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Socio-Economic Studies with Social Accounting and Sociodemographic Matrices. An application to Portugal.

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SOCIO-ECONOMIC STUDIES with SOCIAL ACCOUNTING and SOCIO-DEMOGRAPHIC MATRICES. An application to Portugal.

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Abstract

In looking for empirical evidence about the activity of countries, a proposal is made for studying (measuring and modelling) the activity of countries through the use of Social Accounting Matrices (SAMs) and Socio-Demographic Matrices (SDMs).

SAMs and SDMs are presented as tools that have specific features for conducting studies in several different areas, as well as for supporting policy decision processes.

Based on methodological principles that are derived mainly from the works of Richard Stone, emphasis is placed on the desirability of working in a matrix format, which includes not only people (SDM), but also, at the same time, activities, products, factors of production and institutions (SAM). This is considered to be a way of capturing the relevant network of linkages and the corresponding multiplier effects, which can be used for the subsequent modelling of the activity of the countries studied.

A method will be proposed for the construction of these matrices. In the case of the SAMs, it is proposed that their design and construction should adopt, at least as their starting point, the latest version of the System of National Accounts (2008 SNA) and the corresponding results of its adoption/adaptation by different countries.

The exposition of this proposal is accompanied by an example applied to Portugal.

Key words: Social Accounting Matrix; National Accounts, Socio-Demographic Matrices.

JEL classification: C82; E16; E61; J11.

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CONTENTS

1. Introduction

The Social Accounting Matrix (SAM) and the Socio-Demographic Matrix (SDM) are tools that have specific features intended for studying the activity of countries. Both matrices cover movements in time and space, which are expressed by the former matrix in units of currency and by the latter matrix in terms of human beings.

Such features allow for the reading and interpretation of the reality under study, leading to the production of an empirical work that is not only capable of highlighting specific aspects of that activity, but also offer the chance to experiment with different interventions in regard to its functioning.

A proposal will be made for the development both of a basic SAM and of a standard SDM. Together with an explanation of possible alternative taxonomies, this presentation will show how those matrices can be used as an alternative support for studies being undertaken in several areas, as well as for the work of those taking part in the policy decision process. Underlying the application that will be made in order to illustrate this presentation is a reality whose interpretation will not extend beyond a number of examples explaining how those matrices can be used in those cases.

By stating that our knowledge of the activity of countries involves the use of national and demographic accounts, Section 2 justifies the decision to use the national and the demographic accounts, as well as the matrix form for studying the empirical evidence of that same activity.

Section 3 adopts a methodological framework that is based on Richard Stone's works outlining the main features of the SAM and SDM-based approaches. According to this methodological framework, SAMs and SDMs can describe the activity of countries either empirically or theoretically, depending on whether they are presented in a numerical or an algebraic version, respectively.

Adopting the above-mentioned methodological framework, and based on the latest version of the System of National Accounts (2008 SNA), Section 4 presents a proposal for a SAM structure, beginning with a basic structure and then showing its potentialities for further development. Firstly, Section 4.1 presents a basic structure and emphasises the need to ensure its consistency with the whole system. Such emphasis is then reinforced through the analysis of possible disaggregations and extensions to that basic structure (Section 4.2). Section 4.3 discusses the different forms of analysis made possible by the use of aggregates, indicators and balancing items that can be calculated from such a version and which lie outside the matrix format. In order to test the feasibility of adopting this proposal for different countries, an application is made of the construction of a numerical SAM to Portugal.

In turn, following the methodological framework introduced by Section 3, Section 5 presents a SDM structure, beginning with a standard structure (as proposed by Richard Stone), and then showing possibilities for further developments. In keeping with what was done in Section 4, an application is made of the construction of a numerical SDM for Portugal.

Although both the SAM-based and SDM-based approaches make it possible to work with numerical versions and algebraic versions (models), greater attention will be paid to the construction of the numerical versions of both matrices – with the inclusion of more details and applications. Nonetheless, some works devoted to the modelling of those matrices will also be referred to. On the other hand, because the SDM is a very recent field of research for the author of this paper, this matrix is not developed in so much detail as the SAM, despite the many common aspects that are shared between them both.

Section 6 systematises the main ideas of the other sections and makes some concluding remarks in an attempt to illustrate to what extent countries can use SAMs and SDMs to study (socio-) economic systems and support their policy decision processes.

2. Looking for empirical evidence about the activity of countries

Statistics record facts. The activity of a country is a series of facts. Therefore, any attempt to gain knowledge of those facts calls for the use of statistics. However, the complexity of such activity and the innumerable facts and statistics that serve to record it frequently make this task rather difficult, and sometimes render our efforts unfeasible. The challenge lies in defining the best hierarchy of facts, identifying the correct network of linkages between them, ensuring the availability of statistics and making use of good working tools. Those working tools should enable us to read the reality under study and to produce an empirical work that is not only capable of highlighting specific aspects of that activity, but also offers the chance to simulate different interventions in regard to its functioning. In his preface to the book "Understanding National Accounts", Giovannini, E. states: "(…) today's national accounts are the core of a modern system of economic statistics, and they provide the conceptual and actual tool to bring coherence to hundreds of statistical sources available in developed countries" (Lequiller F., Blades D., 2006: 3). If we accept the truthfulness of this statement, then a plausible statistical base source of information for studying the part of the activity of a country that can be expressed in currency units ought to be its national accounts. But such activity also depends greatly on the population of that country, whose movements are expressed in terms of human beings. The base source for this latter information will therefore be the demographic accounts, more commonly known as demographic statistics. This methodology can also be applied to countries that

are not normally considered to be developed, but which nonetheless seek to produce national accounts. However, although this is not so evident with the demographic accounts, we should bear in mind that underlying the national accounts is a system that defines which facts should be observed and how these same facts should be recorded. The existence of such a system will certainly influence the challenge outlined above. Even so, we will adopt the national accounts as our starting point.

On the other hand, working with the (national and demographic) accounts in a matrix format can be seen as a convenient way of considering the above-mentioned network of linkages existing between facts about the activity of countries, which will thus help us to achieve greater analytical content. The matrix format will also allow for the use of matrix algebra in possible mathematical treatments associated with the above-mentioned empirical work, enabling us to experiment with different interventions in regard to the functioning of reality. Some other advantages to be gained from the use of the matrix format will be identified below.

In looking for empirical evidence about the activity of countries, our proposal for a SAM will therefore make use of the specific hierarchy of the facts that are supposedly observed through the system of national accounts. In order to better achieve the same purpose, a SDM that makes use of the hierarchy of the facts observed through the demographic accounts will also be proposed. This will make it possible to identify networks of linkages that can be worked upon with different purposes in mind, always operating within a macro framework. Based upon that work, which exhaustively explores the features of the national accounts and their underlying system, as well as those of the demographic accounts, further work can be carried out, discovering alternative hierarchies of facts, identifying the existence and importance of the non-observed facts, and criticising the way in which the observed facts are recorded, etc.

As the behaviour of facts is explained by theories, our empirical work will also allow us to either test or better define these theories.

3. Approaches based on Social Accounting Matrices (SAMs) and Socio-Demographic Matrices (SDMs)

Richard Stone worked largely with SAMs and SDMs as matrix formats of the national and demographic accounts. Besides numerical versions, he identified algebraic versions of those same matrices, which were worked on mainly under the scope of input-output analysis. In keeping with that work, and due to their similarities, we will call the approach based on SAMs the SAM-based approach – the term that is normally adopted – and the approach based on SDMs the SDM-based approach – a term that is not normally adopted, but which will be used here.

Following the work of Richard Stone, Graham Pyatt and Jeffrey Round in particular played a key role in the study and dissemination of the SAM-based approach.

In the foreword to the book that can now be regarded as a pioneering work in terms of the SAM-based approach, "Social Accounting for Development Planning with special reference to Sri Lanka", Stone stated that the framework of the system of national accounts can be rearranged and "the entries in a set of accounts can be presented in a matrix in which, by convention (…), incomings are shown in the rows and outgoings are shown in the columns; and in which, reflecting the fact that accounts balance, each row sum is equal to the corresponding column sum". That matrix, with an equal number of rows and columns, is the SAM, in the construction of which "it may be possible to adopt a hierarchical approach, first adjusting the entries in a summary set of national accounts and then adjusting subsets of estimates to these controlling totals". (Pyatt and Roe, 1977: xix, xxiii).

In turn, in the abstract to his article "A SAM approach to modeling", Pyatt says: "Given that there is an accounting system corresponding to every economic model, it is useful to make the accounts explicit in the form of a SAM. Such a matrix can be used as the framework for a consistent dataset and for the representation of theory in what is called its transaction form". In that transaction form (or TV (transaction value) form), the SAM can be seen "(…) as a framework for theory" and its cells "(…) can be filled instead with algebraic expressions, which describe in conceptual terms how the corresponding transaction values might be determined". Thus, the SAM is used as "the basic framework for model presentation". (Pyatt, 1988: 327; 337).

Looking at the question from the perspectives outlined above, it can be said that a SAM can have two versions: a numerical version, which describes the activity of a country empirically; and an algebraic version, which describes that same activity theoretically. In the former version, each cell has a specific numerical value, with the sums of the rows being equal to the sums of the columns. In the latter version, each cell is filled with algebraic expressions that, together with those of all the other cells, form a SAM-based model, the calibration of which involves a replication of the numerical version.

In the words of Pyatt, "the essence of (...) the SAM approach to modelling is to use the same SAM framework for both the empirical and the theoretical description of an economy". (Pyatt, 1988: 337). In 1953, with the first and most fundamental contribution written by Stone, the United Nations recommended the System of National Accounts (SNA), which continued to be published in successive versions until 2008. Also working on the last two versions of that system, published in 1993 and 2008, were, besides the United Nations, the International Monetary Fund, the World Bank, the Organisation for Economic Cooperation and Development and the Statistical Office of the European Communities (Eurostat). Together, they formed the Inter-Secretariat Working Group on National Accounts (ISWGNA).

This system establishes the rules for measuring the activity of countries or groups of countries, which, in turn, have been adopted and adapted to specific realities by the corresponding statistical offices.

The construction of algebraic versions (or SAM-based models) can be seen, among others, in Pyatt (2001; 1988), Pyatt and Roe (1977), Pyatt and Round (1985; 2012) and Santos (2010; 2009).

