake, the interest flows of the National Accounts have to be adjusted. Nominal interest flows as presented in, e.g., Table 1 contain the inflationary compensation which the creditor needs to maintain the real value of his assets, or which the debtor can add to his liabilities without raising the real value of his liabilities.

[18]Whether a change in value of capital is relevant in a macroeconomic sense depends on the extent to which it influences the actions of groups of economic subjects. Von Ungern-Sternberg (1981) concludes e.g. that the correct way in which inflationary losses should be introduced in the consumption function is to regard these losses as negative income. Bhatia (1972) arrived also at the conclusion that formed as well as realized inflationary gains and losses are significant variables in the aggregate consumption function. Further Eisner (1980) points to the growing economic power involved in accruing inflationary gains.

[19]The real rate of interest is usually defined as the nominal rate of interest minus the rate of inflation.

[20]In theory the nominal rate of interest does not need to counter-balance expected inflation fully. True, inflation will raise the nominal rate of interest, but this rise will be less according to some authors than the expected rate of inflation, so that the real rate of interest will go down. See e.g. Mundell (1963) for a theoretical explanation of nominal interest, real interest and inflation, and further e.g. Gordon (1981), pp. 328-356.

The implication of such an adjustment, which will be elaborated later, is that creditors (particularly the household sector) face a lower primary income than before adjustment, whereas after adjustment the primary income of debtors (particularly the sectors "Enterprises" and "Government") is much higher. For enterprises this can be explained using the argument that the component of interest paid, representing the inflationary compensation, can be added to liabilities without changing the ratio between liabilities and equity capital. Because the real value of fixed assets is maintained through capital consumption at replacement value no income has to be "reserved" for that purpose. The actual value of fixed assets increases with the rate of inflation. In an analysis of the distribution of income this increment can be considered irrelevant, if the fixed assets are financed by equity capital, because the purchasing power of equity did not rise. If continuity is a purpose of the firm this nominal increment of the company's wealth can be regarded as non-distributable. However, in so far as the assets are financed by loan capital there is an inflationary gain. The nominal value of the loan is not changed, while the actual value of the assets has increased. In a situation of partial financing by loan capital the level of loan capital can be raised at the rate of inflation without increasing the debt ratio. For that reason too only real interest need be regarded as negative income.

Other ways of adjusting the primary distribution of income can be developed to correct for inflationary effects. First, capital consumption in National Accounts can be defined at historic cost. This seems to be inadequate for purposes of analysis of the production process, to which National Accounts are devoted as well; furthermore, in the case of financing by equity this yields a far from ideal concept of income. Another possibility is to add inflationary gains as extra income. This adjustment too is inconsistent with the aims of analysis of the production process.

An illustration of the first mentioned alternative is presented in section 6. Estimates according to the second alternative can easily be derived from the data presented in sections 4 and 5, where we present data following the method of decomposing nominal interest flows into an inflationary compensation and a real interest flow.

3.4. *Inflationary Effects in a Wider Context*

In the recent international discussions on the development of the System of National Accounts the consequences of chronic inflation for the concepts and valuations in the system are taken into consideration under the heading "*inflation accounting.*" Attention is paid mainly to balance sheets and reconciliation accounts.[21] An explicit recording of inflationary revaluations on these reconciliation accounts can yield data which can be used for the explanation of the sectoral distribution of income. However, that is cold comfort to the many countries not disposing of sectoral balance sheets. Moreover, as we shall see in section 6, these matters are very complicated and not easily estimated from balance sheets. So it is very important that the resistance of many countries to a change in the concept

[21]See e.g. Cukierman and Mortensen (1983), Hibbert (1983) and UNSO (1982), pp. 27-29. Further discussion can be found in Eisner (1980), Siaens (1982) and Siegel (1979).

of income in the National Accounts does not prevent them from carrying out experimental calculations, which lead to alternative presentations of the distribution of income. As has been argued in the foregoing section, present estimates misrepresent the actual distribution of income; explicit adjustments are desirable. The latter view is gaining wide acceptance in business economics and business accounting practices: a vast literature on inflation accounting has emerged—although "accounting for price changes" would be a more accurate description—and its recommendations are increasingly applied.[22] In this connection a very interesting adjustment in the annual report of Philips can be mentioned. This company, which has already been reporting on the basis of current-value accounting for a long period of years, introduced an alternative calculation in the report for 1981.[23] The alternative is that intermediate consumption and capital consumption, to the extent that they are financed by loan capital, are valued at historic cost (a kind of gearing adjustment).[24] The adjustment is very similar to one of the two alternative estimations elaborated in the present paper.

Similarly, the question whether interest received should be considered entirely taxable income is under discussion, as well as the question whether inflationary gains on assets which are financed by equity are to be taxed.[25] Here too the argument is that what in the present paper has been defined as inflationary compensation cannot be regarded as taxable income (of the recipient) or as deductable cost (of the payer).

4. The Calculation of Inflationary Gains and Losses

4.1. *Points of Departure*

As stated in section 3.3., in periods of chronic inflation the distribution of income account in the National Accounts system does not provide a fully adequate description of the distribution of (consumable) income over the various sectors. The primary income of the sectors with (on balance) debts is distorted negatively, and the primary income of the sectors with (on balance) claims is distorted positively. In this and the following chapter an adjustment is discussed which decomposes interest payments into two parts: one that can be seen as inflationary compensation, and a remaining one that is called "adjusted interest". The net inflationary compensation of each sector can be measured by the inflationary gains on its liabilities and the inflationary losses on its financial claims. Then a positive net inflationary compensation is deducted from net interest paid, and a negative one is deducted from net interest received. It should be emphasized that such adjustments do not lead to an income distribution "at constant prices". The redistribution of income caused by the impact of inflation on the real value of

[22]See e.g. Kirkman (1978) for a review of various forms of inflation accounting.

[23]Philips (1981), pp. 41 and 42.

[24]See further Appelo (1982). This way of measuring profit is equivalent to regarding as distributable profit part of the increments in value of real assets. See e.g. Vijn (1983) for the recent practice of Dutch companies in measuring profit.

[25]See e.g. for the Netherlands Hofstra (1978). Thus during inflation corporate taxation affects dividend behaviour and values of shares of companies (see e.g. Dequae (1982)). Another possibility to remove the negative consequences of inflation is, for instance, indexing of securities.

financial claims and debts is calculated in *nominal* terms in order to adjust the *nominal* distribution of income.[26]

In a preceding section[27] it was stated that we try to give an ex-post description of the distribution of income, rather than a causal analysis of this distribution. From that it was concluded that inflationary expectations and anticipations are out of order here. This requires some explanation, now that the calculation of inflationary gains and losses is discussed.

An individual creditor will relate the change in the value of his nominal financial claim to the change in the expected future price level, that is to say, the price level that prevails at the time at which he intends to spend the funds embodied in his claim. An analogous reasoning applies to individual debtors. Here too, the price level expected at the time at which the capital goods financed by the debt will have to be replaced is predominant for his current valuation.

