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DUAL SECTORING IN NATIONAL ACCOUNTS*)

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Summary

The economic process consists of various sub-processes, each requiring its own characteristic classification when described from a statistical point of view. In doing this, the interfaces linking the sub-systems describing the individual processes must be charted in order to reflect the relations existing within the overall process. In the present paper, this issue is examined with the special reference to dual sectoring in systems of national accounts. 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. What will be seen is that the SNA 1968 is incomplete and obscure with respect to the links between the two sub-processes. It would be a pity if the confusion this may have caused were to lead to the renouncement of the use of different classifications for the various sub-processes in the description of the economic process.

1. Introduction

In the description and analysis of the economic process, a distinction is often made between the process of production and income formation on the one hand and that of distribution of income and financing on the other. This distinction is also an essential characteristic of the United Nations System of National Accounts (SNA). The demarcation of these two subprocesses has been carried so far that each now has its own units and classification perspectives. This duality in the description of the economic process is often termed "dual sectoring".

In the present paper, the possibilities and advantages offered by dual sectoring in the description and analysis of the economic process are examined in detail. Our discussion of dual sectoring in national accounts is a contribution to the ongoing debate on the various possible perspectives which can be used here. In order to arrive at a systematical description starting from the large number of actors involved in the economic process, these actors must be grouped into classifications relevant from the perspectives adopted. That is the essence of Stone's argument for multiple classification in social accounting (Stone, 1962). Dual sectoring is related to two of these perspectives. The present paper considers just these two perspectives. This means that in one respect, the scope of the paper is limited. On the other hand, however, the argument for the case of two perspectives can be extended relatively easily to cover three or more perspectives, and the argument can be applied widely as a principle in the design of such statistical systems.

Dual sectoring in national accounts is related to the distinction between what could be called - in brief - the real and the financial aspects of the economy and thus to a difference in perspective which affects nearly every analysis of the economic process. The attention paid to these two perspectives has not been constant in the history of economic and statistical thinking. The focus of attention shifted from one aspect to another from time to time. At the time the SNA was developed as a manual for the construction of national accounts, this even led to heated discussions, as illustrated by Studenski in his "The income of nations" (Studenski; 1958, p. 212). Today there is no longer any dispute about the great significance of both perspectives. For a better understanding of the issue of dual sectoring, both will be explained in more detail here.

From the real perspective, an attempt is made to get the best view possible of the physical process of production and the process of price and income formation which takes place via the market. In the physical process, goods and services are used and processed to produce new goods and services. Basically, attention is paid to the amounts of goods and services in this process and how they are related. Such studies tend to be technological descriptions. Since amounts of goods and services cannot be added up as such, the monetary value of the transactions is used as a common denominator. Due to precisely this, a total value for a number of goods in various production processes does not really mean very much from the point of view of the study of the real process. Only when specified sufficiently can these values give an insight into what actually takes place. This in itself is a handicap in the description of the process concerned, probably best illustrated by the weight the index problem has acquired with respect to the deflation of values in order to gain an insight into volumes. Something similar also applies, *mutatis mutandis*, for the price formation process on the various markets: true insight can only be gained with sufficient specification. This means that disaggregation is an essential characteristic for the description of the process of production and income formation. Obviously, this disaggregation is only worth anything if it is carried out in a manner which leads to as much homogeneity as possible in both the commodity groups to which the transactions relate and in the groups of production processes which represent the transactors in the description. This was the reason why Leontief, in the time when it was usual for national income estimators to include about a dozen sectors, introduced a breakdown into nearly 50 branches for the analysis of the production process.

From the financial perspective, the economic process is related to the acquirement and use of financial means. Here, the processes described are those of the distribution of income and those of financing. These lead to flows between transactors, expressed in terms of money. This perspective tends to lead to a financial legal description, in which the actors must be classified according to their function and characteristic behaviour in the above-mentioned processes. Here too, the extent to which the description is specified determines how much insight it can provide. In the design of the classification of transactors, homogeneity by function and characteristic behaviour is pursued. Hence, sufficient homogeneity must be achieved with respect to the classification of categories of income distribution and capital finance transactions.

It should be mentioned in this respect that, due to the fact that the process of distribution of income and financing consists of transfers of claims expressed in terms of money which do not have to be separated into a volume and a price component as in the case of the process of production and income formation, an aggregate description here is more meaningful than an aggregate description of the production process.

The process of production and income formation on the one hand and the process of distribution of income on the other, are to a great extent interwoven. For it must be remembered that income formed by way of value added supplies the majority of the components of income in the financial process. After the transformation process of the components of income and capital, these are used to purchase the final products of the production process, i.e. final expenditure. Finally, part of this expenditure is again used as a production factor in the production process. To visualize these interactions in the description of the two sub-processes is undoubtedly one of the desiderata of the national accounts. This is what dual sectoring should focus on.

This is the viewpoint from which the present paper will examine dual sectoring. Section 2 gives a conceptual framework of a system in which both sub-processes are described as well as the interfaces between them.

In section 3, the 1968 SNA treatment of the interface is subjected to close scrutiny. In our opinion, the latter is incomplete and unclear, making dual sectoring in the system of national accounts seem more complicated than it actually is. This is probably one of the reasons behind the discrepancy between practice and theory.

Some proposals which may be considered in the light of the coming revision of the SNA indeed show a tendency towards simplification. A number of these proposals is discussed in section 4 against the background of dual sectoring.

Section 5 contains a detailed elaboration of dual sectoring. This elaboration includes a discussion of the practice of the construction of national accounts in order to thus bridge the supposed gap between practice and theory. It will be demonstrated how the linkage tables of the various blocks in a dual sectoring system can be constructed from the original statistical material. The feasibility of the latter is the ultimate defense of dual sectoring.

In section 6 a number of simplifications, introduced to keep a clear view of the description of a system with dual sectoring, are removed. In particular it is explained how the description of final expenditure could be elaborated further.