In their latest article, Pyatt and Round (2012) explore and derive conditions for a phenomenon that they identify as distributional invariance within a SAM-based model. That phenomenon, which they also call "the Stone phenomenon", is associated with the study of a component of the multiplier effects identified during research into the interrelationship between the structure of production and the distribution of income in the context of economic development. The implications of those conditions were identified by the authors in the design of SAMs and in the consequent quality of results generated via subsequent modelling. Consequently, they conclude by appealing for renewed efforts to be made in the design and construction of SAMs with a view to obtaining a more realistic starting point for subsequent modelling.

 The SAMs used in the works of reference written about the SAM-based approach were constructed to deal with specific realities. They were created by teams with access to primary sources of information, and were designed according to each specific case. However, there are many cases in which the SAM-based approach is adequate for proceeding with certain studies, even when access to primary sources of information is not feasible and teams are not available. In view of these circumstances, special attention has been paid by the author to the construction of numerical versions of SAMs from the SNA, a subject which will be examined in Section 4.

Despite the potentialities of Stone's work on SDMs, the SDM-based approach has not been followed by other authors as much as the SAM-based approach. Thus, the study of the SDM-based approach will be based only on Stone's works.

According to this author, the population of a specific country in a specific year "flows in partly along time from last year, through survival, and partly along space from the outside world, through birth and immigration; and flows out, through death and emigration, and partly along time into next year, through survival" (Stone, 1986: 21). With the survivors from the preceding period constituting the opening stock of the population and the survivors into the succeeding period constituting the closing stock, the SDM can thus be considered a stock-flow matrix.

By connecting "the opening and closing stocks of year θ with flows during year θ" (Stone, 1982: 292), two types of versions will be identified for the SDM: numerical versions, in which each cell has a specific numerical value; and algebraic versions, in which each cell is filled with algebraic expressions that, together with those of all the other cells, form a SDM-based model.

Numerical versions of SDMs can thus be constructed from demographic statistics or they can be replicated by the running of SDM-based models. The former versions measure the reality under study and will be examined in Section 5. The latter versions allow for the construction of scenarios resulting from experiments performed with those models, and can be seen in: Stone, 1966, 1971, 1973, 1975, 1981, 1982, 1985, 1986a.

SDM-based models and the combination of SAM and SDM-based approaches will be part of this author's future research work.

4. Constructing SAMs from the SNA.

The latest versions of the SNA have devoted a number of paragraphs to discussing the question of SAMs. The 2008 version mentions SAMs in Section D of its Chapter 28, entitled "Input-output and other matrix-based analysis" (ISWGNA, 2009: 519-522), in which a matrix representation is presented of the accounts identified and described in the whole SNA. This representation is not, however, to be identified with the SAM presented in this paper, although they both cover practically all the flows recorded by those accounts.

In turn, the European System of National and Regional Accounts in the European Union of 2010[2] (the adaptation for Europe of the 2008 version of the SNA) makes a reference to the SAM, stating that, among other features, it can be thought of as an expanded system of labour (satellite) accounts (Chapter 22).

The SAM that will be presented below results from the work that the author has undertaken within the methodological framework presented in Section 3, based especially on the works of Graham Pyatt and his associates (Pyatt, 1988 and 1991; Pyatt and Roe, 1977; Pyatt and Round, 1985 and 2012), as well as from the efforts made to reconcile that framework with what has been defined by (the successive versions of) the SNA (Pyatt, 1985 and 1991a; Round, 2003; Santos, 2009). Thus, the author will propose a version of the SAM that seeks to be as exhaustive as possible regarding the flows observed by the SNA. Pyatt (1999) and Round (2003) also approach this same issue with the use of their own versions.

The following proposal will be accompanied by the applications made of the SAM to Portugal in 2009. In that year, the Portuguese national accounts adopted the European System of National and Regional Accounts in the European Community of 1995 – the adaptation for Europe of the 1993 version of the SNA. Because the general differences between the accounts identified in those

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[2] EU Regulation No. 549/2013 of the European Parliament and of the European Council of 21 May 2013, on the European system of national and regional accounts in the European Union – Official Journal of the European Union, L174, Volume 56, 26 June 2013.

applications and described in the 1993 and 2008 versions of the SNA are not significant, they will be used to illustrate the following exposition.

Thus, returning to the description provided in Section 3, a square matrix will be worked upon, in which the sum of the rows is equal to the corresponding sum of the columns. In keeping with what is conventionally accepted, and after some adjustments have been made to adapt this to the SNA, resources, incomes, receipts or changes in liabilities and net worth will be represented in the entries made in the rows, while uses, outlays, expenditures or changes in assets will be represented in the entries made in the columns. Each flow will therefore be recorded only once, in a cell of its own. The following description will be made in accordance with the 2008 SNA.

The starting point for the construction of a numerical SAM should be its design, i.e. the classification or taxonomy of its accounts. That taxonomy and the levels of disaggregation adopted will depend on the purposes for which the SAM is to be used, as well as on the way that the available information is organised. Adopting the national accounts as the base source of information, a basic structure is proposed below, which takes into account the underlying SNA and highlights the consistency of the whole system. The flexibility of that basic structure will be shown, together with the possibilities that it presents for characterising problems and for achieving specific purposes. These will also be seen as possibilities for going beyond the SNA, which is considered as a starting point, as mentioned in Section 2.

In this respect, we are aware of the dangers associated with the adoption of international standards and systems of classification and their failure to recognise important issues and realities. This problem is also mentioned by Pyatt and Round when they consider the choice of taxonomies within a SAM framework and the strategic influence that these can have on the potential usefulness of subsequent applications. According to those authors: "the taxonomies that are embedded within [the SAM framework] predetermine what any subsequent modelling exercise might have to say in response to specific distributional questions" (Pyatt and Round, 2012: 270).

4.1. **The SAM's basic structure**

Adopting the working method recommended by Stone in the second paragraph of Section 3 of this paper, the basic structure for the SAM presented here will be a summary set of the national accounts and the controlling totals for the other levels of disaggregation, which will later be analysed in Section 4.2. Thus, in keeping with the conventions and nomenclatures defined by the SNA, besides a rest of the world account, the proposed SAM will also include both production and institutional accounts.

Table 1 shows the above-mentioned basic structure, representing the nominal transactions ("t") with which two indexes are associated. The location of these transactions within the matrix framework is

described by those indexes, the first of which represents the row account while the second represents the column account. Each cell of this matrix will be converted into a submatrix, with the number of rows and columns corresponding to the level of disaggregation of the row and column accounts. This same table also identifies blocks, which are submatrices or sets of submatrices with common characteristics. The specification of these blocks will be made below and involves an identification of the flows of the National Accounts, which will continue to be the same even if some disaggregation is performed – thereby preserving the consistency of the whole system.

Table 1. The Basic SAM by blocks

	p	*a*	f	dic	dik	dif	rw	total
p – products	TTM $(t_{p,p})$	IC $(t_{p,a})$	0	FC $(t_{p,dic})$	GCF $(t_{p,dik})$	0	EX $(t_{p,rw})$	AD $(t_{p.})$
a – activities	P $(t_{a,p})$	0	0	0	0	0	0	VPT $(t_{a.})$
f – factors	0	CFP_GAV $(t_{f,a})$	0	0	0	0	CFP $(t_{f,rw})$	AFIR $(t_{f.})$
dic – (domestic) institutions' current account	NTP $(t_{dic,p})$	NTA $(t_{dic,a})$	CFP_GNI $(t_{dic,f})$	CT $(t_{dic,dic})$	0	0	CT $(t_{dic,rw})$	AI $(t_{dic.})$
dik – (domestic) institutions' capital account	0	0	0	S $(t_{dik,dic})$	KT $(t_{dik,dik})$	NLB $(t_{dik,dif})$	KT $(t_{dik,rw})$	INVF $(t_{dik.})$
dif – (domestic) institutions' financial account	0	0	0	0	0	FT $(t_{dif,dif})$	FT $(t_{dif,rw})$	TFTR $(t_{dif.})$
rw – rest of the world	IM&NTP $(t_{rw,p})$	NTA $(t_{rw,a})$	CFP $(t_{rw,f})$	CT $(t_{rw,dic})$	KT $(t_{rw,dik})$	FT $(t_{rw,dif})$	0	TVRWP $(t_{rw.})$
total	AS $(t_{.p})$	VCT $(t_{.a})$	AFIP $(t_{.f})$	AIP $(t_{.dic})$	AINV $(t_{.dik})$	TFTP $(t_{.dif})$	TVRWR $(t_{.rw})$	

Source: Santos (2009; 2010)

Note: The first three accounts (p = products (or goods and services), *a* = activities (or industries) and f = factors (of production)) are the production accounts of the economy and the next three accounts (dic = current; dik = capital; dif = financial) are the accounts of the (domestic) institutions. The last account (rw = rest of the world) represents the "outside" part of the (domestic) economy.

Description of the blocks (included in the texts are letters followed by numbers between brackets, which are the flow codes of the National Accounts, in accordance with the 2008 SNA):

a) Production – P (cell: $t_{a,p}$; basic prices) – represents the output of goods and services (P1).

b) Domestic Trade is represented by the value of domestically transacted products, which can be either domestically produced or imported.

b.1) Intermediate Consumption – IC (cell: $t_{p,a}$; purchasers' prices) – consists of the value of the goods and services consumed as inputs by a process of production, excluding those fixed assets whose consumption is recorded as consumption of fixed capital (P2).

b.2) Final Consumption – FC (cell: $t_{p,dic}$; purchasers' prices) – consists of the expenditure incurred by resident institutional units on goods or services that are used for the direct satisfaction of individual needs or wants, or the collective needs of members of the community (P3).

b.3) Gross Capital Formation – GCF (cell: $t_{p,dik}$; purchasers' prices) – includes gross fixed capital formation, changes in inventories, and acquisitions less disposals of valuables (P5).

c) External Trade includes the transactions in goods and services from non-residents to residents, also known as imports (P7), or IM (cell: $t_{rw,p}$; purchasers' prices), and the transactions in goods and services from residents to non-residents, also known as exports (P6), or EX (cell: $t_{p,rw}$; purchasers' prices).

d) Trade and Transport Margins – TTM (cell: $t_{p,p}$) – amounts to zero and, when it is disaggregated and takes the form of a submatrix, it allocates the output of the trade and transport services used in the domestic trade to the supplied products.