This microeconomic reasoning cannot be simply transposed to the macroeconomic level. Claims are transferred frequently, debts are discharged and incurred again. This may be seen as a process, in which debtors realize their inflationary gains or losses by the sale of their fixed assets to other subjects, who in their turn incur a debt to this end. Similarly, some creditors realize their inflationary gains or losses by the reduction of their net claims, while other units save, and will only realize their inflationary gains or losses in the future. When aggregated, this situation falsely resembles the situation of individual debtors and creditors set out in the above microeconomic reasoning. The dissimilarity between the macro and micro process not only has as a consequence that at the macro level it is of little significance to elaborate the contrast between realized and non-realized gains and losses. It implies as well that it is not at all self-evident that expected inflation should be chosen as a starting point for the computation of inflationary gains and losses. In the following calculations we shall, therefore, make use of data on the actual rate of inflation.

4.2. *A Specific Deflator for Each Sector?*

In the estimation of the inflationary compensation for each sector, the matter at issue is to establish to what extent the wealth of individual sectors has grown or diminished in real terms. In our opinion the change in wealth of creditors has to be measured by the price development of goods and services that would have been bought, if the wealth had not been kept in the form of financial assets. Similarly, the change in wealth of debtors has to be estimated by the goods and services in which the borrowed funds have been invested. This point of departure makes inflation measurable so that further analysis becomes feasible. Furthermore it implies that the rate of inflation may be different for different sectors, because all sectors have their own pattern of expenditure and thus a different experience of inflation. For instance, when capital investment goods are subject to higher price rises than consumption goods, the enterprises which are in debt to house-

[26]One could also say that adjusted interest and inflationary gains and losses are measured in "current prices."

[27]See section 3.1.

holds obtain an inflationary gain that is higher than the absolute value of the corresponding loss of households.[28]

Readers who are accustomed to one single rate of inflation from which, as in general equilibrium theory, deviations exist as a consequence of changes in relative scarcity will have difficulty with the terms "different rate of inflation" and "different experience of inflation." However, this is merely a terminological problem. In the next section we will also present estimates of inflationary gains and losses which are calculated employing a general price index (See Table 6). These gains and losses can be called "inflationary" gains and losses in the strict sense. The differences between these gains and losses and those estimated using specific price indices can be seen as gains and losses from relative price changes. In our opinion the sum total of (general) inflationary gains (or losses) in the strict sense and gains (or losses) from relative price changes is the relevant concept connected with the analysis of the sectoral distribution of income. The argument is that it is not only "general" inflation that influences consumable income of a sector. The sectors' consumable income depends on price changes of the sectors' *specific* expenditure. In other words we are concerned in this connection with changes in relative price levels and not with changes in the general price level. Doubts can be expressed regarding the use of the term "inflationary gains and losses" in the sense we use it in the remainder of the present paper. However, we prefer the term inflationary as a broad concept, which in theory may have a restricted meaning, but which in practice—as an operational concept—may have different meanings. But an important implication is that we cannot use the term "real interest" for the difference between nominal interest and (specific) inflationary compensation, as in section 3. In the following we will, therefore, use the term "adjusted interest".

Postulating that each sector has its own relevant deflator need not mean that the inflationary gains and losses in the economy as a whole cancel out. This means that after adjustments for inflationary gains and losses the aggregated sector incomes will as a rule be different from the income before corrections. This could be regarded as a disadvantage because an imbalance is introduced into the National Accounts. On the other hand it could be argued that the choice of just one universal deflator leads to other problems of interpretation. When, following e.g. Hibbert (1983),[29] the price index for private final consumption expenditure is chosen as the universal deflator, one implication would be that inflationary effects in the enterprise sector, though depending on the use and sale of *capital* goods, would be measured by the price development of *consumer* goods.

A possible justification for this anomaly is that inflationary gains of enterprises will in the end benefit their shareholders, which in turn derive their view of inflation from the price development of consumer goods. However, the question may be asked whether such arguments are compatible with the framework of National Accounts. The National Accounts have adopted the principle of dividing the economy into autonomous sectors and, consequently, the income distribution to be described by the National Accounts should reflect the distribution between these sectors. Therefore, it does not seem appropriate to resolve these sectors

[28]See for a further explanation the end of section 4.3.
[29]See Hibbert (1983), p. 27.

into a single one by the introduction of shareholders. As a matter of fact, it may be questioned whether the balancing requirement of positive and negative inflationary compensations for the economy as a whole is a very important one. With the concept of inflationary gains and losses valuation adjustments are introduced in a system that originally recorded only flows (transactions). In doing so the fundamental consistency in the National Accounts might be already impaired. In view of what has been said above, it appears wise not to include adjustments for inflationary gains and losses in the accounts themselves, but to keep them "below the line." This way room is left for some deviation from the strict balancing rules that apply to the core of the system.[30]

4.3. *Practical Elaboration*

To measure inflationary gains and losses, information on financial claims, liabilities and property (non-financial assets) for each sector is needed. The revaluation of the non-financial assets can be computed and related to the extent to which these assets are financed by loan capital. The devaluation of claims can then be computed from the price development of expenditures. A problem is that in the Netherlands we do as yet not dispose of sectoral balance sheets. However, because in measuring inflationary gains and losses we are concerned with the capital formation financed by loan capital only,[31] as an approximation we may use the data on interest flows connected with loan capital (i.e. payments by owners/debtors and the receipts of creditors). In this way we are able to make—admittedly rather rough—estimates of inflationary gains and losses of the various sectors of the National Accounts. This implies that we confine ourselves to inflationary gains and losses on interest bearing assets and liabilities only. This agrees with what was described before as decomposing actual interest flows into an adjusted interest flow and an inflationary compensation. Now one can state rightly that, for instance, inflationary gains accrue also in financing with non-interest-bearing loan capital, and inflationary losses arise as much from lending non-interest-bearing capital. As far as our information stretches the size of the balance between non-interest-bearing assets and (non-equity) liabilities per sector is insignificant. For that reason we think we may confine ourselves to a calculation based on interest-bearing claims and debts only. The computation roughly is as follows. For each sector the interest paid divided by the average interest rate generates an estimate of the total amount of outstanding debts. Likewise, the total amount of financial claims of each sector can be found. The calculations are carried out for the years 1977–81. As to the arithmetical procedures by sector the following can be noted.[32]

Enterprises

In estimating inflationary gains for the enterprise sector a distinction is made between corporations, private unincorporated enterprises and housing. It is

[30]These kinds of solutions are to be recommended for several purposes. One uniform System of National Accounts cannot serve all purposes. For specific purposes more directed (partial) supplementary statistical data will have to be developed. See further Van Eck, Gorter and Van Tuinen (1983).

[31]See section 3.3.

[32]A more detailed review of statistical data used is available on request from the authors.

necessary to differentiate between corporations and private unincorporated enterprises, because inflationary gains have to be added to different income components (entrepreneurial income or primary income of enterprises). Housing deviates as regards interest rate and price development from the rest of the enterprise sector in such a manner that a separate treatment is justified.