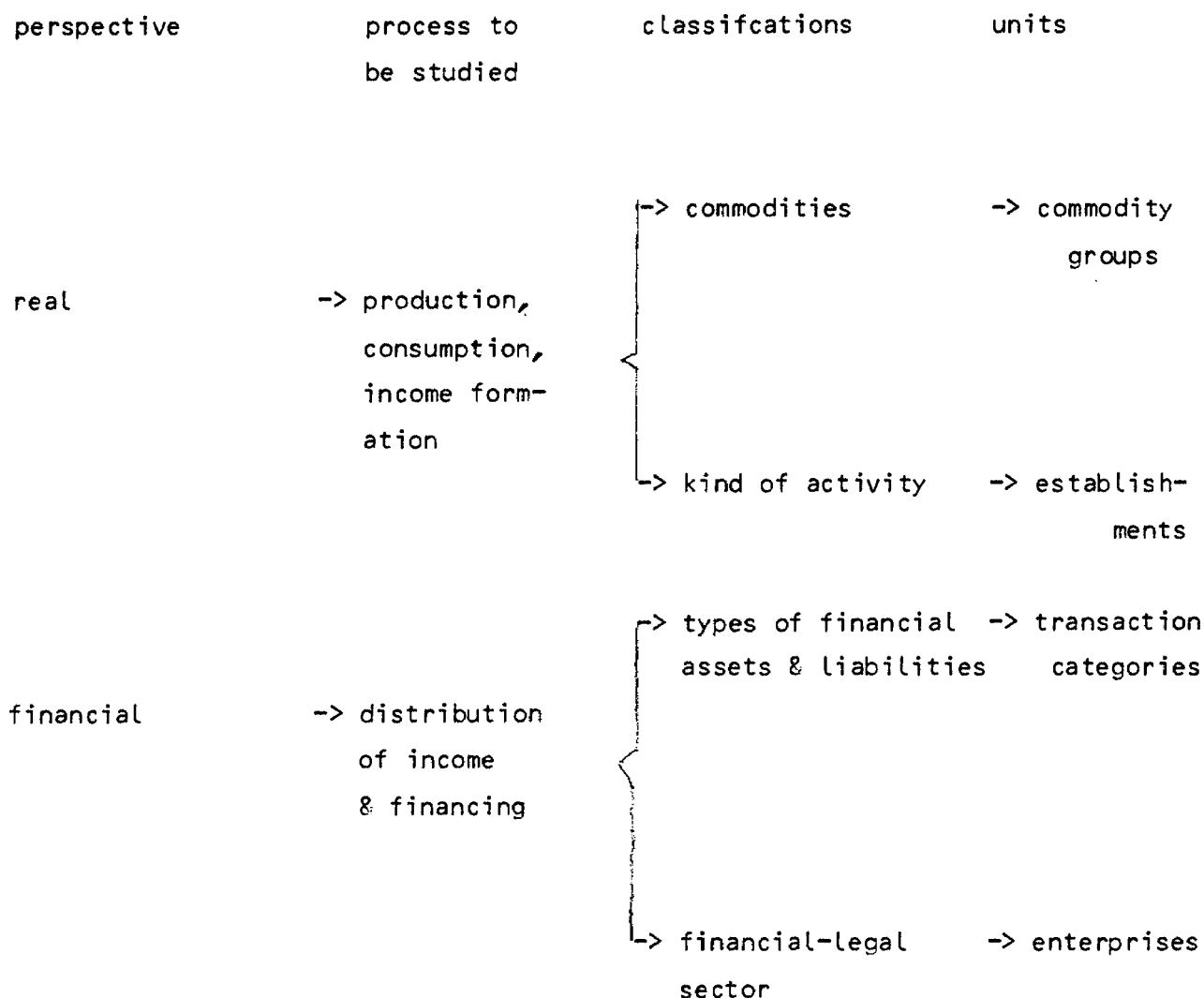
This article gives a theoretical background and a further specification of the links between input-output tables and sector accounts as described in the paper presented by Van den Bos at the 19th conference of the IARIW in 1985 (Van den Bos, 1985, pp. 6-9) and in that of Van Bochove and Van Tuinen (1985, p. 31). The ideas on the updating of the institutional sector classification developed in this paper will be examined in further detail in a forthcoming paper. The present paper starts out from the traditional, 1968 SNA, institutional sector classification. Substituting an alternative classification does not affect our argument.

2. Conceptual elaboration of dual sectoring

The essence of a conceptual elaboration of dual sectoring in the description of the economic process is an adequate description of the two distinguished sub-processes and of the relation between them. The interfaces in which this relationship is expressed require particular attention, since an essential characteristic of dual sectoring is the description of both sub-processes in an inter-related simultaneous analysis of them. In this section, attention will first be paid to the description of each process separately and then to the interfaces. The use of investment goods as a production factor will be left out of consideration for the time being. We shall come back to this aspect in section 6.

For the description of the separate processes, the main theoretical construction is illustrated in figure 1, in which we have used terms which conform with the SNA.

Figure 1. CONSTRUCTION OF A RECORDING SYSTEM FOR THE ECONOMIC PROCESS



This figure clearly illustrates that classifications have to be selected on the basis of the perspective adopted and the corresponding process to be analyzed. The chosen classifications should be relevant from the perspective concerned. These classifications also determine which variables have to be described. Up to this point, the construction of the recording system can almost be completed by theoretical reasoning. The actual operationalization of the system starts with the choice of the units. If we ignore the aspect of the means which are available for the practical filling in and which will always play a part in the extent to which the system is specified, the practical aspect of the describability of the statistical units now comes into the picture. The actual organization of the economic process in society determines the units through which the observation of the variables can take place. In order to bring about the operationalization, the classification, chosen on theoretical grounds, may be adapted to the available units of observation: certain cells might be combined or mixed cells constructed. Even after this, the classification of the units of observation in the adapted operational classification will still take place on the grounds of main activity. Only on this basis can the variables be measured.

To a certain degree it is possible to transform the thus formulated information retrospectively in such a way that it satisfies the original theoretical scheme of classifications. An example of such a transformation is the construction of commodity x commodity or activity x activity tables from input and output tables, which are in the first instance constructed as commodity x activity tables, in which the establishments are classified by main economic activity. The distinction made by Franz in his paper at the 19th IARIW conference between unit of observation and "artificial" units can be traced back to this train of thought (Franz, 1985, p. 7). However, we are not concerned with two different kinds of units, but with two different classifications: an operational one and a theoretical one. The distinction made by Van Bochove and Van Tuinen in their paper for the same conference, between an institutional and a functional description of the economic process, is also based on the same train of thought (Bochove and Tuinen, 1985). The institutional description corresponds with information measured according to an operational classification and a main-activity grouping of the statistical units. Their functional description aims at transformed information, in which the variables are described as they are defined according to the desired

theoretical classification. The present paper only deals with the operational classification of information resulting from the grouping of units of observation by main activity. The transformation of this information to classifications desired from a theoretical point of view, for which additional information and assumptions are usually required, will be left out of consideration here.

The fact that they can be observed is the characteristic property of the statistical units. From the various statistical units available, those which lead to the greatest possible homogeneity must be chosen for each desired classification. This optimal degree of homogeneity is an important point of consideration in the separate descriptions of the two major sub-processes.

The sub-process of production and income formation takes place by way of transactions of goods and services and the use of production factors. This immediately gives us one of the dimensions of the classification of a description of this process, i.e. the classification by commodities, services and production factors. The actors in this process are the producers. They constitute the units of observation. These units are classified by kind of production process, often operationalized in terms of characteristic commodities. From here on, this will be called a classification by kind of economic activity (activity). The information takes the form of input and output tables almost as a matter of course. The statistical units mentioned by the SNA in this respect are the establishment-type units. What are in fact meant here are the smallest organizational units in which decisions are taken on production matters and which are completely describable. Sometimes they are part of an enterprise, in which case the problem of complex costs arises. These constitute a limit of the describability.

If, for now, we assume that establishment-type units are reasonably describable units of observation for the process of production and income formation, the advantage of the use of these units compared with enterprises as units of observation is that there is a greater degree of homogeneity in the rows and columns of the input and output tables. Therefore, the makers of these tables would have to make less use of or depend less on assumptions with respect to the links between the costs of the production process and the sale of goods. The construction of input and output tables thus becomes a more powerful instrument if information from establishment-type units is used, as this also makes a more accurate ex post confrontation of demand and supply on the domestic market possible.