e) Net taxes on production and imports

e.1) Net Taxes on Production – NTA (cells: $t_{dic,a}$; $t_{rw,a}$) – represents the (other) taxes on production (D29) minus the (other) subsidies to production (D39).

e.2) Net Taxes on Products – NTP (cells: $t_{dic,p}$; $t_{rw,p}$) – represents the taxes on products (D21) minus the subsidies on products (D31).

f) Compensation of Factors of Production – CFP (cells: $t_{f,a}$; $t_{dic,f}$; $t_{f,rw}$; $t_{rw,f}$) – consists of the income of the institutional sectors originating from the compensation of employees (D1) and the compensation of employers and own-account (or self-employed) workers, and the compensation of capital, including property income (D4; B2g-B3g). The functional distribution is represented by the Gross Added Value – GAV (cell: $t_{f,a}$), whereas the institutional distribution is represented by the Gross National Income – GNI (cell: $t_{dic,f}$).

g) Current Transactions – CT (cells: $t_{dic,dic}$; $t_{dic,rw}$; $t_{rw,dic}$) – includes: current taxes on income, wealth, etc. (D5); net social contributions (D61); social benefits other than social transfers in kind (D62); other current transfers (D7); and the adjustment made for the change in pension entitlements (D8).

h) Capital Transactions – KT (cells: $t_{dik,dik}$; $t_{dik,rw}$; $t_{rw,dik}$) – includes: capital taxes (D91); investment grants (D92); other capital transfers (D99); and acquisitions less disposals of non-financial non-produced assets (NP1-3).

i) Financial Transactions – FT (cells: $t_{dif,dif}$; $t_{dif,rw}$; $t_{rw,dif}$) – includes: monetary gold and special drawing rights (F1); currency and deposits (F2); debt securities (F3); loans (F4); equity and investment fund shares (F5); insurance, pension and standardised guarantee schemes (F6); financial derivatives and employee stock options (F7); and other accounts receivable/payable (F8).

j) Gross Saving – S (cell: $t_{dik,dic}$) **–** measures the portion of aggregate income that is not used for final consumption expenditure and current transfers to domestic institutions or to the rest of the world (B9g).

k) Net Borrowing/Lending – NLB (cell: $t_{dik,dif}$)

The net lending or borrowing of the total economy is the sum of the net lending or borrowing of the institutional sectors. It represents, respectively, the net resources that the total economy makes available to the rest of the world or the net resources that it receives from the rest of the world to finance the corresponding needs of investment funds (B9).

Here, those amounts are recorded in the row(s) of the capital account, i.e. as changes in liabilities and net worth, and in the column(s) of the financial account, i.e. as changes in assets. This is why the mathematical signs of this item have been changed in relation to the SNA.

The construction of a SAM is easier when it is performed by blocks.

The totals of each account represent the corresponding sums of the cells in rows and in columns, with the following description:

I. Products account (p): Aggregate Demand – AD, the row sum (cell: $t_{p.}$); Aggregate Supply – AS, the column sum (cell: $t_{.p}$).

II. Activities account (*a*): Production Value – VPT, the row sum (cell: $t_{a.}$); Total Costs – VCT, the column sum (cell: $t_{.a}$).

III. Factors of Production (f): Aggregate Factors Income (Received) – AFIR, the row sum (cell: $t_{f.}$); Aggregate Factors Income (Paid) – AFIP, the column sum (cell: $t_{.f}$).

IV. Current account of (domestic) institutions (dic): Aggregate Income (received) – AI, the row sum (cell: $t_{dic.}$); Aggregate Income (Paid) – AIP, the column sum (cell: $t_{.dic}$).

V. Capital account of (domestic) institutions (dik): Investment Funds – INVF, the row sum (cell: $t_{dik.}$); Aggregate Investment – AINV, the column sum (cell: $t_{.dik}$).

VI. Financial account of (domestic) institutions (dif): Total Financial Transactions (Received) – TFTR, the row sum (cell: $t_{dif.}$); Total Financial Transactions (Paid) – TFTP, the column sum (cell: $t_{.dif}$).

VII. Rest of the world account (rw): Value of Transactions to the Rest of the World (Paid) – TVRWP, the row sum (cell: $t_{rw.}$); Value of Transactions from the Rest of the World (Received) – TVRWR, the column sum (cell: $t_{.rw}$).

From the above description, two further advantages of the matrix presentation of the national accounts can be highlighted: each transaction represents a single entry and can be characterised by its position; each account is represented by a row and a column, whose balance is ensured by the equality of their sums.

The Integrated Economic Accounts Table is equivalent to a summary of what is observed by the SNA. According to the 2008 SNA: "The integrated economic accounts use (…) three of the conceptual elements of the SNA (...) [institutional units and sectors, transactions, and assets and liabilities] together with the concept of the rest of the world to form a wide range of accounts. These include the full sequence of accounts for institutional sectors, separately or collectively, the rest of the world and the total economy…. This table shows, simultaneously, the general accounting structure of the SNA and presents a set of data for the institutional sectors, the economy as a whole and the rest of the world" (ISWGNA, 2009: 23; 29). Based on this table and the previous description (adapted to the previous version of the SNA), it was possible to construct the basic SAM presented in Table 2, representing the highest possible level of aggregation of the activity of Portugal observed by the national accounts in 2009.

Table 2. Basic SAM of Portugal in 2009

(Unit: 10^6 euros)

	p	*a*	f	dic	dik	dif	rw	total
p – products	0	162 661		146 934	34 051		47 236	390 882
a – activities	311 365							311 365
f – factors		149 403					9 039	158 443
dic – (domestic) institu-tions' current account	19 694	522	141 423	85 711			4 581	251 931
dik – (domestic) institu-tions' capital account				15 865	1 536	16 222	2 232	35 856
dif – (domestic) institu-tions' financial account						36 659	37 209	73 868
rw – rest of the world	59 823[a]	- 1 222	17 019	3 421	268	20 987		100 297
total	390 882	311 365	158 443	251 931	35 856	73 868	100 297	

Sources: Statistics Portugal *(INE);* Portuguese Central Bank *(Banco de Portugal).*

[a] 59 717 (imports) + 106 (net taxes on products sent to the institutions of the European Union)

Considering the description given about Table 1, and based on the reading of the products account in Portugal in 2009, represented in Table 2 – row and column p, the main components of the aggregate demand and supply of the goods and services transacted in the market and captured by the Portuguese National Accounts, can be identified in millions of euros. Thus, reading in rows, the total aggregate demand of 390,882 million euros was composed of 162,661million euros of intermediate consumption, 146,934 million euros of final consumption, and 34,051 million euros of gross capital formation and 47,236 million euros of exports. Reading in columns, the total aggregate supply of 390,882 million euros (equal to the total aggregate demand) was composed of 311,365 million euros from the output of goods and services, 19 694 million euros of net taxes on products received by the Portuguese Government and 59,717 million euros of imports and 106 million euros of net taxes on products sent to the institutions of the European Union. A similar reading can be made for each of the other columns and rows of Table 2 for Portugal.

Therefore, as mentioned above, and again using the words of Stone, the basic SAM that has just been described can be considered as the most aggregate "summary set of national accounts", representing a first level of the intended hierarchical method, with all the controlling totals for the next level of that hierarchy. From here the consistency of the whole (supposedly) observed system can be ensured.

From the above description, two further advantages of the matrix presentation of the national accounts can be highlighted: each transaction represents a single entry and can be characterised by its position; each account is represented by a row and a column, whose balance is ensured by the equality of their sums.

4.2. **Disaggregations and extensions**

Since the national accounts cover all the details covered by the basic structure presented above, some other levels of the above mentioned-hierarchical method can be identified within the national accounts, providing other controlling totals for greater levels of disaggregation. As will be seen below, this disaggregation can be made at the levels of the production, institutional and rest of the world accounts, either within the scope of the SNA conventions or not. Reverse reasoning can be applied to the case of aggregation. Therefore, in addition to the already-mentioned advantages of presenting the national accounts in the form of a matrix, it is also possible to make an easier aggregation and disaggregation of the accounts, in accordance with the specific requirements of the exercise and the available information, without losing the consistency of the system.

In the words of Round, in his Foreword to Santos (2009): "The key to constructing a useful SAM and developing an effective SAM-based model is the SAM design. A SAM need not be dimensionally large as long as it represents the most significant features of economy-wide interdependence. More precisely, this means designing the SAM so that the key sectors, markets and institutions are as fully represented as is practicable. Estimation of the transactions between accounts is obviously also important but this needs to go in tandem with the SAM design" (Santos, 2009: xiv).

It is also worth mentioning that, although the quarterly national accounts are not as complete as the annual ones, it will nonetheless be possible to make some further disaggregations from these accounts in terms of time.

Furthermore, disaggregations can be made in terms of space, since regional accounts are also considered. In that case, it is possible to work with regions and countries, either individually or as a group. Round (1991; 1994), for example, experimented with the case of Europe. It would even be possible to think in world terms, if the SNA could be adopted worldwide.

Extensions are also possible, either from the national accounts or from other sources of information, with the convenient adjustment to, or connection with, the whole system in order to maintain its consistency.

The 2008 SNA dedicates its Chapter 29 to "Satellite accounts and other extensions" (ISWGNA, 2009: 523-544)[3], where the main idea is to serve specific analytical purposes, in a way that is consistent

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[3] The 2010 ESA dedicates its Chapter 22 to that same subject (see footnote 1).

with the central framework, although not fully integrated into it (ISWGNA, 2009: 37-38). In this respect, the author would like to support Steven Keuning and Willem Ruijter's idea of a "complete data set" which "could be tentatively labelled: a System of Socio-economic Accounts" (Keuning and Ruijter, 1988: 73).

4.2.1. Production accounts

In the basic structure proposed in Section 4.1, the production accounts are the accounts of products, activities and factors of production. These accounts correspond respectively to the SNA accounts of goods and services, production and the primary distribution of income. Thus, within these accounts and depending on the available level of disaggregation, it can be seen how the available products are used, with some details being provided about the process of production and about the way in which the incomes resulting from that process and the ownership of assets are distributed among institutions and activities.

The SNA uses the Central Product Classification (CPC) Version 2 (completed in December 2008) to classify products (ISWGNA, 2009: 19), which are organised into 10 sections, with it being possible to go as far as the fifth level of disaggregation within each of these.