The interest transactions of the various segments in the enterprise sector being known, we first tried to estimate an average interest rate on the claims and debts of these segments. For the corporation segment the Statistics of Finances of Business Corporations were used. These present aggregate balance sheets and profit and loss accounts of industrial corporations from 1977 onwards. From this information an average rate of interest on interest-bearing financial claims and liabilities can be derived. For the time being this average interest rate has been used with respect to all corporations.[33] As to interest rates and price changes of real assets, because of lack of information with regard to unincorporated enterprises we had to use the same data on corporations. The liabilities of housing were computed using the average rate of interest on mortgage loans.

Next, by use of interest transactions and the estimated average interest rates, for each segment of the enterprise sector total (net) non-equity liabilities were established. Subsequently the inflationary gains were computed by multiplying these estimated liabilities by the price change of the capital goods of enterprises. This price change is derived from price indices of gross fixed capital formation of enterprises by type, weighted by the broadly estimated share of the various categories of capital goods in the total net capital stock of the enterprise sector.[34] As to housing, the approximative price index for building costs of dwellings was used.

Government

The inflationary gain of the government sector[35] was calculated by the average rate of interest of redeemable government loans and the price change of its gross fixed capital formation.[36] The interest paid on government debt related to the average rate of interest on government loans generates an estimate of total government debt. However, for some subsectors of government direct information on total debt is available. This information was used as a check. In addition

[33]From the year 1980 other branches of economic activity are also represented in these statistics, so that a more complete picture arises.

[34]These shares are derived from the calculations made within the framework of the computation of consumption of fixed capital in National Accounts by the "perpetual inventory method." To this method of calculation we will return in section 6.

[35]The government sector comprises central Government and other public authorities such as provinces, municipalities, education, and the like, and social security funds.

[36]Some authors use for the calculation of inflationary gains of the government sector the price index of government final consumption expenditure (See e.g. Praet (1982)). As for the enterprise sector, we use the price index of government gross fixed capital formation. Our treatment may be questionable, because government expenditure consists of consumption as well as capital formation. In our opinion, if government were a net lender we would have had to estimate inflationary losses employing the price index of total government expenditure. The reason for this is that it is not known what kind of expenditure would have occurred if the money was not lent. But in the Netherlands, as in most countries, government is a net borrower. Thus inflationary *gains* accrue. These gains are earned through price rises of capital goods in which the borrowed funds have been invested. But certainly there are also good arguments for employing a price index of total government expenditure.

estimates were made of the interest-bearing claims of the government sector. To compute the inflationary gain, total net liabilities were multiplied by the price change of gross fixed capital formation of the government sector.[37]

Households (Including Insurance and Private Non-Profit Institutions)

The sectors "Households" and "Insurance", which, as stated earlier,[38] are combined in this analysis, on balance possess claims, so they are confronted with inflationary losses. The interest rates on claims and liabilities are, in so far as the household sector is concerned, based on the average rate on the money and capital market (claims) and the average rate of interest on consumer credit (liabilities).

With regard to the insurance sector, the interest rates are based on the Statistics of Investments of Institutional Investors and the Reports of the Verzekeringskamer (Chamber of Insurance). The price changes of expenditure are based on the price index numbers of private consumption, assuming that the (future) expenditure of wealth will lie in the consumption domain. The computation of inflationary losses is analogous to that of inflationary gains of the enterprise and government sectors. The interest flows related to the various rates of interest produce in this way an estimate of the net interest-bearing claims of the household and insurance sector. When multiplied by the price change of final consumption expenditure of households, it provides us with the inflationary loss suffered.

Rest of the World

The inflationary gains and losses of the rest of the world are determined indirectly. The inflationary gains of the external sector are computed from the inflationary losses of the domestic sectors lending to the rest of the world. Similarly, the inflationary loss of the external sector is calculated by the inflationary gains of the domestic sectors borrowing from the rest of the world. Thus inflationary gains and losses of the domestic sectors in respect of foreign countries are computed applying the same procedures as described above for the various sectors.

The results of the calculations for the various sectors are shown in Table 4. As to the sector "Banks" no inflationary gains or losses are computed, because these gains and losses are assumed to cancel out.

From the description of the computation procedures it may be clear that, given the many uncertainties and inaccuracies in the data used, the results presented in Table 4 reflect only rough estimates of the magnitudes involved. From Table 4 it is apparent that the inflationary gains and losses aggregated over all sectors do not cancel out (with the exception of 1981), as was already indicated in the previous section. The positive balance is caused by the fact that price rises of capital investment goods (in particular residential and non-residential buildings) exceed those of consumer goods. To illustrate this, Table 5 shows a comparison of the price changes of gross fixed capital formation, final consumption expenditure and national expenditure for the years 1977-81.

[37]Reweighting was not possible for statistical reasons and also seems quantitatively of minor importance.

[38]See section 2.2.

TABLE 4

INFLATIONARY GAINS (+) AND LOSSES (−) BY SECTOR

Sectors	1977	1978	1979	1980	1981
			Thousand Million Guilders		
Enterprises	15	18	21	21	20
Government	7	7	8	9	8
Households[1]	−16	−13	−16	−28	−29
Rest of the World	1	1	0	1	1
Balance	7	13	13	3	0

[1]Including insurance and private non-profit institutions.

TABLE 5

PERCENTAGE CHANGE IN THE PRICE LEVEL OF GROSS FIXED CAPITAL FORMATION, FINAL CONSUMPTION EXPENDITURE, AND NATIONAL EXPENDITURE, 1977-81

	1977	1978	1979	1980	1981
			% Change from the Previous Year		
Gross fixed capital formation	6.5	6.0	7.0	7.5	7.0
Final consumption expenditure	6.0	4.5	4.5	7.0	6.5
National expenditure	6.0	5.0	5.5	6.5	5.5

To illustrate this point further Table 6 compares the inflationary gains and losses resulting from using a specific price index for each sector instead of one general price index (in this case the implicit deflator of national expenditure).

The differences between columns A and B represent what in section 4.2. has been called gains and losses from relative price changes. Comparing Table 4 with Table 6, the question could be asked whether a non-zero balance of inflationary gains and losses should be viewed as temporary or whether systematic positive

TABLE 6

COMPARISON OF INFLATIONARY GAINS (+) AND LOSSES (−) BY SECTOR USING DIFFERENT DEFLATORS[1]

	1977		1978		1979		1980		1981	
Sectors	A	B	A	B	A	B	A	B	A	B
					Thousand Millions Guilders					
Enterprises	15	12	18	12	21	13	21	17	20	17
Government	7	5	7	4	8	5	9	8	8	8
Households[2]	−16	−17	−13	−16	−16	−18	−28	−26	−29	−26
Rest of the World	1	0	1	0	0	0	1	1	1	1
Balance	7	0	13	0	13	0	3	0	0	0

[1]A = using a sector-specific deflator (See table 4)
B = using the implicit deflator of national expenditure
[2]Including insurance and private non-profit institutions.

or negative balances could persist in the long run. In view of the methodology of the present analysis, the latter would imply that in the long run the price rises of investment goods would be systematically higher than those of consumer goods. No simple theoretical opinion can be expressed about this phenomenon. First, the concept of "price rises of capital goods" is hardly a simple one. Secondly, the underlying relations are complicated even in a general equilibrium analysis, while furthermore in the case of technical change these relations can have various forms. A systematic rise in capital productivity ("defined" as production volume divided by the volume of capital stock or a function thereof) in the consumer-goods industry may be attended by prices of capital goods that permanently grow faster than prices of consumer goods. Even without growing capital productivity a relative decrease in import prices may produce such an effect. However, the Dutch statistics do not show great deviations over a longer period.