On the other hand, if establishment-type units are used, it will be necessary in a number of cases to assign the complex costs, of which the nature is only known on enterprise level, to the establishments. In this context, Franz says the following, which is certainly worthy of notice, assuming it does not refer to details: "Obviously this can all be done in a meaningful manner in close co-operation with the correspondents only. What is absolutely not worth supporting is armchair breakdown done in statistical offices on the basis of keys and assumption" (Franz, 1985, p. 21). Should the latter occur, the assumptions with respect to the connection between demand and costs which must be made for the construction of the input and output tables are only replaced by assumptions made during the collection and construction of the basic information. There is then a limit to the meaningful possibilities of splitting enterprises into smaller units, but in as far as there is some sort of co-operation with the informants, this division has a favourable effect on the quality of the input and output tables. It is up to the statistician to seek an optimum within these limits.

The sub-process of distribution of income and financing has a great number of transactions, as defined in the various items of the system of accounts as point of departure. The core of this process is the transformation of income and capital components on the basis of the legal and financial structure of society. The actors in the economic process are classified correspondingly in groups which, as far as possible, have the same functions and characteristic behaviour in this sub-process. Obviously, here too we have a classification of observable units in groups. To a certain extent this classification is also one by main "activity". The traditional term for the groups of units in this sub-process is "institutional sectors". In the SNA, enterprises are entered as statistical units. The reasoning behind this is that enterprises constitute the lowest level in the actual organization of the economic process on which decisions are taken with respect to distribution of income and financing.

The literature on the subject contains much less discussion on the choice of institutional sectors for a classification and enterprises as the statistical unit for the description of the process of distribution of income and financing than on the choice of activities and establishments, respectively, for the description of the process of production and income formation. This could be interpreted as if the classifications in the former process were largely obvious and no longer a subject for discussion. The paper by Van den Bos for the 19th conference of the IARIW leads us to believe differently, however. The

existing classification and choice of enterprises have probably been considered obvious for too long, and an updating of the classification is urgently required due to the increased complexity of the transformation processes in the financial field.

Dual sectoring in national accounts has two aspects then. There is a difference between the statistical units and there are different perspectives from which these can be classified. The radical sub-division into two major sub-processes illustrates this clearly. In reality, there is a strong two-way linkage between the two. Apart from the use of investment as a production factor, an issue which involves a different time dimension than the usual annual description of the economic process and which will be dealt with in section 6, there are two interfaces of the two sub-processes. First of all, there is the area of primary costs/value added. The income generated in the production process as compensation for the production factors is obviously the input for the process of distribution of income and financing. Secondly, there is the area of final demand/expenditure. The final goods and services which come onto the domestic market as a result of the production process are ultimately paid for or financed with the means which are available per sector after the process of distribution of income.

Naturally, the complexity of dual sectoring is expressed in precisely these two interfaces of the sub-processes. For both, a scheme with three dimensions emerges which should be completely filled in with information if it is to describe the connections.

The three dimensions in the area of primary costs/value added are:

- the activity in which value added is formed;
- the components of value added;
- the sector in which value added is formed.

For the area of final expenditure, these dimensions are:

- the sectors that do the spending;
- the components of final expenditure;
- the goods supplied.

In addition, it would also be logical to establish a link with the activity which does the supplying. However, where establishments are used in the description of the production process, the output-matrix of the input-output

system will be almost a diagonal matrix, so substitution of the supplying activity for goods is relatively easy. This complication will therefore be left out of consideration here.

This description of the interfaces immediately makes it clear that the conceptual complexity of dual sectoring lies not so much in the use of different units, but in the use of two different perspectives for the classification of statistical units. For if the same unit is chosen for the description of both sub-processes, the dimensions of the interfaces do not change as a result. The use of the same units for the description of both sub-processes would only reduce the complexity of dual sectoring to any substantial extent if in addition the sector classification were an aggregate of the activity classification. This aggregate should be possible on the level of the groups of statistical units which are formed for both classifications. This would impose too serious a restriction on the possibilities of choosing the most adequate classifications for the two processes which are significant from the real and financial perspective. This conclusion with respect to the use of only one set of units in the description of both sub-processes needs modification in one special case only: first of all, if complete information on both processes is available for all units, and, secondly, the integration of the information could be done on the level of individual units.

In spite of this complexity, the construction of a linkage table between the description of production and income formation on the one hand and distribution of income and financing on the other with respect to final demand/expenditure is not all that difficult from a statistical point of view. Part of this linkage table is often included in the input-output table. The Dutch input-output table, for example, contains the final columns: exports, investments by industry, investments by the government, government consumption, household consumption, increase in stock. Two divisions can be seen in this list: on the one hand into components of final expenditure, and on the other a (rudimentary) sector classification. The construction of the three-dimensional linkage table is made much easier by the fact that many cells will remain empty, either by definition or due to the chosen classification of groups of goods. For the sector "rest of the world" for example, no distinction need be made between the consumption and investment components; there is only one vector of exports for each group of commodities. The choice of groups of commodities can be and is in many cases determined in such a way that invest-

ment commodities and consumption commodities do not fall in one and the same group. If the final deliveries per group of commodities can be distributed among the spending sectors, this would lead to an immediate division by sector and component for each group of commodities. With a classification of groups of commodities aimed towards it, the three-dimensional linkage table concerning expenditure thus lies within easy reach if autonomous information on expenditure by sectors is available. It should be mentioned here that in the linkage scheme described here, investments would be grouped by the sector which invests its financial means. The specification of investments by the activity for which they are used is not at issue yet.

The linkage scheme between the real and the financial block in the area of primary costs/value added poses the same statistical problems. Here it should be indicated for each activity and for all primary cost components which sectors of the accounts system these fall to in the form of income. In other words, the producing units should be distinguished by the sectors to which they belong. In a system with complete dual sectoring, in which different classifications and different units are used for describing the two major sub-processes in the economy, this would mean that the establishments would also have to be classified by the sector to which the enterprise in which they are comprised belongs. Basically, the three-dimensional linkage scheme here is not essentially different from that in the area of final demand/expenditure.

3. Dual sectoring in the SNA

The SNA 1968 has complete dual sectoring. The process of production and income formation is described in a commodity x activity classification with establishments as units of observation. The process of distribution of income and financing is described with the aid of a transaction x institutional sector classification with enterprises as unit of observation. However, in reading through the SNA 1968, many people might have difficulty in seeing the linkage between the two descriptions.

In the interface of final demand/expenditure, matrix 2.1 "An illustration of the complete system" on the face of it seems to provide this linkage, since in rows 5-12 commodities are set off against activities, grouped in sectors. However, the activities are not classified by institutional sectors but by a sort of production sectors: industries, producers of government services and producers of private non-profit services. So the SNA has first a classification into production sectors, subdivided in activities, in which establishments have to be classified; and second an institutional sectoring, also subdivided in activities (viz. in Annex 8.3) in which enterprises have to be classified. As the production sector classification differs from the institutional sector classification, no complete linkage is in fact made with the institutional sectors that use their financial means to pay this final expenditure. However, no clear perspective can be found which leads to the aggregation of activities into production sectors. Therefore, production sectors were probably introduced because the classification of establishments by institutional sector appeared to be too complicated; in spite of this, the addition of production sectors in this system seems unnecessarily complicated and seems to prevent the linkage between the real and the financial block. As we saw in the conceptual elaboration in the last section, it would be better to classify the activities by institutional sector for the construction of linkage schemes. In section 5 we shall see how that can be done from a statistical point of view. The three production sectors are distinguished in the SNA because government services and private non-profit services do not appear on the market. Without going into this in great detail, we can suffice by saying that there will usually be a relation between whether or not services appear on the market and the financial structure of the producer of these services. The replacement of the production sector classification by an institutional sector classification for establishments will then probably pose few problems in the analysis of the process of production and income formation.