In turn, the International Standard Industrial Classification of All Economic Activities (ISIC) Revision 4 (officially released in August 2008) is used to classify activities (ISWGNA, 2009: 20), organised into 23 sections, the disaggregation of which is perfectly consonant with that of the product classification. The Supply and Use Table provides this information, usually at an intermediate level of disaggregation.

As described above, in the characterisation of the block representing the compensation of the factors of production, the disaggregation that can be made from the already mentioned tables of the national accounts is between labour (or the compensation of employees) and what has been referred to as the compensation of other factors, which includes the compensation of employers and own-account (or self-employed) workers, and the compensation of capital, namely property income. Such information can only be derived from the Integrated Economic Accounts Table if the products and activities accounts are not disaggregated, or from the Supply and Use Table if those same accounts are disaggregated. Table 3, which contains the above-mentioned application to Portugal, in which the products and activities accounts are not disaggregated, presents the possible disaggregation of the factors of production accounts based on the Integrated Economic Accounts Table.

Regarding the design of SAMs and in order to establish a connection between the taxonomies dealt with in this section and in the next, it should be mentioned that in their latest work, besides a rest of the world account, Pyatt and Round identify accounts for goods and non-factor services and factor

services, as well as, accounts for institutions. In the latter, they identify private and public sector current accounts and combined capital accounts. About this classification, they say the following: "taxonomies for goods and services serve to distinguish different markets and should therefore be constructed in ways that recognise significant market failures and segmentation. In contrast, the institutions within the private sector are differentiated by the assets they own (or do not own…) and the productive activities they are responsible for…. Factors of production and the assets that provide them are therefore the defining feature of institutions." (Pyatt and Round, 2012: 268).

4.2.2. Institutions and Rest of the World accounts

In the basic structure proposed in Section 4.1, the domestic institutions are divided into current, capital and financial accounts. These accounts correspond, respectively, to the following SNA accounts: secondary distribution of income, redistribution of income in kind and use of income; capital; and financial accounts. Within these accounts, depending on the level of disaggregation available, the current accounts show how the national income is transformed into disposable income through the receipt and payment of current transfers, and how the latter is distributed between final consumption and saving. In turn, the capital account records the transactions linked to acquisitions of non-financial assets and capital transfers involving the redistribution of wealth, whereas the financial account records the transactions in financial assets and liabilities between institutional units, and between these and the rest of the world.

All the linkages between the domestic economy and the rest of the world, i.e. all the transactions between resident and non-resident units, are recorded both in the SAM and in the SNA through the rest of the world account.

Chapter 4 of the 2008 SNA specifies the institutional sectors, including the rest of the world, and their possible disaggregation, which in some cases can be taken as far as the third level (ISWGNA, 2009: 61-85), although normally it cannot be taken beyond the first level. In the case of the rest of the world, such disaggregation will certainly depend on the country, or group of countries, that adopt and adapt this system[4].

At the first level of disaggregation, the accounts of the institutions, as well as the rest of the world account, are part of the Integrated Economic Accounts Table. Higher levels of disaggregation, whenever these are possible, are usually published in the separate accounts of institutions. Even at the first level of disaggregation, any work conducted with the institutional sectors when there are

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[4] In the case of the 2010 ESA (Chapter 23), a second level of disaggregation is made, with a distinction being drawn between Member States and institutions and bodies of the European Union and non-member countries and international organisations that are not resident in the European Union. For the former, the disaggregation can be made as far as the fourth level (see footnote 1).

transactions involving more than one row or column of the SAM also requires the so-called "from whom to whom matrices". These matrices make it possible to fill in the cells of the submatrices of transactions taking place within domestic institutions and between institutions and the rest of the world, recorded in the above-described blocks of current, capital, and financial transactions (Section 4.1 g-i). For the application to Portugal, the connection between the totals of the current transactions block of the SAM (Table 3) and the Integrated Economic Accounts Table (Appendix A) can be identified in Appendix B, with all its cells being filled in from the "from whom to whom matrices" of the transactions included in the block (current taxes on income, wealth, etc.; social contributions, etc.).

The disaggregation of specific institutional sectors makes it possible to analyse the most diverse aspects of the corresponding roles in the activity of countries (Santos (2004) and (2007) are examples of studies on the role of the general government and its subsectors – central government, local government and social security funds).

The detailed study of the specific accounts of domestic institutions and their corresponding transactions also makes it possible to analyse specific aspects of that same activity: the distribution and redistribution of income, using the current account; the redistribution of wealth, using the capital account; investment, its financing, and the implicit levels of the financing requirements and availability of the institutional sectors and the whole economy, using the capital and financial accounts.

In turn, the rest of the world account can provide many possibilities for studying the international economic relations of the domestic economy.

Table 3 presents the possible disaggregation of the institutions' current and capital accounts, made from the Integrated Economic Accounts Table and the "from whom to whom matrices", for the above-mentioned application. From that table, we can discover a little more about the reality under study – Portugal in 2009. This is the case with the aggregate factors income – the so-called primary distribution of income, to the amount of 158,443 million euros, in which it can now be seen that 86,127 million euros account for the compensation of employees – row and column 3, and 72,315 million euros account for the compensation of other factors of production, namely employers and own-account workers, land and capital (including property income) – row and column 4.

Through row 3 we can see that 85,888 million euros represent the part of the gross added value, generated in the domestic economy by residents and non-residents that is attributed to the compensation of employees, to which are added 239 million euros generated abroad by residents. In turn, row 4 shows that 63,515 million euros represent the part of the gross added value, generated in the domestic economy by residents and non-residents, that is attributed to the above-mentioned other

factors of production, to which are added 8,800 million euros generated abroad by residents. Rows 3 and 4 allow for the study of aspects related with the functional distribution of income.

Through column 3, we can see that 85,757 million euros represent the part of the gross national income, generated in the domestic economy and abroad by residents, that is attributed to the compensation of employees, to which are added 370 million euros generated in the domestic economy by non-residents and sent abroad. In column 4, we can see that 55,666 million euros is the part of the gross national income, generated in the domestic economy and abroad by residents, that is attributed to the compensation of other factors, to which are added 16,649 million euros generated in the domestic economy by non-residents and sent abroad. From the cells of columns 3 and 4, it is possible to study aspects related to the institutional distribution of income.

Just as the matrix form of the production accounts may be easily worked on from the supply and use tables, it would also be possible to work on the matrix form of the institutional accounts if some kind of "from whom to whom tables" were made official. This would be a crucial factor for implementing the SAM-based approach, in which SAMs with production and institutional accounts, conveniently capturing the circular flow of income and the underlying network of linkages, would form the basis for macroeconomic models capable of reproducing the multiplier processes implicit in the activity of countries.

Table 3. SAM of Portugal in 2009, with disaggregated factors of production and the (domestic) institutions' current and capital accounts

(Unit: 10^6 euros)

Outlays (expenditures) / Incomes (receipts)			PRODUCTION					INSTITUTIONS					
					FACTORS			CURRENT ACCOUNT					
			PRODUCTS	ACTIVITIES	Labour (employees)	Other	Total	Households	Nonfinancial corporations	Financial corporations	Government	NPISH	Total
			1	2	3	4		5	6	7	8	9	
PRODUCTION		PRODUCTS	1	0	162 661	0	0	0	106 206	0	0	37 160	3 568	146 934
		ACTIVITIES	2	311 365	0	0	0	0	0	0	0	0	0	0
	FACTORS	Labour (employees)	3	0	85 888	0	0	0	0	0	0	0	0	0
		Other	4	0	63 515	0	0	0	0	0	0	0	0	0
		Total		0	149 403	0	0	0	0	0	0	0	0	0
INSTITUTIONS	CURRENT ACCOUNT	Households	5	0	0	85 757	34 258	120 015	801	1 830	5 226	28 998	95	36 949
		Nonfinancial corporations	6	0	0	0	14 615	14 615	1 830	0	613	171	0	2 613
		Financial corporations	7	0	0	0	5 990	5 990	5 289	519	131	42	32	6 013
		Government	8	19 694	522	0	- 34	- 34	31 224	5 684	671	8	22	37 610
		NonProfitInstitutionsServing Households(NPISH)	9	0	0	0	837	837	324	154	50	1 997	0	2 525
		Total		19 694	522	85 757	55 666	141 423	39 468	8 187	6 690	31 215	150	85 711
	CAPITAL ACCOUNT	Households	10	0	0	0	0	0	13 728	0	0	0	0	13 728
		Nonfinancial corporations	11	0	0	0	0	0	0	8 903	0	0	0	8 903
		Financial corporations	12	0	0	0	0	0	0	0	5 283	0	0	5 283
		Government	13	0	0	0	0	0	0	0	0	- 11 695	0	- 11 695
		NonProfitInstitutionsServing Households(NPISH)	14	0	0	0	0	0	0	0	0	0	- 354	- 354
		Total		0	0	0	0	0	13 728	8 903	5 283	- 11 695	- 354	15 865
	FINANCIAL ACCOUNT		15	0	0	0	0	0	0	0	0	0	0	0
REST OF THE WORLD			16	59 823	- 1 222	370	16 649	17 019	1 345	240	110	1 726	0	3 421
TOTAL				390 882	311 365	86 127	72 315	158 443	160 747	17 331	12 082	58 407	3 363	251 931

Sources: Statistics Portugal *(INE);* Portuguese Central Bank *(Banco de Portugal).*

Table 3 (continued). SAM of Portugal in 2009, with disaggregated factors of production and the (domestic) institutions' current and capital accounts

(Unit: 10^6 euros)