5. The Adjusted Sectoral Distribution of Income 1977-81

On the basis of the inflationary gains and losses estimated in the last section we are able to compile primary distribution of income accounts after adjustment for inflationary gains and losses.[39] For the enterprise sector the inflationary gains of corporations are recorded as primary income. The inflationary gains of private unincorporated enterprises (including ownership of dwellings) are recorded as entrepreneurial income, which leads to a higher primary income of the household sector. The adjusted sectoral distribution of income for the years 1977 and 1981 is presented in Table 7. Incomes received and paid are balanced for each sector. Household sector and the insurance sector are consolidated.[40]

Table 7 illustrates that after adjustment the level of interest flows is substantially lower than before adjustment. Adjusted interest flows for 1977 appear to yield a surplus equal to the corresponding column total of Table 4. This results in an adjusted total primary income which is higher than before adjustment. After adjustment entrepreneurial income is much higher mainly because housing yielded high inflationary gains.[41] The decrease over time is smaller than before adjustment. Of course the column "Other property income" is not adjusted. Primary income of enterprises and government is higher after adjustment. The decrease in adjusted primary income over time is much smaller. After adjustment primary income of the consolidated household and insurance sector is lower and shows a smaller increase.

It is interesting to explore the effects of inflationary gains in case of the enterprise section a little further. In Table 8 the changes in some primary income categories of the enterprise sector before and after adjustment for inflationary gains and losses are compared.[42]

[39]This adjusted presentation of the primary distribution of income agrees with the suggestion made by Fischer & Modigliani (1978), when they mention "the inflation illusion that is present in economic statistics" (p. 820).

[40]In conformity with the suggestion in section 2.2.

[41]Inflationary gains on dwellings owned by institutional investors are also counted in entrepreneurial income, because the sectors "Households" and "Insurance" are consolidated here.

[42]This table is derived from Tables 3 and 7. From these the absolute levels after adjustment for inflationary gains and losses can also be determined.

TABLE 7

INCOME CATEGORIES BEFORE AND AFTER ADJUSTMENT FOR INFLATIONARY GAINS AND LOSSES BY SECTOR[1]

Sectors	Year	Interest		Entrepreneurial Income		Other Property Income		Primary Income	
		Before Adjustment	After Adjustment	Before Adjustment	After Adjustment	Before Adjustment	After Adjustment	Before Adjustment	After Adjustment
Enterprises	1977	−19	−4	−24	−35	−12	−12	15	19
	1981	−36	−16	−21	−34	−24	−24	7	14
Government	1977	−5	+2	—	—	+9	+9	4	11
	1981	−11	−3	—	—	+18	+18	7	15
Households[2]	1977	+17	+1	+24	+35	+3	+3	203	198
	1981	+33	+4	+21	+34	+6	+6	262	246
Banks	1977	+8	+8	—	—	−1	−1	3	3
	1981	+13	+13	—	—	−1	−1	5	5
Rest of the World	1977	−1	0	—	—	+1	+1	—	1
	1981	+1	+2	—	—	+1	+1	—	1
Total	1977	0	+7	0	0	0	0	225	232
	1981	0	0	0	0	0	0	281	281

[1]+=received on balance.
−= paid on balance.
[2]Including insurance and private non-profit institutions.

TABLE 8

DEVELOPMENT OF SOME PRIMARY INCOME COMPONENTS OF THE ENTERPRISE SECTOR BEFORE AND AFTER ADJUSTMENT FOR INFLATIONARY GAINS AND LOSSES, 1977-81

Income components	Change 1977-81 in Thousand Million Guilders		Change 1977-81 in Percentages	
	Before Adjustment	After Adjustment	Before Adjustment	After Adjustment
Compensation of employees	+30	+30	+25	+25
Interest payable, net	+17	+12	+90	+300
Entrepreneural income	−3	−1	−15	−5
(ditto, exclusive of housing)	(0)	(+2)	(0)	(+10)
Other property income payable, net	+12	+12	+100	+100
Primary income	−8	−5	−55	−25
(ditto, exclusive of corporation tax)	(−10)	(−7)	(−125)	(−60)
Value added (net, at factor cost)	+48	+48	+25	+25

From Table 8 it can be concluded that the absolute changes in all income categories are smaller after adjustment, with the exception of entrepreneurial income exclusive of housing (and, of course, the categories not affected by the adjustment). In other words, after adjustment for inflationary gains the changes in the distribution of value added over income categories are more moderate. Relative changes by income category are not always smaller after adjustment. In the case of interest particularly the relative change is much higher after adjustment, thus reflecting the major increase in interest cost of enterprises.

6. AN ALTERNATIVE ESTIMATION OF INFLATIONARY GAINS OF ENTERPRISES

6.1. *Introduction*

The method of calculating the inflationary gains and losses as described in the fourth section yields the best possible results when using the statistical data we have at our disposal. Nevertheless these results are inaccurate and they give only a rough indication of their size. Therefore, it is interesting to check if some other method will result in estimates of the same order. The method described in section 4 generates an estimate of all interest-bearing financial liabilities of the enterprise sector out of an estimate of interest payments in combination with an average rate of interest. Then estimates of inflationary gains were made with the aid of price indices. The methodology applied in this section starts from an estimate of the capital invested in fixed assets. The increase in the value of these fixed assets as a result of inflation (henceforth called capital gains) will in principle be calculated with the same price indices as used in section 4. An estimate also needs to be made of that part of fixed assets financed by loan capital. Utilizing this financing percentage it is possible to calculate the inflationary gains.

This approximation of inflationary gains takes no account of any inflationary gains accrued on stocks of other goods than fixed assets financed by loan capital.

From a rough estimation it can be concluded that these gains cannot exceed 2 or 4 thousand million guilders annually over the period 1977–81. Before presenting the results, we first want to describe the method of calculating consumption of fixed capital in Dutch National Accounts. At the same time we will carry out a calculation of the capital gains realized yearly by means of depreciation at replacement cost.

6.2. *Calculation of Consumption of Fixed Capital in Dutch National Accounts*

Consumption of fixed capital in Dutch National Accounts is calculated by means of the so-called "perpetual inventory method."[43] This method starts with the determination of the gross capital stock (K^*). This is achieved by accumulating the gross fixed capital formation (I) by type of capital good over a sequence of years equal to the supposed service life (N), after revaluation at actual prices. Every year t, after revaluation, the new fixed capital formation is added and the fixed capital formation of year $t-N(E)$ is subtracted.[44] We can formulate this as follows:[45]

$$K_t^* = \sum_{i=t-N+1}^{t} I_i = K_{t-1}^* + I_t - E_t. \tag{1}$$

By applying a rate of depreciation to every kind of asset—the inverse of the supposed service life of the asset in question—we get an estimate of consumption of fixed capital (D) for the year under review.[46] The calculation of consumption of fixed capital yields yearly information on the net capital stock (K)—gross capital stock at replacement value reduced by depreciation at replacement value cumulated over the entire service lives of the assets contained in the gross capital stock—divided over the different kinds of assets of the enterprise sector. This can be rendered as:

$$K_t^T = K_t^{*T} - \sum_{i=t-N+1}^{t} (D_i^T - D_i^{T'}), \tag{2}$$

where K_t^T = net capital stock of asset T at the end of year t valued at replacement value at the end of year t ($T=1 \ldots n$), K_t^{*T} = gross capital stock of asset T at the end of year t valued at replacement value at the end of year t, D_k^T = consumption of fixed capital at replacement value of asset T in year k, $D_k^{T'}$ = consumption of fixed capital at replacement value of asset T in year k not belonging to K_t^{*T} at the end of year t ($k<t$), N^T = supposed service life of asset T.