The linkage in the area of primary costs/value added can be found in rows 29-37 of matrix 2.1 of the SNA 1968. Here the value added of activities is transformed into institutional sector of origin. The SNA is very unclear about the way in which this should be done. In the conceptual elaboration of dual sectoring in the previous section, it was illustrated that the connection scheme in this area should be one with the dimensions components of value added x activity x sector. Such a scheme can only be achieved by classifying establishments both by activity and - by way of the enterprise to which they belong - by sector. As the enterprises consist of one or more establishments, only the two-way classification of establishments results in the required picture for each activity and sector. This two-sided classification is not to be found in the SNA 1968 however, so that it does not provide the linkage scheme for the interface we are concerned with here.

What can be found in the SNA is a two-sided classification of enterprises. In sections 2.31 and 5.59 it is proposed that the enterprises also be classified by activity. Section 5.59 states: "The non-financial corporate and quasi-corporate enterprises and financial institutions are also to be classified according to their major kind of economic activity"; and one of the two main reasons behind this is: "classification of data according to kind of economic activity in the case of both industries and their parent enterprises will provide links between the two bodies of information". It seems as if this two-sided classification of enterprises has to provide the link between the financial and the real block. However, this is a misunderstanding: by classifying enterprises by their main economic activity as well, we get a link between information on the sectors and information on the activities, but we now have two activity descriptions: one based on the main economic activity of the enterprises, and one based on that of the establishments. These differ from each other in that a number of establishments fall under different activities according to the two classifications. In order to link the information according to one classification to that according to the other, the establishments once again have to be classified twice, viz. once according to their own main economic activity and once according to that of the enterprise to which they belong. Therefore, the classification of enterprises by activity does not solve the linkage problem. It creates a detour in which the same problem crops up in a different place. This is illustrated quite clearly by table 17 and the explanatory notes in section 8.130. The SNA does not actually solve the problem of connection in dual sectoring.

It should be mentioned that an information set-up whereby enterprises are classified according to main economic activity is not necessarily a meaningless one. A good reason for this is stated in section 5.59: "the financial behaviour and experience of the business enterprises will, it is thought, be related with their major kind of economic activity". Unfortunately in the almost twenty years since this hypothesis was formulated not enough serious research has been done to transform it into more than a hypothesis. Here we shall suffice with the argument that this classification is not of significance for the construction of linkage tables between the description of the process of production and income formation and that of the process of distribution of income and financing. On the contrary, as we shall see in the following section, the classification proposed in section 5.59 would seem rather to have caused confusion.

4. Dual sectoring versus a monistic system

The real process cannot exist without the financial process, and vice versa. In the absence of a financial process, the production process would degenerate into production for own use and barter trade. Without the production process, the financial process would be reduced to a short-lived money illusion, as its sub-structure is removed. This essential interdependence must be reflected in the description of the economic process. In addition, there must be a certain degree of specification in the description of both sub-processes if this information is to have any meaning for analysis and policy purposes. These will form our starting points for the study of a number of proposals bearing on the revision of the SNA. However, before discussing these proposals, a third evaluation criterion will be developed. This criterion is derived from the strength of the statistical process for the construction of national accounts.

In the overall economic process, there are three points of observation at which total national income can be measured. First of all there is the formation of value added in the production process. Measurement at this point is known as the net-output method. Secondly, we have the measurement of disposable income. This method is called the income-distributed or subjective method. In the third place, final expenditure can form the point of measurement, in which case we speak of the income-disposed or final-products method. Of these three, Studenski considers the income-distributed method the strongest for economically advanced countries (Studenski, 1958, p. 258). It would be ideal from a statistical point of view to confront the measurements according to the various methods in order to arrive at as plausible as possible an estimate. In literature and in practice, a combination of the income-disposed and net-output methods is considered superior, even in comparison with the income-distributed method. This confrontation is carried out by way of trade balances, usually in the form of input and output tables, and is known as the commodity-flow method. If a sufficient number of commodities is distinguished, the balancing of fairly homogeneous items is possible, which provides for great statistical accuracy.

This also means that there is a relation between the maximum strength of the estimation method for national income and the units chosen as a starting point for the description of the process of production and income formation. The more homogeneous the groups of units are in their production process, the stronger the description of the trade balances becomes and thus the stronger the

estimate of national income according to this method. The groups of units, classified by economic activity, will usually have a greater degree of homogeneity if the units are chosen on a lower level in the organisation of the production process than the enterprise level; on the establishment level for example.

In the following, critical attention will be paid to a number of proposals made in the context of the revision of the SNA. In this examination, three considerations mentioned above play an important part, viz.:

- simultaneous analysis and disaggregation in the description of both sub-processes of the overall economic process is important;
- the total system of national accounts should do justice to the interdependence between the two sub-processes and should also describe it;
- the intrinsic strength of the estimation methods which fit the system should also be taken into account in the choice of the system.

First of all, the conceptual complexities of dual sectoring can be avoided by employing a very small macro-system. An elegant example of a proposal in this direction is the contribution by the UNSO to the discussion in the OECD in May 1985 on the revision of the SNA under the title of "The SNA as a framework for statistical co-ordination" (UNSO, 1985). In this proposal, the core of the SNA is limited to the description of three sectors in the economy derived from the financial sub-process, viz. households, government and enterprises, with the sector "rest of the world" added. No specification by groups of transactors is proposed at all for the process of production and income formation. The paper is very clear on this point: "That detail should be rather reserved for specialized analysis of production accounts, input-output tables etc." If a wider significance is to be attributed to this than that of a proposal for the presentation of data from national accounts alone, then what is actually proposed for the SNA is not dual sectoring, but a monistic system, since all attention is focussed on the financial sub-process. The description of the production process is restricted to an absolute minimum, i.e. gross output, intermediate consumption and value added per sector, on the basis of enterprises; consequently, there is no real analysis in the proposed core. It should be clear that this should be considered a great impoverishment with respect to the current SNA, as the production process and the formation of value added are not described adequately and consequently the interdependence between that process and the financial one cannot be charted. Moreover, the strongest method for estimating national income cannot be used for the

construction of the core of the system. This proposal would mean a step backwards in the development of the SNA.

A second proposal which merits attention is the one Stahmer presented in his paper for the International Meeting on Problems of Compilation of Input-Output Tables in Baden (Austria), also in May 1985 (Stahmer, 1985). In this paper, he calls attention to the link between the two major sub-processes in the economy which are distinguished in dual sectoring. At the same time he attempts to retain the input and output tables and the accounting system in detailed form. In this respect, his proposal is completely in line with the requirements formulated above. In section 2 of his paper in particular, he devotes his attention to dual sectoring. This section will therefore receive most of our attention. We shall not go into details on section 3 which deals with the presentation of economic activities in the input-output tables. This lies too far from the subject on hand. Stahmer further pays a lot of attention to the difference between the SNA and the ESA in respect of the definition of the units on the basis of which the process of production and income formation is described. As a basis for the description of this process, the ESA equivalents of the SNA establishments are the "homogeneous production units", each producing only one particular commodity group (ESA, 1979, p. 10). This rule seems to imply that homogeneous units can be distinguished in the actual organisation of the economic process to such an extent that these can be fitted into the classification chosen for the production process without any classification by main activity having to be applied. Stahmer's objection that obtaining information in this respect would require radical adjustments of what can actually be observed is justified. What can actually be observed in reality is less homogeneous. Commodity x commodity tables with a classification such as that desired in theory should indeed be considered as building blocks. For an operationalization of the information scheme, units which can be observed in reality must be taken into account.