Outlays (expenditures) / Incomes (receipts)			INSTITUTIONS							FINANCIAL ACCOUNT	REST OF THE WORLD	TOTAL
			CAPITAL ACCOUNT									
			Households	Nonfinancial corporations	Financial corporations	Government	NPISH	Total				
			10	11	12	13	14		15	16	
PRODUCTION		PRODUCTS	1	7 269	19 812	1 064	5 071	834	34 051	0	47 236	390 882
		ACTIVITIES	2	0	0	0	0	0	0	0	0	311 365
	FACTORS	Labour (employees)	3	0	0	0	0	0	0	0	239	86 127
		Other	4	0	0	0	0	0	0	0	8 800	72 315
		Total		0	0	0	0	0	0	0	9 039	158 443
INSTITUTIONS	CURRENT ACCOUNT	Households	5	0	0	0	0	0	0	0	3 783	160 747
		Nonfinancial corporations	6	0	0	0	0	0	0	0	103	17 331
		Financial corporations	7	0	0	0	0	0	0	0	79	12 082
		Government	8	0	0	0	0	0	0	0	615	58 407
		NonProfitInstitutionsServing Households(NPISH)	9	0	0	0	0	0	0	0	1	3 363
		Total		0	0	0	0	0	0	0	4 581	251 931
	CAPITAL ACCOUNT	Households	10	0	0	53	139	0	192	- 9 004	177	5 093
		Nonfinancial corporations	11	0	0	0	795	0	795	11 407	924	22 029
		Financial corporations	12	0	0	53	24	0	77	- 4 157	0	1 202
		Government	13	3	95	28	0	2	129	17 135	1 118	6 687
		NonProfitInstitutionsServing Households(NPISH)	14	0	0	0	344	0	344	840	14	844
		Total		3	95	135	1 301	2	1 536	16 222	2 232	35 856
FINANCIAL ACCOUNT			15	0	0	0	0	0	0	36 659	37 209	73 868
REST OF THE WORLD			16	- 2 179	2 122	3	315	8	268	20 987		100 297
TOTAL				5 093	22 029	1 202	6 687	844	35 856	73 868	100 297	

Sources: Statistics Portugal *(INE);* Portuguese Central Bank *(Banco de Portugal).*

4.3. **Aggregates, indicators and balancing items**

As was seen above, practically all the transactions of the national accounts are covered by the SAM, so that macroeconomic aggregates, indicators and balancing items can be identified from it (see the description of the cells or blocks in Table 1, as well as Tables 2 and 3 for the application to Portugal). Gross Domestic Product at market prices (GDP$_{pm}$), which is usually considered the main macroeconomic aggregate, can be calculated in the three known approaches:

Gross Domestic Product at market prices (GDP$_{pm}$), which is usually considered the main macroeconomic aggregate, can be calculated in the three known approaches:

- Production approach: GDP$_{pm}$ = P – IC + NTP = $t_{a,p}$ – $t_{p,a}$ + ($t_{dic,p}$+ (part of) $t_{rw,p}$);

- Expenditure approach: GDP$_{pm}$ = FC + GCF + Ex – IM = $t_{p,dic}$ + $t_{p,dik}$ + $t_{p,rw}$ – (part of) $t_{rw,p}$;

- Income approach: GDP$_{pm}$ = GAV + NTP + NTA = $t_{f,a}$ + ($t_{dic,p}$+ (part of) $t_{rw,p}$) + ($t_{dic,a}$ + $t_{rw,a}$).

The Portuguese GDP$_{pm}$ in 2009 was 168 504 * 10^6 euros, which can be calculated from these three approaches as follows:

- Production approach: GDP$_{pm}$ = 311 365 – 162 661 + (19 694 + 106);

- Expenditure approach: GDP$_{pm}$ = 146 934 + 34 051 + 47 236 – 59 717;

- Income approach: GDP$_{pm}$ = 149 403 + (19 694 + 106) + (522 – 1 222).

Domestic Product can be converted into National Product by adding the compensation of factors received from the rest of the world and deducting the compensation of factors and the net indirect taxes (on both products and production) sent to the rest of the world, when these exist. Thus, from the described cells of the basic SAM, GDP$_{pm}$ can be converted into Gross National Product at market prices (GNP$_{pm}$) or Gross National Income (GNI$_{pm}$), as follows: GDP$_{pm}$ + $t_{f,rw}$ – $t_{rw,f}$ – $t_{rw,a}$– (part of) $t_{rw,p}$. On the other hand, as the SAM directly provides Gross National Income, this can also be calculated just by adding the net indirect taxes (on both products and production) received by domestic institutions: $t_{dic,f}$ + $t_{dic,p}$ + $t_{dic,a}$. The corresponding amount for Portugal in 2009 is 161 639 * 10^6 euros, for which the underlying calculations are as follows: GNP$_{pm}$= 168 504 + 9 039 – 17 019 – (–1 222) – 106; GNI$_{pm}$= 141 423 + 19 694 + 522.

Disposable Income (Domestic or National) is also very important and can be calculated by adding to GNI$_{pm}$ the net current transactions received by domestic institutions: GNI$_{pm}$ + ((received)$t_{dic,dic}$+ $t_{dic,rw}$) – ((paid) $t_{dic,dic}$+ $t_{rw,dic}$). In our application to Portugal: 161 639 + (85 711 + 4 581) – (85 711 + 3 421) = 162 800 * 10^6 euros.

In turn, gross aggregates can be converted into net aggregates (and balancing items) by deducting the consumption of fixed capital, which lies outside the basic SAM but is part of the integrated economic accounts.

Gross Saving (S) and Net Lending or Borrowing (NLB) are given directly by the SAM, through $t_{dik,dic}$ and $t_{dik,dif}$, respectively, which in the case of Portugal in 2009 are: 15 865 and 16 222 * 10^6 euros. As explained in Subsection 4.1 - k), the latter amount represents Net Borrowing.

It is also possible to calculate structural indicators of the functional and institutional distribution of generated income, as well as indicators of the use of disposable income.

In the functional distribution of generated income, the distribution of gross added value – GAV – among the factors of production is given by the structure of the submatrix in cell $t_{f,a}$ of the basic structure, with its level of detail depending on the disaggregation of the activities (column account) and of the factors of production (row account). Table 4 shows the results for the applications to Portugal.

Table 4. Portuguese functional distribution of the income generated in 2009 (in percentage terms)

	%
Factors of Production (generated income = gross added value or gross domestic product)	
Labour (employees)	57.5
Other (employers and own-account workers; capital)	42.5
Total	100.0

Source: Table 3

In the institutional distribution of generated income, the distribution of gross national income – GNI – is given by the structure of the submatrix in cell $t_{dic,f}$ of the basic structure. In this case, the level of detail will depend on the disaggregation of the factors of production (column account) and of the current account of the domestic institutions (row account). Table 5 shows the results of our application.

Table 5. Portuguese institutional distribution of the income generated in 2009 (in percentage terms)

	Factors of Production		
	Labour (employees)	Other (employers and own-account workers; capital)	Total
Institutions (generated income = gross national income)			
Households	100.0	61.5	84.9
Non-financial corporations		26.3	10.3
Financial corporations		10.8	4.2
General government		- 0.1	0.0
Non-profit institutions serving households		1.5	0.6
Total	100.0	100.0	100.0

Source: Table 3

As described above for the whole economy, the disposable income of the institutional sectors can be calculated in the same way, and then its distribution and use can also be studied – see Table 6.

Table 6. Portuguese distribution and use of disposable income among institutions in 2009 (in percentage terms)

	Distribution of Disposable Income	Use of Disposable Income	
		Final Consumption Expenditure	Saving
Households	73.7	88.6	11.4
Non-financial corporations	5.5	---	100.0
Financial corporations	3.2	---	100.0
General government	15.6	145.9	- 45.9
Non-profit institutions serving households	2.0	111.0	- 11.0
Total	100.0	90.3	9.7

Source: Table 3

The main items in the revenue and expenditure of the institutional sectors and of the rest of the world can be calculated from the respective rows and columns of the SAM. In the case of institutional sectors, the total balancing item is the net lending/borrowing (NLB) of the respective institutional sector, with an opposite mathematical sign to the one registered in the SAM; the current balancing item is the respective gross saving (S); and the capital balancing item is the difference between the first and the second.

5. Constructing SDMs.

From what was stated in Section 3, just as in any SAM, time and space dimensions can also be identified in any SDM. With an equal number of rows and columns, in each SDM "in any period, the equality of inflows and outflows implies that the difference between the opening and the closing stocks is equal to the net inflow from the outside world" (Stone, 1986: 21). Thus, the SDM connects the opening and the closing stocks of year θ with the flows during the year θ.

In the standard stock-flow SDM, presented in Table 7, the state at New Year θ or $\theta+1$ refers to the position on the 1st of January each year.

Table 7: The standard SDM

(Unit: number of individuals)

State at New Year θ / State at New Year θ+1	Outside World	Our Country: Opening States	Closing Stocks
Outside World	α	d'	
Our Country: Closing States	b	S	Λn
Opening Stocks		n'	

Source: Stone (1981, 1982, 1986)

Key:

- α (scalar) = individuals who both enter and leave our country during year θ and so are not recorded in either the opening or the closing stock of that year (babies born in our country during year θ who die in our country or emigrate before the end of it; immigrants into our country during year θ who died in our country or emigrate before the end of it).

- d' (row vector) = individuals who leave our country during year θ and so are recorded in the opening stock but are not included in the closing stock (deaths and emigrants of year θ).

- b (column vector) = individuals who enter our country during year θ and so are recorded in the closing stock but are not included in the opening stock (births and immigrants of year θ).

- S (square matrix) = individuals who survive in our country through year θ and so are recorded in both the opening and the closing stocks (classified by their opening states in the columns and by their closing states in the rows).

- Λn (column vector) = closing stock in each state.

- n' (row vector) = opening stock in each state.

The taxonomic framework, within which each study is developed, will depend not only on its purposes, but also on the information available. The whole population must, however, be included. There is no doubt about the complexity of this work and the difficulty of obtaining credible and adequate statistical data.

As seen above, besides the opening and closing stocks, the SDM also quantifies (for each year) the flows of individuals, which are recorded under "our country: (opening or closing) states", defined in accordance with the taxonomic framework adopted. As far as those flows are concerned, adopting the words of Stone, "Each year individuals can enter a state in several ways: by survival in that same state from last year, by moving into it from a different state in the course of the year, by birth or by immigration; and they may leave it by survival into the year, by moving into another state during the year, by emigration or by death" (Stone, 1986: 22).

Active or passive sequences can be adopted within this framework. In the case of active sequences, different population groups can be identified, including those who are learning – schoolchildren and students; those who are earning – members of the labour force, who participate in the market; and the rest – all the educationally and economically inactive (in the sense that they do not participate in the labour market and do not produce goods and services transacted in the market). Passive sequences cover socio-economic groups, which may include such considerations as income, social class, family size, etc.

The identification of different age groups can be regarded as the necessary step to be taken before working with an active or a passive sequence.