Consumption of fixed capital is defined as:

$$D_t^T = \frac{1}{N^T}[K_{t-1}^{*T} + \tfrac{1}{2}(I_t^T - E_t^T)], \tag{3}$$

where D_t^T = consumption of fixed capital (at replacement value) of asset T in

[43]See Goldsmith (1951).

[44]This somewhat cumbersome method is applied because we have no statistical information on stocks of capital goods in the Netherlands after the 1950s. Recently the Netherlands Central Bureau of Statistics has tried to change this (See e.g. CBS (1982b) and Lock (1985)).

[45]Unless otherwise stated in the following all variables are valued at prices at the end of year t.

[46]See further on the advantages and disadvantages of this method Ward (1976), especially pp. 31–35.

year t, N^T = supposed service life of asset T, K^{*T}_{t-1} = gross capital stock of asset T at the end of year $t-1$ at replacement value at the end of year t, I^T_t = gross fixed capital formation of asset T in year t, E^T_t = scrapping of asset T in year t $(=I^T_{t-N}T)$.

The data on stocks of capital goods resulting from the calculation of consumption of fixed capital must be considered very crude. In fact in the Netherlands as well as in the rest of the world, there is a lack of reliable information on the service lives of capital goods (N). From equation (1) it is clear that capital stock data are very sensitive to the variance in N. The margin within which N can range is in the order of magnitude of tens of percents.[47] For this reason the Netherlands Central Bureau of Statistics considered these data on stocks of capital goods useless as capital stock estimates for general purposes. Nevertheless, there are two reasons for using this method for the calculation of consumption of fixed capital. First, consumption of fixed capital is an indispensable datum in National Accounts, for which as yet no better estimation method is available. Second, the estimation of consumption of fixed capital is far less sensitive to errors in the chosen service life (N) than capital stock estimates, as can be seen by combining equation (1) with (3).[48]

Starting from the estimation for the net capital stock (K) derived from the calculation of consumption of fixed capital, we can calculate the capital gains (V^*) of the enterprise sector in the following way:

$$V^*_t = \sum_{T=1}^{n}\left[\left(K^T_{t-1} - \frac{1}{N^T}\cdot E^T_t\right)\cdot(\pi^T_t - 1) + \tfrac{1}{2}I^T_t\cdot(\pi^T_t - 1)\right]$$

$$= \sum_{T=1}^{n}\left[\left(K^T_{t-1} - \frac{E^T_t}{N^T} + \frac{I^T_t}{2}\right)\cdot(\pi^T_t - 1)\right], \qquad (4)$$

where V^*_t = capital gains of the enterprise sector in year t, K^T_{t-1} = net capital stock of assets T at the end of year $t-1$ valued at prices of year $t-1$, N^T = supposed service life of asset T, E^T_t = scrapping of asset T in year t valued at prices at the end of year $t-1$ $(=I^T_{t-N}T)$, I^T_t = gross fixed capital formation of asset T in year t measured at purchaser's prices at the moment of acquisition, π^T_t = price index of asset T at the end of year t (end of year $t-1=1$).

The estimated capital gains include realized as well as non-realized capital gains of the enterprise sector. As we have seen in section 3.2. the concept of income in National Accounts is based upon depreciation at replacement cost. In

[47] In a recent paper by Blades some results are given on the sensitivity of capital stock estimates in some countries to the assumed service lives of fixed assets. Shortening of the service lives of total assets by 15–20 percent lowers the net capital stock by 10–15 percent (See Blades (1983)).

[48] When we assume for convenience that $I^T_t = I^T_{t-1} = E^T_t$, we can write for each kind of asset: $K^*_t = K^*_{t-1} = N\cdot I_t$, from which it follows that

$$D^T_t = \frac{1}{N^T}\cdot N^T_t\cdot I^T_t = I^T_t.$$

From this it appears that in case of a constant stock of capital goods, built up from a constant level of investment, the level of consumption of fixed capital (D) is insensitive to the assumed service life of an asset, while the stock varies proportionally with the length of the service life. In a situation of a variable level of investment a certain sensitivity of the estimate of consumption of fixed capital emerges.

the following we suppose a situation in which all enterprises use the method of depreciation at replacement cost. Then one way to estimate the annual capital gains realized by enterprises is to subtract depreciation at historic cost. Given depreciation at historic cost, all successive revaluations of the capital stock have no influence on the size of consumption of fixed capital for the enterprise sector.

Hence, a comparison of the results of depreciation at historic cost with depreciation in National Accounts provides an indication of the influence of the successive increments of fixed assets of enterprises on the size of depreciation in National Accounts. We can use this as an indication of the size of realized capital gains by enterprises resulting from replacement-cost depreciation. Therefore, the realized capital gains of the enterprise sector ($\bar{V}^*$) can be calculated as follows:

$$\bar{V}_t^* = \sum_{T=1}^{n} (D_t^T - \bar{D}_t^T), \tag{5}$$

where $\bar{D}_t^T$ = depreciation at historic cost of asset T in year t.[49]

The results of the calculations for the period 1977–81 with regard to both total and realized capital gains of the enterprise sector are given in Table 9. A distinction is made between enterprises exclusive of housing and housing in view of the differences in service lives and the annual percentage change in the price level.

TABLE 9

CAPITAL GAINS OF THE ENTERPRISE SECTOR

	Year (t)	V_t^*	D_t	$\bar{D}_t$	$\bar{V}_t^*$ ($=D_t-\bar{D}_t$)	$\bar{V}_t^*/V_t^*$	$\bar{D}_t/D_t$
		Thousand Million Guilders				%	
Enterprises exclusive of housing	1977	18	19	13	6	0.33	0.67
	1978	20	21	14	7	0.34	0.67
	1979	23	22	15	7	0.32	0.68
	1980	30	25	17	8	0.28	0.67
	1981	31	27	18	9	0.30	0.66
Housing	1977	21	3	1	2	0.10	0.37
	1978	24	4	2	2	0.10	0.38
	1979	25	5	2	3	0.11	0.38
	1980	27	5	2	3	0.12	0.37
	1981	25	6	2	4	0.14	0.37
Total enterprises	1977	39	22	14	8	0.22	0.63
	1978	44	25	16	9	0.21	0.63
	1979	48	27	17	10	0.21	0.63
	1980	57	30	19	11	0.20	0.62
	1981	56	33	20	13	0.22	0.61