In his explanation, Stahmer first of all points out the complexity of the system which is caused by dual sectoring. He states that the reason behind this complexity is the use of various classifications and points out that - if no linkage tables are made for the switch from one classification to another - there is a risk of the economy being split into two relatively independent sub-systems.

Although Stahmer has built in several degrees of freedom in the solutions he presents, the following common characteristics can be distinguished. First of all, for the basis of the description of the process of production and income formation, he suggests commodity x institutional sector tables. This means that the classification of the actors which applies in the accounting system is also imposed on input and output tables. As the description of the two sub-processes then use the same classification, the linkage is substantially simplified. In the second place, it appears from table 1 of this paper that in spite of the supposed freedom, the integration of the input and output tables and accounting system can only be effected very well (++) if the same statistical units, enterprises, are also used. Thirdly, it is proposed that in addition to the thus formed basic tables, commodity x commodity tables and institutional sector x institutional sector tables should also be constructed.

It should not be difficult to see that if the basic input and output tables are defined as commodity x institutional sector, and if it is based on enterprises as the statistical unit, the description of the process of production and income formation will link up well with a description of the financial process on the basis of enterprises grouped by the same sector. The drawback of this, however, is that on the basis of these tables, no sound analysis of the production process is possible. For, groups of units will come into existence which will be very heterogeneous in terms of commodities in both their input and their output structure. This undermines the strength of the commodity-flow method as the strongest method for estimating national income. Moreover, these tables do not provide the desired insight into the production process as a physical process. For a switch from these tables to a commodity x commodity classification, drastic assumptions will have to be made. Stahmer overcomes the latter by proposing the construction of additional commodity x kind of economic activity tables on the basis of establishments. However, it may be questioned how this is can be done in tune with the commodity x institutional sector tables. What in fact happens here is that the essential problem in dual sectoring - the use of two different classifications at the same time - is only shifted to the area of input-output tables, not solved. The same situation then exists as in the SNA.

Finally, Postner's work in the area of units also deserves our attention here. One of his main points is the idea that there must be a level in the actual organisation of the production process which is suitable to supply units which could serve as a basis for the description of the process of production

and income formation and that of distribution of income and financing at the same time. He believes that he can find this unit in the "division", which is a compromise between the enterprise level and the establishment level. Without claiming to penetrate the merits of this idea completely, the following may be remarked on this. On the one hand, the application of the division as a unit for the description of the production process will affect the strength of the commodity-flow method, since a lower degree of homogeneity in the commodity x kind of activity tables will result. On the other hand, the matter of the complex costs (which will be reduced with the use of these units) partly makes up for this. However, problems will probably arise with complex financial transactions of the total enterprise. This subject cannot be dealt with in all its aspects here. However this turns out in practice, the complexity of the dual sectoring system is not - as we have already demonstrated - so much connected with the use of various units for the description of the two sub-processes as with the different perspectives with regard to the classification. Therefore, Postner's proposals are not very meaningful for dual sectoring and should not be placed or judged in this respect.

5. Complete and consistent dual sectoring

In section 2, we gave a conceptual elaboration of dual sectoring. In this section, a possible statistical design of the system will be discussed. In doing this, we shall adhere to the descriptions of the process of production and income formation and the process of distribution of income proposed by the SNA as much as possible. After all that has already been said, it should by now be clear that the statistical construction of the linkage schemes between the blocks merits particular attention. In this thought process, a long practical experience with national accounts - in which systems of accounts and input-output tables are constructed jointly and attuned to each other - at the Netherlands Central Bureau of Statistics has played an important part. This experience has been built up over a period of over thirty years, since input-output tables have formed a cornerstone for calculating national incomes since the beginning of the fifties.

In this course of thought, the description of the process of production and income formation is based on commodity x kind of economic activity input and output tables. The most suitable units in this respect are establishments. These are the smallest units in which decisions are taken with respect to the production process and which can be described. With respect to the describability, statisticians need not necessarily take a passive attitude. On the one hand, a meaningful breakdown of costs can be achieved through co-operation with informants by means of which enterprises can be broken down into establishments; and on the other, for more detailed information of that breakdown, more generic keys can be applied without any problem. Once the smallest units of observation have been reached, this then determines the highest possible homogeneity of the variables in the operational scheme. This by no means means that the establishments are strictly homogeneous by economic activity. Many secondary activities will not be separated. This outlined procedure is not only applicable to enterprises but also to government bodies and private non-profit institutions. In the latter, establishment-type units in principle come into being for enterprises as well as government bodies and private non-profit institutions. We shall call the establishment-type units EST's.

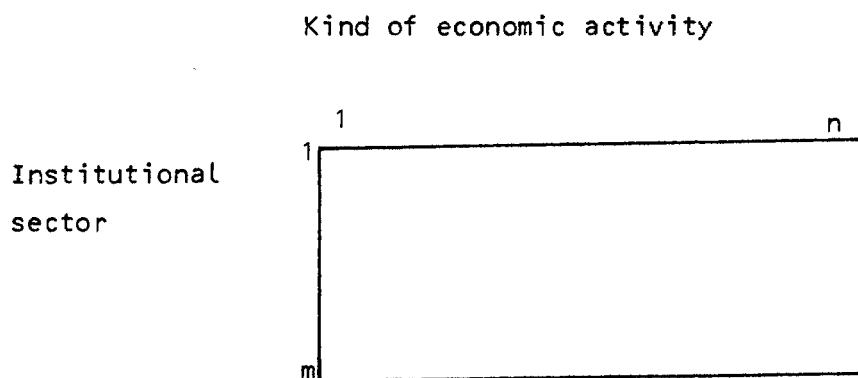
The process of distribution of income and financing is described in accounts of transactions x sectors. The SNA mentions enterprises as the smallest units in which decisions on distribution of income and financing are taken. In this

article, we start out from the assumption that the institutional sector and the enterprise are the two most adequate concepts for the description from the financial point of view. For the sake of simple terminology, we shall use the term ENT's for enterprises as well as government bodies, and private non-profit institutions.

As already argued above, the linkage tables between the two processes are commodity x activity x sector tables. In order to be able to construct these tables on the basis of original statistical material, the classification chosen for the one process will have to be taken into account in the description of the other. As the EST's are found on a lower aggregation level in the actual organisation of the economic process, this is only possible by taking the sector classification of the description of the process of distribution of income into account in the description of the process of production and income formation. This means that the EST's must be classified by sector as well as by economic activity. The sector characteristic is derived from the sector classification of the ENT to which they belong.

The EST's therefore have to be divided into groups formed by one specific economic activity and one specific sector. In such a group, the EST's are classified by main activity on the basis of data from the EST itself in the case of economic activity and on the basis of data from the ENT to which they belong in the case of the sector. A schematic representation of the group classification in which the EST is grouped is given in figure 2.