In the following application to Portugal in 2009, in order to better deal with the above-mentioned complexity and to study the so-called economic activity of the population, two levels of disaggregation were identified. At the first level of disaggregation, the population was organised by age groups. At the second level of disaggregation, within each age group, the population was classified as either active or inactive, in accordance with their economic activity, understood as their participation both in the labour market and in the supply side of the goods and services market. With this process of organisation, the difficulty of obtaining data led, in some cases, to the adoption of estimates and assumptions in order to be able to complete the matrices. The hierarchical method, adopted in the previous section (for the construction of the SAM), was adopted. According to this method, each level of disaggregation has all the controlling totals for the next level of that hierarchy.

The specification of the sources and the methodologies adopted in the construction of the following SDMs are available in the Appendixes C and D.

Table 8: SDM of Portugal in 2009 – first level of disaggregation: by age group.

(Unit: 10^3 individuals)

State at 31/12/2008 / State at 31/12/2009		Outside World	Population in Portugal by age group				Closing Stock
			0-14	15-24	25-64	65 and over	
Outside World			5	5	25	81	10 638
Population in Portugal by age group	0-14	105	1 510				1 615
	15-24	10	110	1 070			1 190
	25-64	16		146	5 790		5 952
	65 and over	0			108	1 772	1 881
Opening Stock		10 623	1 625	1 221	5 924	1 853	

Source: Table D.

In the first age group of the population in Portugal in 2009, represented in Table 8 – column and row 0-14, we can see the stocks and the flows of children aged 0 to 14, measured in thousands of individuals. Thus, reading by columns, the opening stock of children was 1,625; of these, 4 died or emigrated, 1,510 remained in that age group throughout the year and 110 moved to the 15-24 age group. Reading by rows, the closing stock was 1,615, which is composed of 105 children surviving births and immigrants and 1,510 children who have not changed state. A similar reading can be made for each of the other columns and rows.

The next level of disaggregation will look at the economic activity (as described above) of the population in Portugal in 2009, within each age group and as represented in Table 9. As was seen above, the economically active population amounts to those people that participate in the labour market and/or produce goods and services transacted in the market. Reading the column of the active 15-24 age group, we can see that the opening stock of the active population aged 15 to 24, measured in thousands of individuals, was 508; of these, 5 died or emigrated, 456 remained in the same situation throughout the year and 47 moved to the active 25-64 age group. Reading the row for the same age group, the closing stock was 466, which is composed of 10 immigrants, and 456 who have not changed state. As was stated for the previous level of disaggregation, a similar reading can be made for each of the other columns and rows.

The above-described work with population movements within a country, during a specific period captured by a SDM, can complement and improve the information that has been captured by a SAM regarding the production, consumption and income of the institutional sector of households.

Table 9: SDM of Portugal in 2009 - second level of disaggregation: by age group and economic activity.

(Unit: 10^3 individuals)

| | | Outside World | Population in Portugal by age group and economic activity | | | | | | | | | | Closing Stock |
| | | | 0-14 | 15-24 | | | 25-64 | | | 65 and over | | | |
				Active	Inactive	Total	Active	Inactive	Total	Active	Inactive	Total	
Outside World			5	5		5	22	3	25	42	39	81	10 638
Population in Portugal by age group and economic activity	0-14	105	1 510										1 615
	15-24 Active	10		456									466
	15-24 Inactive		110		614								724
	15-24 Total	10	110			1 070							1 190
	25-64 Active	16		47			4 734						4 797
	25-64 Inactive				100			1 056					1 156
	25-64 Total	16				146			5 790				5 952
	65 and over Active	0					35			284			320
	65 and over Inactive							73			1 488		1 561
	65 and over Total	0							108			1 772	1 881
Opening Stock		10 623	1 625	508	714	1 221	4 791	1 133	5 924	326	1 527	1 853	

Source: Table D.

6. Summary and Concluding remarks

The Social Accounting Matrix (SAM) and Socio-Demographic Matrix (SDM) are tools for working with the activity of countries both empirically and theoretically, depending on whether they are presented in a numerical or algebraic version. These are the so-called SAM-based and SDM-based approaches for studying (measuring and modelling) the activity of countries.

Assuming that the core of the statistics representing the part of the activity of countries that can be expressed in currency units (covered by the SAM), and in human beings (covered by the SDM), are the national and the demographic accounts, respectively, at least as a starting point, their adoption is recommended for any study that is looking for empirical evidence about that activity. This will enable us to work with, and gain a greater knowledge about, the activity that is (supposedly) observed by the national and the demographic accounts, which, both in a SAM and a SDM framework, will benefit from the increased analytical content provided by the matrix format and the possibility of capturing and working with networks of linkages not captured and worked on otherwise.

Numerical versions of those matrices can provide empirical descriptions of the reality under study, whereas the corresponding algebraic versions can provide theoretical descriptions. From the former matrix, the analysis of the activity of the country can be oriented in accordance with the purposes of the study to be undertaken. From the latter, the performance of experiments will allow for the analysis of scenarios that result from changes in those same realities. Although this paper focuses on the numerical versions of both approaches, some references to work with algebraic versions are also provided. Further research work is also envisaged into the possible combination of SAM and SDM-based approaches.

Supported by the 2008 SNA, a basic SAM structure is proposed amounting to a summary set of the flows that the SNA assumes to be observed and the controlling totals for other levels of disaggregation. From that structure, it is possible to study specific aspects and maintain the consistency of the whole system. The study of those specific aspects is made possible by the different disaggregations and extensions that can be made or through the use of the aggregates, indicators and balancing items that can be calculated.

In the accounts of that basic structure, represented by its rows and columns, besides the rest of the world, the production and the (domestic) institutions are identified. The components of the production accounts are: products (goods and services), activities (industries) and factors. The institutional accounts, representing the institutional sectors, are broken down into current, capital and financial accounts. In turn, the cells of that same basic structure are presented by blocks with common characteristics, relating to the flows covered by the national accounts.

At other levels of disaggregation of these accounts, the blocks of cells will be converted into blocks of submatrices. Working with those blocks is suggested as an easier way of constructing SAMs.

Disaggregations of the proposed SAM structure do not affect the consistency of the whole system. Extensions, either from the national accounts or from other sources of information, pass through the convenient adjustment to, or the connection with, the whole system in order to maintain its consistency. This concern with consistency is a condition for ensuring that the network of linkages that underlies the activity of countries is complete; in other words, besides the generation of income, the distribution, redistribution and use of income, as well as the redistribution and accumulation of wealth, have to be included. Such consistency is only possible when production and institutions are worked on together. That network of linkages can only be identified and worked on in a matrix form in a tool like the SAM, which can be worked on not only for the observed but also for the non-observed activity of countries through the national accounts. The convenient coverage of that network of linkages is a necessary condition for capturing multiplier effects in subsequent modelling, which can provide important knowledge.

From the proposed SAM structure, it is also proposed that work should be performed outside the matrix format with aggregates, indicators and balancing items, which can be seen as elements extracted from our working tool in order to empirically highlight our purposes. Depending on the detail of the SAM, we can therefore calculate more or less detailed aggregates, such as Gross Domestic Product (GDP), Gross National Income, Disposable Income, etc. The same thing happens in the case of the structural indicators of the functional and institutional distribution of generated income, as well as the indicators of the use of disposable income. On the other hand, the ease with which the main items in the revenue and expenditure of the institutional sectors and of the rest of the world can be extracted from the respective rows and columns of the SAM can also be seen as a great advantage.

Particularly when the focus of the study that is being undertaken is on the role played by the households (within the institutional sectors) in the activity of a country during a pre-defined period (usually a year), all that can be studied through the SAM can be further complemented with a SDM. Representing the households, all the population in a country and the flows (expressed in currency units) representing its production, its consumption and its income can be worked upon within a SAM framework. In turn, when all the population in a country is worked upon within a SDM framework, its movements (expressed in numbers of human beings) can be represented in the form of a stock-flow matrix, which offers many possibilities for disaggregation. Establishing the connection between the opening and the closing stock of the population for a particular period and the flows of people during that period, births, deaths, immigration, emigration and changes between groups are the

movements that are recorded in a SDM. Depending on the purposes of the study, active or passive sequences can be adopted to identify those groups. Usually identifying the different age groups is the first step that should be taken prior to the definition of those sequences.

The matrices described in this paper can be either the numerical versions of the reality under study or their replication(s) after running a SAM or SDM-based model(s) in order to try out policy measures or other types of changes and to identify the corresponding macroeconomic effects. In the case of replication(s), we will have one or more scenarios representing the impacts of those policy measures, which, when compared with the reality under study, can support the processes of policy decision-making and policy decision-taking.

With or without the proposed structures, when the activity of countries has to be studied, the empirical work of measurement and modelling, the matrix format and the use of the national and demographic accounts are all recommended. Those accounts can be considered as a starting point for the use of other sources of information and for the inclusion of other dimensions. In order to do this, in the case of the national accounts, it would be convenient if the compilers of countries were to give the same importance to the institutional accounts as they give to the production accounts. It would also be convenient if they made the results of their work and the methodological details underlying their work available, namely the "from whom to whom" matrices and the manuals about sources and methodologies, in order to enable their free use and evaluation by potential users (international organisations, students, researchers, etc.). The last recommendation could also be extended to the demographic accounts. This would certainly be a contribution towards developing our knowledge of the activity of countries, especially where there are problems of poverty and inequalities in the distribution of income, with the consequent need for special attention to be paid to the households.

This proposal is intended to contribute towards a more detailed and complete study of the activity of countries, with greater knowledge being provided about the whole and the corresponding interactions of its parts. This will allow for subsequent interventions to be carried out in relation to the parts while remaining aware of the impacts that this will have on the whole.

This is what the author of this paper considers to be a possible way of introducing empirical evidence into the work being carried out at the macroeconomic level, where the network of linkages within the socioeconomic groups that intervene in the activity of countries should not continue to be neglected so completely. The adoption of this principle could even ensure the greater commitment on the part of countries to adopt and adapt systems of national and demographic accounts, with greater collaboration between macroeconomists and statisticians.

References

Inter-Secretariat Working Group on National Accounts (United Nations, European Commission, International Monetary Fund, Organisation for Economic Cooperation and Development and World Bank) – ISWGNA, *System of National Accounts 2008,* Series F, No. 2, Rev. 5, United Nations, New York, 2009.

Keuning S. and Ruijter W., "Guidelines to the construction of a Social Accounting Matrix", *Review of Income and Wealth*, 34, 71-100, 1988.

Lequiller F., Blades D., *Understanding National Accounts*, Organisation for Economic Co-operation and Development (OECD), Paris, France, 2006.