We can deduce from Table 9 that consumption of fixed capital of the enterprise sector at historic cost is about two thirds of consumption of fixed capital at replacement cost. Furthermore, enterprises realize yearly capital gains to the extent of $\bar{V}^*$, when the methodology of calculating depreciation allowances

[49]The formula for depreciation at historical cost arises from (3) by valuing K_{t-1}^{*T} at replacement cost at the end of year $t-1$.

in National Accounts is employed. On average this amount is slightly lower than one fourth of the total capital gains of enterprises. This means that by using the methodology of calculating depreciation in National Accounts about one third of the total depreciation charges of the enterprise sector consists of realized revaluations of the capital stock caused by inflation, whereas these revaluations never have been measured as income.[50]

In the present section we discussed total capital gains of enterprises, but we paid no attention to the character of these capital gains. A part of these capital gains, however, has to be considered a compensation for the purchasing-power loss of equity capital caused by inflation. In other words, if we want to obtain an estimate of capital gains earned on loan capital (which we have called inflationary gains[51]), we must have information about the extent to which capital stocks are financed by loan capital. This is discussed in the next section.

6.3. *The Debt Ratio of the Enterprise Sector*

At this moment no information is available on the capital structure of the entire enterprise sector in the Netherlands. For this part we must confine ourselves to the information given by the Statistics of Finances of Business Corporations. Since 1977 this yearly survey yields data on the financial structure of large non-financial enterprises concentrated in manufacturing industry. Because there is as yet no better information we assume that these data are representative of all non-financial enterprises exclusive of housing. As to resulting data on the ratio between equity and loan capital of the surveyed enterprises, we can postulate two extreme hypotheses:

Hypothesis I: All enterprises covered apply to some form of current cost accounting in valuing the fixed assets on the balance sheet.

Hypothesis II: All enterprises covered apply historic cost in valuing the fixed assets on the balance sheet.

Reality will lie between these two extreme hypotheses.[52] Here we confine ourselves to the measurement of capital stocks. With regard to the measurement of profits, the ratio between enterprises which calculate their profits on historic cost and enterprises which calculate their profits by some form of current cost accounting may be quite different.[53]

The above refers to the enterprise sector exclusive of housing. Likewise, we can postulate two extreme hypotheses for the housing sector, one that the value of the net stock of dwellings in connection with the (mortgage) debts, as far as observed, is based on replacement cost and one that the value of the net stock of dwellings is based upon historic cost. Although the latter hypothesis comes nearest to reality, we must bear in mind that sales of older houses will have taken place at current values. These sales of long existing houses cause an increasing difference between the net stock of dwellings valued at historic cost according

[50]Compare section 3.2.

[51]See section 3.3.

[52]Yearly less than 10 percent of all companies in the Statistics of Finances of Business Corporations apply some form of revaluation of fixed assets. Their total wealth amounts to some 30 percent of total wealth stated in these statistics. Compare also Vijn (1983).

[53]See also Vijn (1983).

to the perpetual inventory method and reality. This phenomenon leads to the fact that the observed share of loan capital in financing the net stock of dwellings will be lower than the share related to the net stock according to the perpetual inventory, since in the latter method the houses are still valued at the original cost of construction. As this is principally a problem of owner-occupied dwellings and as we have no reliable statistical information about the financing by loan capital of this kind of houses in connection with the value of these houses, we have studied two cases for estimating the debt ratio pertaining to hypothesis I. In the first case we assumed for owner-occupied housing valued at historic cost a debt ratio of 125 percent and in the second one we assumed a debt ratio of 70 percent. A combination of these cases with the observed debt ratios for rental houses yields a debt ratio of 95 percent and 65 percent respectively for total housing.

Starting from the hypotheses as formulated above, we can apply the following reasoning to the debt ratio of the enterprise sector. Representing the debt ratio by the symbol ϕ, we obtain the following conclusions with respect to the level of ϕ. When the first hypothesis is valid, ϕ equals the observed debt ratio. When the second hypothesis is valid, the observed debt ratio has to be multiplied by a factor α, where:

$$\alpha = \frac{\text{net stock of capital goods valued at historic cost}}{\text{net stock of capital goods valued at replacement cost}}.$$

The factor α can be derived from the calculations of consumption of fixed capital of the enterprise sector. For the enterprise sector exclusive of housing α equals 0.54 and 0.39 for housing during the period under review. The ϕ's corresponding to the two hypotheses are presented in Table 10, where the observed debt ratio is calculated as follows:

$$\phi = \frac{L^p - L^a + L'^p - L'^a}{Z - L'^a - L^a}, \tag{6}$$

where ϕ = observed debt ratio, L^a, L^p = interest bearing financial assets and liabilities respectively, L'^a, L'^p = non-interest bearing financial assets and liabilities respectively, Z = total wealth.

TABLE 10

SHARE OF LOAN CAPITAL IN FINANCING THE CAPITAL STOCK OF THE ENTERPRISE SECTOR

	1977	1978	1979	1980	1981
			%		
Enterprises exclusive of housing:					
Hypothesis I	54	56	56	57	57
Hypothesis II	29	30	30	31	31
Housing:					
Hypothesis I	65 or 95	65 or 95	65 or 95	65 or 95	65 or 95
Hypothesis II	25 or 35	25 or 35	25 or 35	25 or 35	25 or 35

6.4. *The Alternative Calculation of Inflationary Gains of Enterprises*

Given the capital gains (V^*) estimated in section 6.1. and the debt ratios of the enterprise sector (ϕ) discussed in section 6.3. we are able to make an alternative estimate of the inflationary gains of enterprises, namely an estimate of the capital gains on debt-financed capital goods. Inflationary gains and realized inflationary gains are calculated as follows:

$$V'_t = \sum_{T=1}^{n} V_t^{*T} \cdot \phi_t^T, \tag{7}$$

and

$$\bar{V}_t = \sum_{T=1}^{n} \bar{V}_t^{*} \cdot \phi_t^T, \tag{8}$$

where V'_t = inflationary gains of the enterprise sector in year t, $\bar{V}_t$ = realized inflationary gains of the enterprise sector in year t.

Starting from the hypotheses formulated in the preceding section we can compute two series of inflationary gains and realized inflationary gains, viz. $V'^{\max}$ and $\bar{V}^{\max}$ corresponding with the first hypothesis and $V'^{\min}_t$ and $\bar{V}^{t\min}$ corresponding with the second hypothesis. Then the series $V'^{t\max}_t$ and $V'^{\min}_t$ can be compared with the series of inflationary gains (V_t) calculated in section 4.3. based upon interest transactions. The various series are shown in Table 11.