Figure 2. CLASSIFICATION SCHEME FOR EST'S



In order to classify EST's according to both classifications, we need a well-specified register of all economic actors on EST and ENT level, which also includes the relationships between EST's ENT's. From a statistical point of

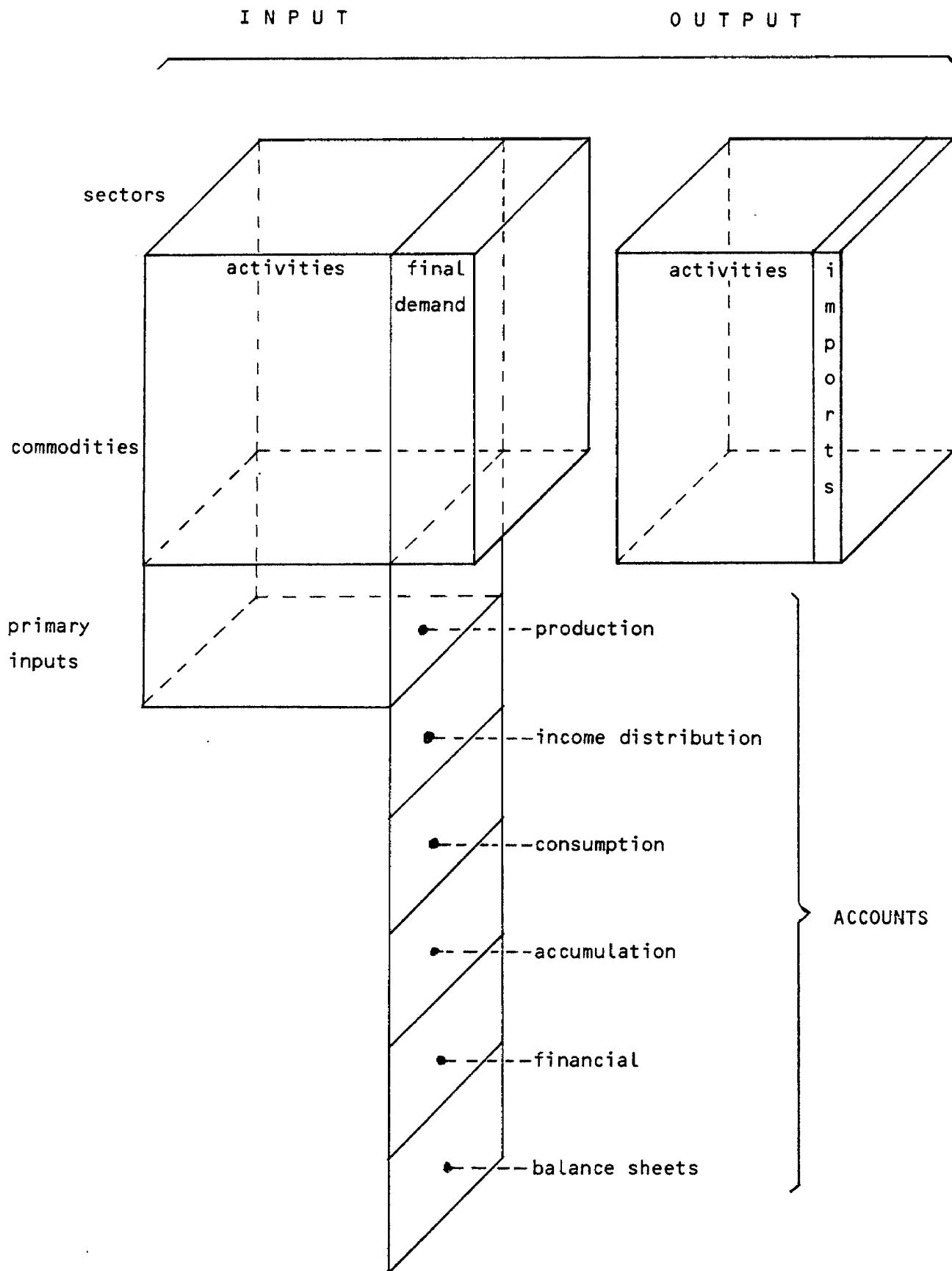
view, this is undoubtedly a difficult labour-consuming task due to the dynamic process of concentration and deconcentration. However, it should be kept in mind that the sector classification of ENT's will not change very much by the addition or removal of an EST. In a large number of these cases, the transferred EST will simply receive the sector classification of the new ENT to which it belongs. Reclassification of the ENT concerned by main function and characteristics in the sector classification, which would make a new analysis of the properties of the ENT necessary, will not occur very frequently. Keeping a register referring to a classification according to figure 2 will at least be easier than the classification of ENT's by activity as proposed in the SNA. In the latter, a new analysis of all the activities of an ENT will be necessary much sooner in order to assign it a new main activity classification if an EST is added to or removed from that ENT.

It is perhaps worth mentioning that there are a number of cells in figure 2 in which no EST can be placed at all. For example, for a large number of economic activities, no EST will be found in the general government sector. Neither need any EST's be distinguished in the sector "rest of the world". The actual number of groups with an EST will therefore be much lower than it would seem at first glance.

Information on goods and services transactions and on the production factors applied must now be collected for the thus formed groups of EST's. This information is entered in a scheme as defined for the input-output matrices. This yields an operationalization for the area of intermediary consumption and primary costs. The scheme now consists of a three-dimensional table, as, in addition to the usual commodity and activity dimensions, the sector dimension can now also be distinguished in this information.

In order to complete the input table, information on final expenditure has to be entered. To this end, information on final expenditure must be collected in the groups of economic actors according to the sector classification. Here, the sectors "rest of the world" and "households" (including non-financial private unincorporated enterprises) also play a part. ~~In the existing institutional~~
sector classification, households and non-financial private unincorporated enterprises form one and the same sector as they cannot be distinguished in the process of income distribution and financing. This means that in the input and