Pyatt, G., "Some Early Multiplier Models of the Relationship between Income Distribution and Production Structure", *Economic Systems Research*, 13, 139-163, 2001.

Pyatt, G., "Some Relationships between T-Accounts, Input-Output Tables and Social Accounting Matrices", *Economic Systems Research*, 11, 365-387, 1999.

Pyatt, G., "Fundamentals of Social Accounting", *Economic Systems Research*, 3, 315-341, 1991.

Pyatt, G., "SAMs, the SNA and National Accounting Capabilities", *Review of Income and Wealth*, 37, 177-198, 1991a.

Pyatt, G., "A SAM Approach to Modeling", *Journal of Policy Modeling, 1*0, 327-352, 1988.

Pyatt, G., "Commodity Balances and National Accounts: a SAM Perspective", *Review of Income and Wealth*, 31, 155-169, 1985.

Pyatt, G. and Roe, A., *Social Accounting for Development Planning with Special Reference to Sri Lanka*, Cambridge University Press, Cambridge, UK, 1977.

Pyatt, G. and Round, J., "Distributional Invariance and the Design of SAMs", *Economic Systems Research*, 24, 251-273, 2012

Pyatt, G. and Round, J., "Accounting and Fixed Price Multipliers in a Social Accounting Matrix Framework", in G. Pyatt, and J. Round, (coord.), *Social Accounting Matrices. A Basis for Planning*. A World Bank Symposium, World Bank, 52-69, 1985.

Round, J., "Constructing SAMs for Development Policy Analysis: Lessons Learned and Challenges Ahead", *Economic Systems Research*, 15, 161-183, 2003.

Round, J., "The Structure of the European Economy: a SAM Perspective", in J. Round, (ed.), *The European Economy in Perspective. Essays in Honour of Edward Nevin*, University of Wales Press, Cardiff, 59-83, 1994.

Round, J., "A SAM for Europe: Problems and Perspectives", Economic Systems Research, 3, 249-268, 1991.

Santos S., "A quantitative approach to the effects of social policy measures. An application to Portugal, using Social Accounting Matrices", EERI (Economics and Econometrics Research Institute) RP (Research Papers) 2010/33; MPRA (Munich Personal RePEc Archive) Paper No. 23676, 2010.

Santos S., *From the System of National Accounts (SNA) to a Social Accounting Matrix (SAM)-Based Model. An Application to Portugal,* Edições Almedina, Coimbra-Portugal, 2009.

Santos S., "Modelling Economic Circuit Flows in a Social Accounting Matrix Framework. An Application to Portugal", *Applied Economics*, 39, 1753-1771, 2007.

Santos S., "Portuguese net borrowing and the government budget balance. A SAM approach", *Journal of Policy Modeling*, 26, 703-717, 2004.

Stone, R., "Nobel Memorial Lecture 1984. The Accounts of Society", *Journal of Applied Econometrics,* 1(1), 5-28, 1986.

Stone, R., "Demographic Input-Output: An Extension of Social Accounting", in: I.Sohn (coord), *Readings in Input-Output Analysis: Theory and Applications*, Oxford University Press, USA, 151-172, 1986a.

Stone, R., "The Disaggregation of the household Sector in the National Accounts", in G. Pyatt, and J. Round, (coord.), *Social Accounting Matrices. A Basis for Planning*. A World Bank Symposium, World Bank, 145 - 185, 1985.

Stone, R., "Working with what we have: how can existing data be used in the construction and analysis of socio-demographic matrices?", *Review of Income and Wealth*, 28(3), 291-303, 1982.

Stone, R., Aspects of Economic and Social Modelling, Editions Droz, Genéve (Suisse), 154p, 1981.

Stone, R., "Towards a System of Social and Demographic Statistics", Studies in Methods, Series F, Nº18, United Nations, New York, 198p, 1975.

Stone, R., "A System of Social Matrices", *Review of Income and Wealth*, 19(3), 143-166, 1973.

Stone, R., "An Integrated System of Demographic, Manpower and Social Statistics and its Links with the System of National Economic Accounts", *Sankhyā: The Indian Journal of Statistics*, 33(1-2), 1-184, 1971.

Stone, R., "The Social Accounts from a consumer's point of view. An outline and discussion of the revised United Nations System of National Accounts", *Review of Income and Wealth*, 12(1), 1-33, 1966.

Appendixes

Table A. Integrated Economic Accounts Table for Portugal in 2009[5] (unit: 10^6 euros)

Current accounts
Uses

Accounts	Total	S.2 Goods and Services Account (Resources)	S.2 Rest of the World Account	S.1 Total of the Economy	S.15 NPISHs	S.14 Households	S.13 General Government	S.12 Financial Corporations	S.11 Non-Financial Corporations	Code	Transactions and other flows, stocks and balancing items
I. Production / external account of goods and services	59 717	59 717								P.7	Imports of goods and services
	47 236		47 236							P.6	Exports of goods and services
	311 365	311 365								P.1	Output of goods and services
	162 661			162 661	2 394	12 470	8 390	5 238	134 170	P.2	Intermediate consumption
	19 800	19 800		19 800						D.21-D.31	Net taxes on products
	168 504			**168 504**	**2 896**	**29 827**	**24 491**	**10 487**	**81 001**	B.1g/B.1*g	**Gross added value/gross domestic product**
	29 795			29 795	565	9 145	3 585	739	15 761	K.1	Consumption of fixed capital
	138 708			**138 708**	**2 331**	**20 682**	**20 907**	**9 748**	**65 240**	B.1n/B.1*n	**Value added, net/Net domestic product**
	12 482		**12 482**							B.11	**External balance of goods and services**
II.1. Primary distribution of income accounts — **II.1.1. Generation of income account**	86 127		239	85 888	2 633	5 284	21 386	4 260	52 325	D.1	Compensation of employees
	19 100			19 100	- 300	65	- 390	28	- 103	D.2-D.3	Net taxes on production and imports
	19 800			19 800						D.21-D.31	Net taxes on products
	- 700			- 700	- 300	65	- 390	28	- 103	D.29-D.39	Net taxes on production
	45 770			**45 770**	**563**	**6 734**	**3 495**	**6 199**	**28 779**	B.2g	**Gross operating surplus**
	17 745			**17 745**		**17 745**				B.3g	**Gross mixed income**
	18 452			**18 452**	**- 2**	**66**	**- 89**	**5 460**	**13 018**	B.2n	**Net operating surplus**
	15 268			**15 268**		**15 268**				B.3n	**Net mixed income**
II.1.2. Allocation of primary income account	57 187		8 800	48 387	45	3 847	4 820	17 996	21 679	D.4	Property income
	161 639			**161 639**	**837**	**120 015**	**20 182**	**5 990**	**14 615**	B.5g	**Gross national income/ Gross balance of primary incomes**
	131 844			**131 844**	**272**	**110 870**	**16 598**	**5 251**	**- 1 147**	B.5n	**Net national income/ Net balance of primary incomes**
II.2. Secondary distribution income account	15 176		32	15 145	5	10 137	8	637	4 358	D.5	Current taxes on income, wealth, etc
	26 791		109	26 682		26 682				D.61	Social contributions
	34 257		46	34 210	52	42	28 659	3 627	1 830	D.62	Social benefits other than social transfers in kind
	17 299		4 394	12 904	92	3 952	4 274	2 347	2 240	D.7	Other current transfers
	162 800			**162 800**	**3 214**	**119 745**	**25 466**	**5 472**	**8 903**	B.6g	**Gross disposable income**
	133 004			**133 004**	**2 648**	**110 600**	**21 881**	**4 733**	**- 6 858**	B.6n	**Net disposable income**
II.3. Redistribution of income in kind account	23 963			23 963	3 568		20 396			D.63	Social transfers in kind
	162 800			**162 800**	**- 354**	**143 708**	**5 070**	**5 472**	**8 903**	B.7g	**Gross adjusted disposable income**
	133 004			**133 004**	**- 919**	**134 564**	**1 485**	**4 733**	**- 6 858**	B.7n	**Net adjusted disposable income**
II.4. Use of income account	**162 800**			**162 800**	**3 214**	**119 745**	**25 466**	**5 472**	**8 903**	B.6g	**Gross disposable income**
	133 004			**133 004**	**2 648**	**110 600**	**21 881**	**4 733**	**- 6 858**	B.6n	**Net disposable income**
	146 934			146 934		130 170	16 765			P.4	Actual Final Consumption
	146 934			146 934	3 568	106 206	37 160			P.3	Final consumption expenditure
	189			189				189		D.8	Adjustment for the change in the net equity of households in pension funds reserves
	15 865			**15 865**	**- 354**	**13 728**	**- 11 695**	**5 283**	**8 903**	B.8g	**Gross saving**
	- 13 930			**- 13 930**	**- 919**	**4 583**	**- 15 279**	**4 543**	**- 6 858**	B.8n	**Net saving**
	18 186		**18 186**							B.12	**Current external balance**

Accumulation accounts
Changes in Assets

Accounts	Total	S.2 Goods and Services Account (Resources)	S.2 Rest of the World Account	S.1 Total of the Economy	S.15 NPISHs	S.14 Households	S.13 General Government	S.12 Financial Corporations	S.11 Non-Financial Corporations	Code	Transactions and other flows, stocks and balancing items
III.1. Capital accounts — **III.1.1. Change in net worth due to saving and capital transfers**										B.8g	**Gross saving**
										B.8n	**Net saving**
										B.12	**Current external balance**
										D.9	Capital transfers, receivable
										D.9	Capital transfers, payable (-)
	4 256		**16 217**	**- 11 962**	**- 564**	**4 833**	**- 15 476**	**4 485**	**- 5 241**	B.10.1	**Changes in net worth due to saving and capital transfers**
III.1.2. Acquisitions of non-financial assets account	34 051			34 051	834	7 269	5 071	1 064	19 812	P.5	Gross capital formation
	- 29 795			- 29 795	- 565	- 9 145	- 3 585	- 739	- 15 761	K.1	Consumption of fixed capital (-)
			- 4	4	8	- 2 295	173	3	2 116	K.2	Acquisitions less disposals of non-produced non-financial assets
			16 222	**- 16 222**	**- 840**	**9 004**	**- 17 135**	**4 157**	**- 11 407**	B.9	**Net lending (+) /borrowing (-)**

Accounts	Total	S.2	S.2	S.1	S.15 + S.14		S.13	S.12	S.11	Code	Transactions and other flows, stocks and balancing items
III.2 Financial account	93 794		37 209	56 586	12 284		1 059	37 866	5 376		Net acquisition of financial assets\
											Net incurrence of liabilities
			11	- 11				- 11		F.1	Monetary gold and SDRs
	6 430		4 242	2 188	1 084		- 506	1 783	- 173	F.2	Currency and deposits
	49 697		28 529	21 168	116		325	20 617	109	F.3	Securities other than shares
	8 781		- 763	9 544	- 186		- 192	8 071	1 850	F.4	Loans
	18 312		4 529	13 783	7 880		1 001	3 696	1 205	F.5	Shares and other equity
	4 762		5	4 757	4 638			57	62	F.6	Insurance technical reserves
	5 812		655	5 158	- 1 249		431	3 654	2 322	F.7	Other accounts receivable/payable
										B.9 F	**Net lending (+) /borrowing (-)**

[5] This table still uses the 1993 SNA terminology. Its form is the one usually made available by Statistics Portugal, to which the author added the financial account, made available separately by the Portuguese Central Bank.