TABLE 11

REVIEW OF ALTERNATIVE ESTIMATES OF INFLATIONARY GAINS OF THE ENTERPRISE SECTOR

	Year (t)	$V'^{\max}_t$	V_t	$V'^{\min}_t$	$\bar{V}^{\max}_t$	$\bar{V}^{\min}_t$
		Thousand Million Guilders				
Enterprises exclusive of housing	1977	10	6	5	3	2
	1978	11	8	6	4	2
	1979	13	10	7	4	2
	1980	17	11	9	5	2
	1981	18	11	10	5	3
Housing	1977	14 or 20	9	5 or 7	1 or 2	1
	1978	16 or 23	10	6 or 8	1 or 2	1
	1979	16 or 24	11	6 or 9	2 or 3	1
	1980	18 or 26	10	7 or 9	2 or 3	1
	1981	16 or 24	9	6 or 9	3 or 4	1
Total enterprises	1977	24 or 30	15	10 or 12	4 or 5	3
	1978	27 or 34	18	12 or 14	5 or 6	3
	1979	29 or 37	21	13 or 16	6 or 7	3
	1980	35 or 43	21	16 or 18	7 or 8	3
	1981	34 or 42	20	16 or 19	8 or 9	4

It is obvious that the following relationship should hold:

$$V'^{\max}_t \geq V_t \geq V'^{\min}_t. \tag{9}$$

For two reasons it is plausible that V_t will be nearer to $V'^{\min}_t$ than to $V'^{\max}_t$. In the first place it is evident from business practice that the majority of fixed assets

are valued at historic cost, in other words hypotheses II from the previous section, on which $V_t'^{min}$ is based, is the most plausible. In the second place a shorter service life of the various types of assets will be applied by enterprises in their calculation of capital consumption than in the National Accounts. The latter can have a strong effect on the estimate of the net capital stock of the enterprise sector, from which V_t' via V_t^* is calculated.[54] This means that V_t' will be too high. The things mentioned are found in Table 11, where the inflationary gains obtained in section 4 (V_t) are somewhat higher than $V_t'^{min}$.

6.5. *Concluding Remarks*

A major finding of this section's alternative estimation of inflationary gains of the enterprise sector is that the results are not contrary to the ones obtained in section 4 based on interest transactions. The advantage of the estimation based on interest transactions is the insensitivity of this calculation to estimates of the debt ratio. A further advantage of the estimation method of section 4 is its robustness under changes in the supposed service lives of the various types of assets belonging to the stock of capital goods. The debt ratio of the enterprise sector appears to be very sensitive to valuations of the various assets comprising total wealth. The latter is an important limitation, when one wishes to analyse the issue of inflationary gains and losses exclusively within the framework of (sectoral) balance sheets, as is e.g. suggested by Hibbert (1983).[55] Besides, most countries (including the Netherlands) do not have sectoral balance sheets, but nevertheless wish to advance a valid analysis and explanation of the sectoral distribution of income. Furthermore it appears from the calculations presented in this section that enterprises yearly realize a significant part of their inflationary gains given the concept of income used in national accounting.

7. Summary and Conclusions

In the present study developments in the macroeconomic distribution of income in the Netherlands are shown for the period 1977-81. To the developments as shown by present National Accounts an estimation of inflationary gains and losses has been added. The paper examines the inflationary bias in national accounting data on sectoral income transactions. An inconsistency is pointed out between the measurement of depreciation allowances and the recording of interest payments in the National Accounts during a period of persistent inflation, if the stock of capital goods is partially or wholly financed by liabilities. A general discussion is presented on the occurrence of inflationary gains on real assets in relation to the accounting procedures and the concept of income used in the System of National Accounts. Then an attempt is made to estimate the inflationary gains and losses for the various sectors in the Dutch National Accounts for the period 1977-81 employing data on interest payments, as data on sectoral balance sheets are not yet available. Thus, only gains and losses earned on financial liabilities and assets are taken into account. Furthermore the use of one instead

[54]See note 47.

[55]See Hibbert (1983), pp. 7-8 and 13-14. Compare also section 3.4.

of different deflators in calculating inflationary gains and losses is discussed. After calculating gains and losses for the various sectors an alternative presentation is given of the distribution of income account using adjusted interest flows.

An alternative estimation of inflationary gains of the enterprise sector is presented, using perpetual inventory estimates of capital stocks and capital consumption. Realized as well as total inflationary gains are estimated. It is concluded that the results of this method, like the results of inflation accounting on the basis of balance sheets, are extremely sensitive to the valuation of fixed assets and, of course, equity.

The main conclusions regarding the developments in the Netherlands' macroeconomic distribution of income in 1977–81 shown by present National Accounts are:

—a decreasing share of the enterprise sector in national income and an increasing share of all other sectors;
—a constant share of compensation of employees in national income;
—an increasing share of interest and other property income and a decreasing share of entrepreneurial income and primary income of enterprises in national income;
—sharply growing interest flows through the banking sector and the rest of the world; a doubling of interest on the public debt as well as property income of government (including receipts from the production of natural gas) and a sharp decline in saving of non-financial corporations;
—other property income (including natural-gas revenues) paid by enterprises as well as interest paid almost doubling.

If the data are adjusted for inflationary gains and losses, these conclusions have to be adjusted on the following points:

—the share of the enterprise sector in national income shows a smaller decrease, the share of government does not change, the share of the other sectors shows a smaller increase;
—the level of interest flows is much lower, but rises more sharply;
—the level of entrepreneurial income is much higher and shows hardly any decrease;
—although net interest paid by enterprises increases more sharply, primary income shows a smaller decrease.

The major conclusion must be that the estimation of inflationary gains and losses is an important contribution to understanding the macroeconomic distribution of income. In a situation of persistent inflation an explanation of the development of the distribution of income is severely biased if no attention is paid to the redistributive effects of inflation.

References

Appelo, H. H. A. [1982]. "Nieuwe grondslagen voor de winstberekening bij Philips (New Foundations for the Calculation of Profit by Philips)", *Maandblad voor Bedrijfsadministratie en-Organisatie*, Volume 86, no. 1019 (February 1982), pp. 40–43 (in Dutch)

Bach, G. L. and Stephenson, J. B. [1974]. "Inflation and the Redistribution of Wealth", *The Review of Economics and Statistics*, Volume 56, no. 1 (February 1974), pp. 1–13

Bhatia, K. B. [1972]. "Capital Gains and the Aggregate Consumption Function", *The American Economic Review*, Volume 62, no. 5 (December 1972), pp. 866–879

Blades, D. W. [1983]. *Service Lives of Fixed Assets*, Organisation for Economic Co-operation and Development, Economics and Statistics Department Working Papers No. 4, Paris, March 1983

CBS (Netherlands Central Bureau of Statistics) [1981]. "De fiscale invloed op het effectief rendement van staatsleningen (The Influence of Taxation upon the Yield of Government Loans)", *Monthly Bulletin of Financial Statistics*, Volume 29, no. 12 (December 1981), pp. 57-68 (in Dutch)

CBS (Netherlands Central Bureau of Statistics) [1982a]. *National Accounts 1981*, Staatsuitgeverij, The Hague, 1982 (in Dutch)

CBS (Netherlands Central Bureau of Statistics) [1982b]. *Contributions to the Statistics on Stocks of Capital Goods 1981*, Staatsuitgeverij, The Hague, 1982 (in Dutch)

Cukierman, A. and Mortensen, J. [1983]. *Monetary Assets and Inflation Induced Distortions of the National Accounts: Conceptual Issues and Correction of Sectoral Income Flows in 5 EEC Countries*, Commission of the European Communities, Economic Papers No. 15, Brussels, June 1983