Figure 3. BASIC INFORMATION



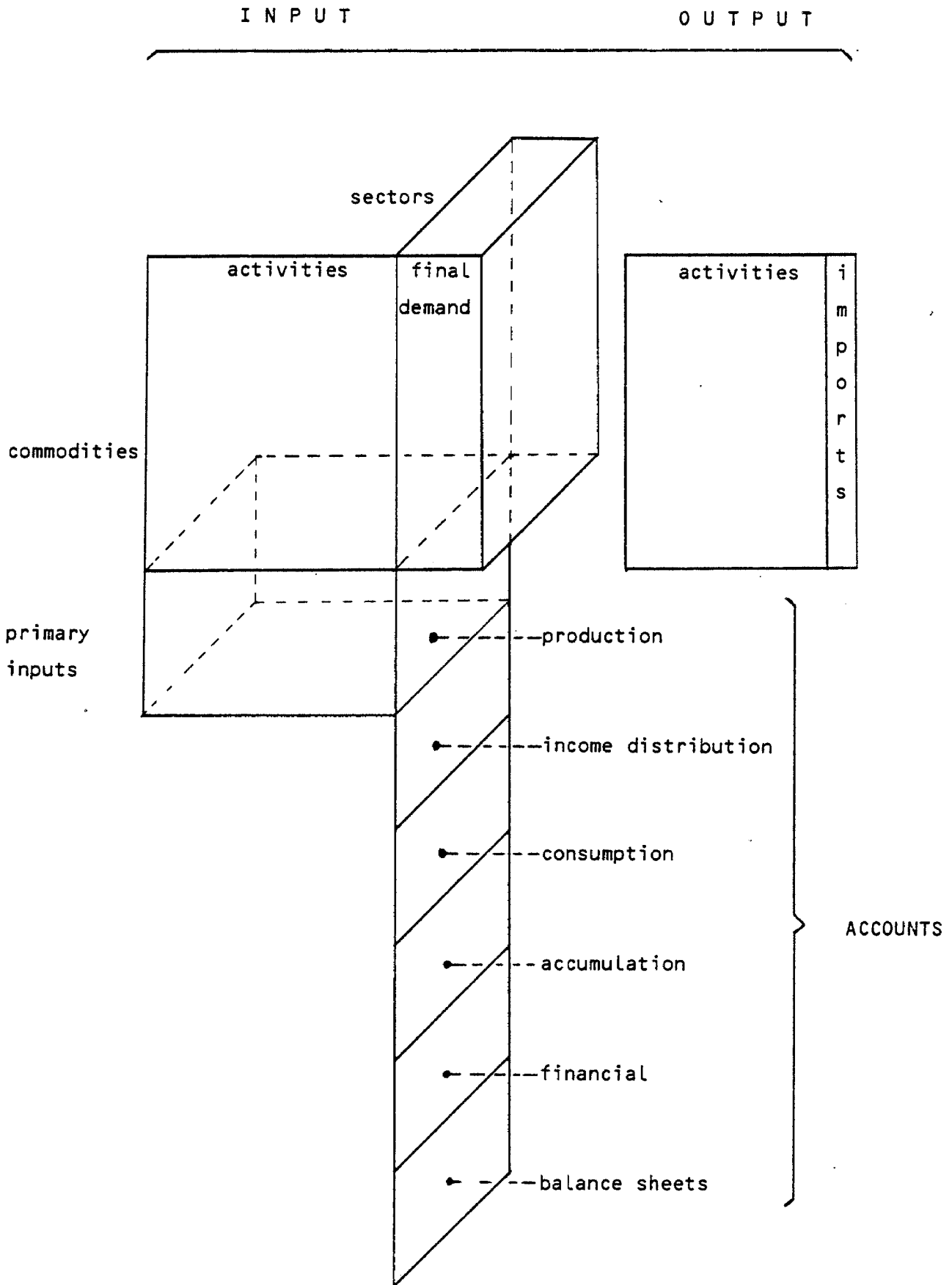
output tables for the description of the process of production and income formation, the transactions of non-financial private unincorporated enterprises occur in the intermediary block and the primary costs block and that the transactions of households occur in the block of final demand under the term consumption. The purchase of investment goods by unincorporated enterprises appears in the final block for this sector under the term "investments".

When this has been added, an information scheme corresponding to the input-output block illustrated in figure 3 emerges. Though it is probably obvious, it is worth mentioning that the block of final demand in the input-table, as mentioned in section 2, is only non-zero for a limited number of vertical columns and that others, by definition, remain empty.

For transactions in the process of distribution of income and financing, the ENT units have to be classified into groups according to the institutional sector classification. No other arrangement of the information is required for a system with dual sectoring and the construction of linkage tables in particular. The information on this sub-process then fits into the two-dimensional sector x transaction scheme, as illustrated in figure 3. One of the first aspects which can be noted here is that there is no longer any difference between a classification by production sectors and a complete institutional sector classification. Compared with the SNA 1968, this scheme has the advantage of the clarity of a uniform sector classification.

Before going into the merits of this arrangement of information for the link between the blocks describing the major sub-processes, attention will be paid to the essence of the procedure of statistical processing. Having completed the scheme with original information from various sources, including the necessary estimates which have to be carried out to this end on this level, comes the inevitable stage of integrating this information. In the experience of every statistician who has ever worked on national accounts, when the scheme has been filled in, several inconsistencies emerge. We shall not go into all the techniques of integrating data here, but we do want to take a look at the level on which this should take place. It is not possible to get every thing to fit in the complete three-dimensional scheme, as this integration procedure is based on and must lead to the balancing restriction that everything available in the domestic economic process should be included in it. In order to balance the

Figure 4. BALANCED INFORMATION



input and output tables, the information must be transformed to a form to which the commodity-flow method applies. There are two conceivable ways of doing this. First of all, the three-dimensional tables can be reduced to two-dimensional ones by, for each activity and component in final demand, constructing just as many sub-columns as there are sectors containing EST's in the activity or component concerned. The sector data are entered in these sub-columns. If this scheme is used in the integration process, each variable defined in figure 3 will give a result which also fits. After balancing, the original threedimensional form can be restored, in order to obtain comprehensive integrated information for the scheme in figure 3. This is undoubtedly the most consistent, but at the same time most laborious variant. A second, abridged, method can be found by aggregating the three-dimensional input-output tables per activity and per component of final expenditure across the sectors. We then get a traditional input and output scheme with the dimensions commodity x activity. Here too the commodity-flow method applies. However, when this has been integrated, the resulting goods and services transactions once again have to be specified by separate sectors for the blocks providing the links to the accounts: the primary costs/value added block and the final demand/final expenditure block. This would not seem to pose an insurmountable problem, since, as far as the integration procedure takes place on the basis of additional information, error correction procedures and expertise, it should not be difficult to indicate how many of these corrections are related to the sector specification. Where proportional distribution techniques are used for the final details in this integration procedure, the same techniques can be used for the further sector specification. It should be kept in mind though in this respect that in the three-dimensional scheme of figure 3, there are a number of vertical columns which will remain empty and thus make this sector specification much more simple than it initially seems. Following the integration procedure and the calculations through to primary costs/value added and final demand/final expenditure, the resulting information will take the form shown in figure 4. This figure shows the minimal form which the integrated result will take. If the abridged version is not used for integrating the input and output tables, the integrated result will take the form of figure 3. The schemes show that the ultimately generated information comprises at least the following, whichever integration procedure is applied:

- input and output tables specified by commodity x activity.
These tables form a good basis for various possible variants such as commodity x commodity or activity x activity, which can be further produced with the aid of additional information and assumptions.
- the accounts, completely specified by institutional sectors and corresponding transactions, including production accounts.
- a primary costs/value added block specified by both activity and sectors and by components of value added.
- a final demand/final expenditure block specified by both commodities and sectors and also by transactions, consumption, investments and increase in stocks.

The two latter blocks are the principal result of the design of the statistical process described above. They constitute strong linkage tables between the input-output system and the accounts. The production account is thus no longer joined to the production block by the thin thread of the macro-total of the components of value added, but strongly interwoven by the three-dimensional character of the primary costs/value added block. It therefore also comprises a specification by activity through which the sector income is generated. The consumption account and the capital formation account are strongly linked to the production sphere by way of the specification of final demand/final expenditure, since these accounts are linked directly with the final demand/final expenditure block which is specified by sector and commodity. Via the commodities, the line follows through the activity dimension of the producers in the output table. We believe that these linkage blocks are the obvious means, also for the users of national accounts information, for the link between the financial and the real perspective in model construction.

Although we have now given sufficient reasons for the existence of a complete and consistent elaboration of dual sectoring, we still feel that one statistical advantage should be mentioned.

This is related to the possibilities offered by complete dual sectoring as described here for the integration of the income-distributed method in the estimation process of the national accounts. If, in the schemes, primary costs

are summed over the economic activities, these components of income specified by sector constitute a good point for confrontation with a direct measurement of income arranged from the same point of view. This confrontation can be included in the balancing of the input-output block and the accounts. In this way, the possibility of combining the commodity-flow method and the income-distributed method is created. In the case of complete dual sectoring, all three methods of measuring national income are thus incorporated.

6. Some further extensions

For the sake of simplicity, a number of specifications of the final expenditure components investment, change in stocks and consumption have been left out of consideration up to now, except for specifications which indicate which sector invests its means. As stated in the introduction, the system design described above can be relatively easily extended to more perspectives. These perspectives must first of all be translated into classifications and then units of observation must be established. In this section, we give a rough outline of how this should be done for consumption, increase in stocks and investment.

Consumption

For the further analysis of consumption, satisfaction of demands is an interesting perspective. The corresponding classification is one of purpose of consumer demand. The units with which this classification can be operationalized are the commodity groups. If this is the only classification to be introduced in the system outlined in the previous section, the column for the consumption component in final expenditure can be specified by purpose. This will not lead to any further complications. Should the satisfaction of demands perspective require a specification by socio-economic group, households will be the logical choice for the unit of observation. Instead of specification by purpose, a specification by socio-economic group could be introduced in the scheme. If both classifications are considered relevant for the analysis of consumption, and if their relation to each other also requires analysis, this will lead to a fairly complex specification in the original consumption column which can only be represented by a separate multi-dimensional block.

Changes in stocks

For the analysis of the process of production and income formation, not only stock changes by commodity are relevant, stock changes by activity are also important. Due to the fact that stocks are also a form of invested means, it is also important to know changes in stocks per sector from the analysis of the process of distribution of income and financing. These desired classifications were already included in the scheme outlined in the previous section. The introduction of some form of recording for the change in stocks is therefore not too difficult. If the columns of final expenditure which describe the increase in stocks per sector are broken down by activity, the required recording comes about automatically.

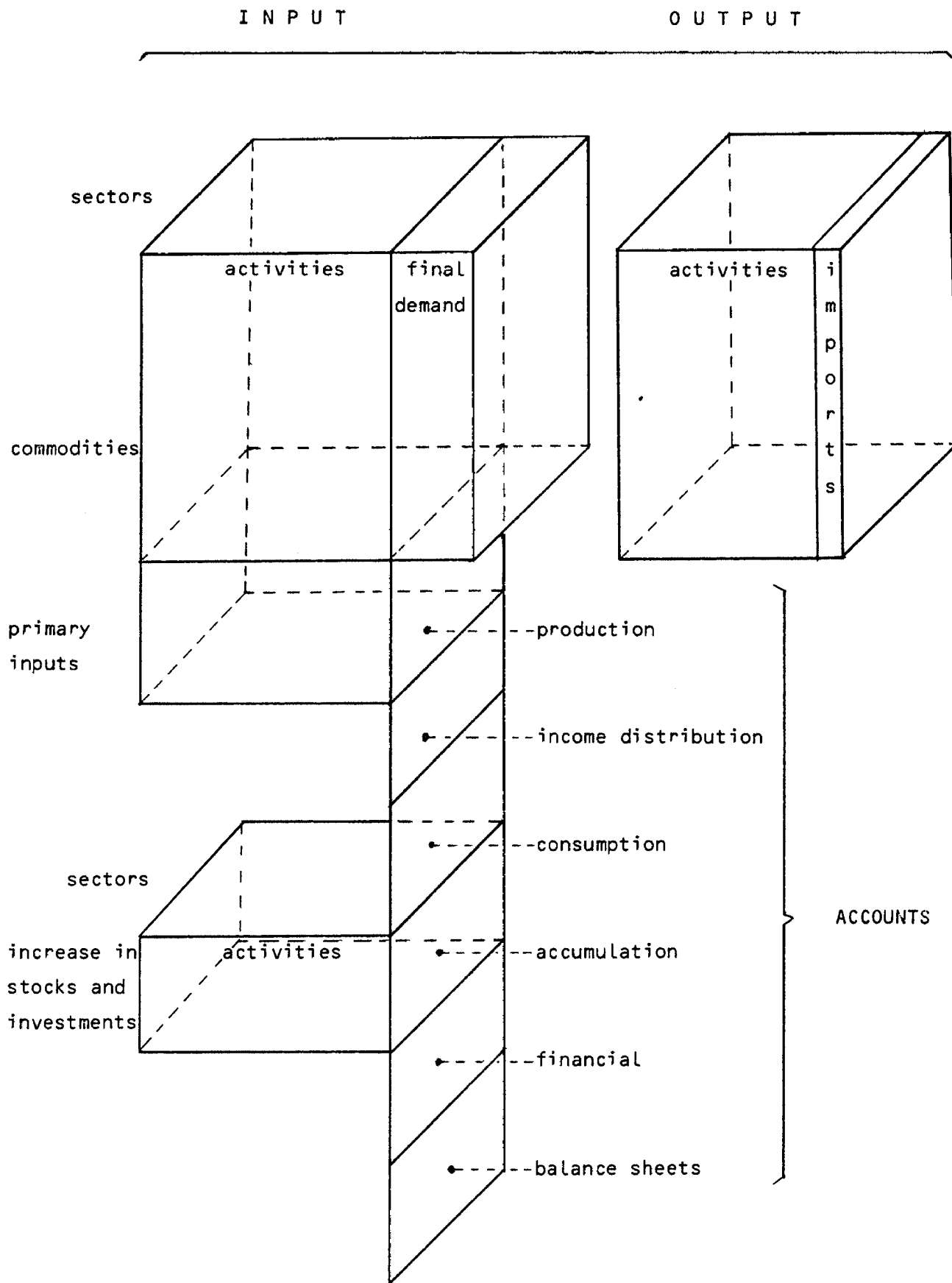
Investments

For the analysis of the process of production and income formation, capital goods used in this process are important. These capital goods therefore have to be described with the aid of a classification by the activity where they are employed. On the other hand, financial means are invested in the capital goods used. A description of the appropriation of financial means should therefore be specified by sector. This far, the required description fits in the scheme of the previous section, as the same classifications by economic actors are used. If the only change in capital goods is the addition of new investment goods and if every ENT only acquires these goods to use them in the production processes in the EST's which they comprise, this description too is easy to fit into the scheme. This is because, just as in the case of increase in stocks, only the columns for investment per sector have to be classified by activity in this case. In this specification, exactly the same groups of EST's per activity and per sector are created for investment. This can be illustrated by extending figure 3 to figure 5, where the specification of both the increase in stocks and the investments by activity and by sector are presented as a specification of the accumulation account, so that a direct link is made with the block of intermediary and primary costs.

It should be mentioned that in practice, it is not all as easy as this. Capital goods are sometimes rented, so that they are no longer necessarily used in the production processes of the EST's which belong to the ENT and sometimes are not even used in the same sector as that whose financial means are invested in these goods. On the face of it, it would seem that this problem could be solved by introducing a commodity group "rent of capital goods" in what this paper describes as the operational description. If the information is transformed to a classification desired on theoretical grounds, this commodity group will have to be translated into terms of capital goods in use in the EST's. A second practical complication is that capital goods from previous production processes change ownership and - unconnected with this - may even switch between EST's where they are used for the production process. This requires a much more extensive recording of capital goods still present from earlier years in order to be able to present a picture of the use of capital goods in the production processes of the EST's.

Complete elaboration of the latter is beyond the scope of the present paper. However, our discussion should suffice to demonstrate that in our approach to dual sectoring it is quite possible to record capital goods both by the economic activity where they are used and by financing sector.

Figure 5. TREATMENT OF INCREASE IN STOCKS AND INVESTMENTS



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