Dequae, M. [1982]. "Inflatie en waarde van de aandelen (Inflation and Value of Shares)", *Tijdschrift voor Economie en Management*, Volume 27, no. 3 (1982), pp. 275-313 (in Dutch)

Eck, R. van, Gorter, C. N. and Tuinen, H. K. van [1983]. *Flexibility in the System of National Accounts*, Netherlands Central Bureau of Statistics, Department for National Accounts, Voorburg, March 1983

Eisner, R. [1980]. "Capital Gains and Income: Real Changes in the Value of Capital in the United States, 1946-1977"; In D. Usher (editor): *The Measurement of Capital*, Studies in Income and Wealth, Volume 45, The University of Chicago Press, Chicago, 1980, pp. 175-342

Eurostat (Statistical Office of the European Communities) [1979]. *European System of Integrated Economic Accounts (ESA)*, 2nd edition, Eurostat, Luxembourg, 1979

Fase, M. M. G. [1972]. "Obligatierendement en inflatieverwachtingen: een kwantitatieve analyse van de ervaringen in Nederland (Bond Yields and Inflationary Expectations: A Quantitative Analysis of the Experiences in the Netherlands)", *Economisch Kwartaaloverzicht Amro Bank*, no. 30 (September 1972), pp. 5-11 (in Dutch)

Fischer, S. and Modigliani, F. [1978]. "Towards an Understanding of the Real Costs of Inflation", *Weltwirtschaftliches Archiv*, Volume 114, no. 4 (1978), pp. 810-833

Gans, M. P. [1976]. "De kwalitatieve achteruitgang van de vermogensstructuur van Nederlandse ondernemingen: betekenis, oorzaken, remedies (The Qualitative Decline of the Capital Structure of Dutch Companies: Importance, Causes, Remedies)"; In: *Vermogensstructuur en financieringsproblemen van Nederlandse ondernemingen* (Capital Structure and Financing Problems of Dutch Companies Pre-adviezen NIBE-jaardag 1976 (Preliminary Reports NIBE Annual Meeting 1976), Nederlands Instituut voor het Bank- en Effectenbedrijf, Amsterdam, 1976, pp. 11-32 (in Dutch)

Goldsmith, R. W. [1951]. "A Perpetual Inventory of National Wealth"; In: *Studies in Income and Wealth*, Volume 14, National Bureau of Economic Research, New York, 1951, pp. 5-61

Gordon, R. J. [1981]. *Macroeconomics*, 2nd edition, Little Brown and Company, Boston, 1981

Hibbert, J. [1983]. *Measuring the Effects of Inflation on Income, Saving and Wealth*, Report prepared for OECD and SOEC, Organisation for Economic Co-operation and Development, Paris, 1983

Hill, T. P. [1979]. *Profits and Rates of Return*, Organisation for Economic Co-operation and Development, Paris, 1979

Hofstra, H. J. [1978]. *Inflatieneutrale belastingheffing* (An Inflation-Adjusted Tax System), Staatsuitgeverij, The Hague, 1978 (in Dutch)

Keus, J. [1980]. *Bedrijven in de tang van de hefboomfactor* (Enterprises in a Fix of the Gearing Ratio), Erasmus University Rotterdam, Centrum voor bedrijfseconomisch onderzoek, Report No. 8011, Rotterdam, July 1980 (in Dutch)

Kirkman, P. R. A. [1978]. *Accounting Under Inflationary Conditions*, 2nd edition, George Allen & Unwin, London, 1978

Laan, P. van der and Tuinen, H. K. van [1982]. "Rente, overig inkomen en inflatie: Enkele macro-economische aspecten van de inkomensverdeling (Interest, Operating Surplus and Inflation: Some Macroeconomic Aspects of the Distribution of Income)", *Economisch Statistische Berichten*, Volume 67, no. 3343 (17th February 1982), pp. 168-174; Reprinted in: Netherlands Central Bureau of Statistics: *Statistical Magazine*, Volume 2, no. 2 (1982), pp. 28-36 (in Dutch)

Laidler, D. E. W. and Parkin, J. M. [1975]. "Inflation: A Survey", *The Economic Journal*, Volume 85, no. 340 (December 1975), pp. 741-809

Lock, J. D. [1985]. *Measuring the Value of the Capital Stock by Direct Observation. The Review of Income and Wealth* Series 31, no. 2 (June 1985), pp. 127-138.

Mundell, R. A. [1963]. "Inflation and Real Interest", *Journal of Political Economy*, Volume 71, no. 3 (June 1963), pp. 280-283

Pen, J. [1980]. "Profits as a Rich Source of Puzzlement", *De Economist*, Volume 118, no. 3 (1980), pp. 285-313

Philips Jaarveslag 1981 (Philips Annual Report 1981)

Praet, P. [1982]. "Some Estimates of the Wealth-Effect of Inflation on the Belgian Government Budget", *Cahiers Economiques de Bruxelles*, Tome 24, no. 93 (1982), p. 145-153

Prins, C. J. [1983]. "Enkele determinanten van de rente-ontwikkeling in Nederland (Some Determinants of the Development of Interest Rates in the Netherlands)", *Economisch Statistische Berichten*, Volume 68, no. 3393 (16th February 1983), pp. 160-162 (in Dutch)

Siaens, A. [1982]. "La comptabilité nationale en contexte d'inflation de quelques erreurs d'enregistrement et d'interprétation", *Cahiers Economiques de Bruxelles*, Tome 24, no. 93 (1982), p. 79-93

Siegel, J. J. [1979]. "Inflation-Induced Distortions in Government and Private Saving Statistics", *The Review of Economics and Statistics*, Volume 61, no. 1 (February 1979), pp. 83-90

Tuinen, H. K. van [1978]. "Integratie van economische statistieken (Integration of Economic Statistics)"; In: Netherlands Central Bureau of Statistics: *Statistical Essays*, Staatsuitgeverij, The Hague, 1978, pp. 18-29 (in Dutch)

Ungern-Sternberg, T. von [1981]. "Inflation and Savings: International Evidence on Inflation-Induced Income Losses", *The Economic Journal*, Volume 91, no. 364 (December 1981), pp. 961-976

UNSO (Statistical Office of the United Nations) [1968]. *A System of National Accounts (SNA)*, Studies in Methods, Series F, No. 2, Rev. 3, United Nations, New York, 1968

UNSO (Statistical Office of the United Nations) [1982]. *The System of National Accounts: Review of Major Issues and Proposals for Future Work and Short Term Changes*, United Nations Economic and Social Council, New York, 15th February 1982, ESA/STAT/AC.15/2

Vijn, R. M. [1983]. "Winst- en vermogensbepaling in Nederland: De situatie anno 1981 (The Measurement of Profit and Net Worth in the Netherlands: The Situation in 1981)", *Economisch Statistische Berichten*, Volume 68, no. 3395 (2nd March 1983), pp. 192-196 (in Dutch)

Ward, M. [1976]. *The Measurement of Capital: The Methodology of Capital Stock Estimates in OECD Countries*, Organisation for Economic Co-operation and Development, Paris, 1976