Table A (continued)**.** Integrated Economic Accounts Table for Portugal in 2009 (Unit: 10^6 euros)

Current accounts
Resources

Code	Transactions and other flows, stocks and balancing items	S.11 Non-Financial Corporations	S.12 Financial Corporations	S.13 General Government	S.14 Households	S.15 NPISHs	S.1 Total of the Economy	S.2 Rest of the World Account	Goods and Services Account (Uses)	Total	Accounts
P.7	Imports of goods and services							59 717		59 717	I. **Production / external account of goods and services**
P.6	Exports of goods and services								47 236	47 236	
P.1	Output of goods and services	215 171	15 725	32 881	42 297	5 290	311 365			311 365	
P.2	Intermediate consumption								162 661	162 661	
D.21-D.31	Net taxes on products						19 800			19 800	
B.1g/B.1*g	**Gross added value/gross domestic product**	**81 001**	**10 487**	**24 491**	**29 827**	**2 896**	**168 504**			**168 504**	II.1.1. **Generation of income** account
K.1	Consumption of fixed capital										
B.1n/B.1*n	**Value added, net/Net domestic product**	**65 240**	**9 748**	**20 907**	**20 682**	**2 331**	**138 708**			**138 708**	
B.11	**External balance of goods and services**							12 482		12 482	
D.1	Compensation of employees				85 757		85 757	370		86 127	II.1.2. **Allocation of primary income** account
D.2-D.3	Net taxes on production and imports			20 216			20 216	- 1 116		19 100	
D.21-D.31	Net taxes on products			19 694			19 694	106		19 800	
D.29-D.39	Net taxes on production			522			522	- 1 222		- 700	
B.2g	**Gross operating surplus**	**28 779**	**6 199**	**3 495**	**6 734**	**563**	**45 770**			**45 770**	
B.3g	**Gross mixed income**				**17 745**		**17 745**			**17 745**	
B.2n	**Net operating surplus**	**13 018**	**5 460**	**- 89**	**66**	**- 2**	**18 452**			**18 452**	
B.3n	**Net mixed income**				**15 268**		**15 268**			**15 268**	
D.4	Property income	7 514	17 787	1 291	13 626	319	40 538	16 649		57 187	
B.5g	**Gross national income/ Gross balance of primary incomes**	**14 615**	**5 990**	**20 182**	**120 015**	**837**	**161 639**			**161 639**	
B.5n	**Net national income/ Net balance of primary incomes**	**- 1 147**	**5 251**	**16 598**	**110 870**	**272**	**131 844**			**131 844**	II.2. **Secondary distribution** income account
D.5	Current taxes on income, wealth, etc			15 146			15 146	30		15 176	
D.61	Social contributions	1 830	3 773	21 031	42	52	26 728	64		26 791	
D.62	Social benefits other than social transfers in kind				34 081		34 081	176		34 257	
D.7	Other current transfers	887	2 320	2 047	6 421	2 474	14 148	3 151		17 299	
B.6g	**Gross disposable income**	**8 903**	**5 472**	**25 466**	**119 745**	**3 214**	**162 800**			**162 800**	II.3. **Redistribution of income** in kind
B.6n	**Net disposable income**	**- 6 858**	**4 733**	**21 881**	**110 600**	**2 648**	**133 004**			**133 004**	
D.63	Social transfers in kind				23 963		23 963			23 963	
B.7g	**Gross adjusted disposable income**	**8 903**	**5 472**	**5 070**	**143 708**	**- 354**	**162 800**			**162 800**	
B.7n	**Net adjusted disposable income**	**- 6 858**	**4 733**	**1 485**	**134 564**	**- 919**	**133 004**			**133 004**	
B.6g	**Gross disposable income**	**8 903**	**5 472**	**25 466**	**119 745**	**3 214**	**162 800**			**162 800**	II.4. **Use of income** account
B.6n	**Net disposable income**	**- 6 858**	**4 733**	**21 881**	**110 600**	**2 648**	**133 004**			**133 004**	
P.4	Actual Final Consumption							146 934	146 934		
P.3	Final consumption expenditure								146 934	146 934	
D.8	Adjustment for the change in the net equity of households in pension funds reserves				189		189			189	
B.8g	**Gross saving**										
B.8n	**Net saving**										
B.12	**Current external balance**										

Accumulation accounts
Changes in liabilities and net worth

B.8g	**Gross saving**	**8 903**	**5 283**	**- 11 695**	**13 728**	**- 354**	**15 865**			**15 865**	III.1.1. Change in net worth due to saving and
B.8n	**Net saving**	**- 6 858**	**4 543**	**- 15 279**	**4 583**	**- 919**	**- 13 930**			**- 13 930**	
B.12	**Current external balance**							18 186		18 186	
D.9	Capital transfers, receivable	1 719	77	1 246	369	358	3 769	264		4 033	
D.9	Capital transfers, payable (-)	- 102	- 135	- 1 442	- 119	- 2	- 1 801	- 2 232		- 4 033	
B.10.1	**Changes in net worth due to saving and capital transfers**	**- 5 241**	**4 485**	**- 15 476**	**4 833**	**- 564**	**- 11 962**	**16 217**		**4 256**	III.1.2 Acquisitions of non-financial assets account
P.5	Gross capital formation								34 051	34 051	
K.1	Consumption of fixed capital (-)										
K.2	Acquisitions less disposals of non-produced non-financial assets										
B.9	**Net lending (+) /borrowing (-)**										

		S.11	S.12	S.13	S.14 + S.15		S.1	S.2			
	Net acquisition of financial assets\										
	Net incurrence of liabilities	17 420	34 082	18 199	4 167		73 868	19 926		112 824	III.2 **Financial account**
F.1	Monetary gold and SDRs										
F.2	Currency and deposits		6 063	- 532			5 532	898		29 818	
F.3	Securities other than shares	2 102	16 412	16 235			34 749	14 948		28 663	
F.4	Loans	4 565	- 2 867	1 640	3 015		6 352	2 429		34 711	
F.5	Shares and other equity	6 745	10 521				17 266	1 046		5 407	
F.6	Insurance technical reserves	- 140	4 845				4 705	57		5 929	
F.7	Other accounts receivable/payable	4 148	- 892	855	1 152		5 263	549		8 296	
B.9 F	**Net lending (+) /borrowing (-)**	**- 12 044**	**3 784**	**- 17 139**	**8 117**		**- 17 282**	**17 282**			
	Statistical discrepancy	**- 636**	**- 374**	**- 4**	**- 47**		**- 1 061**	**1 061**			

Sources: Statistics Portugal (*INE*); Portuguese Central Bank (*Banco de Portugal*)

Table B. Connection between the totals of the current transactions block of the SAM and the Integrated Economic Accounts Table for Portugal in 2009

(Unit: 10^6 euros)

			SAM									Integrated Economic Accounts Table					
			INSTITUTIONS														
			CURRENT ACCOUNT						*(with)* REST OF THE WORLD	*Total Current Transactions (Incomes)*		Current taxes on income, wealth, etc	Social contributions	Social benefits other than social transfers in kind	Other current transfers	Adjustment for the change in ... pension ...	Total *(Resources)*
			Households	Enterprises (nonfinancial corporations)	Financial corporations	Government	NonProfitInstitutionsServing Households (NPISH)	Total *(within Domestic Institutions)*								
			5	6	7	8	9		16							
SAM	INSTITUTIONS CURRENT ACCOUNT	Households	5	801	1 830	5 226	28 998	95	36 949	3 783	40 732	0	42	34 081	6 421	189	40 732
		Enterprises (nonfinancial corporations)	6	1 830	0	613	171	0	2 613	103	2 716	0	1 830	0	887	0	2 716
		Financial corporations	7	5 289	519	131	42	32	6 013	79	6 092	0	3 773	0	2 320	0	6 092
		Government	8	31 224	5 684	671	8	22	37 610	615	38 224	15 146	21 031	0	2 047	0	38 224
		NonProfitInstitutionsServingHouseholds(NPISH)	9	324	154	50	1 997	0	2 525	1	2 526	0	52	0	2 474	0	2 526
		Total *(within Domestic Institutions)*		39 468	8 187	6 690	31 215	150	85 711	4 581	90 292	15 146	26 728	34 081	14 148	189	90 292
	(with) REST OF THE WORLD		16	1 345	240	110	1 726	0	3 421			30	64	176	3 151	0	3 421
	Total Current Transactions (Outlays)			40 813	8 428	6 800	32 941	150	89 131			15 176	26 791	34 257	17 299	189	93 712
Integrated Economic Accounts Table		Current taxes on income, wealth, etc		10 137	4 358	637	8	5	15 145	32	15 176						
		Social contributions		26 682	0	0	0	0	26 682	109	26 791						
		Social benefits other than social transfers in kind		42	1 830	3 627	28 659	52	34 210	46	34 257						
		Other current transfers		3 952	2 240	2 347	4 274	92	12 904	4 394	17 299						
		Adjustment for the change in ... pension ...		0	0	189	0	0	189	0	189						
		Total *(Uses)*		40 813	8 428	6 800	32 941	150	89 131	4 581	93 712						

Source: Table 3 and Appendix A.

Table C: Statistical sources used for the construction of the numerical version of the SDMs for Portugal in 2009

(Unit: 10^3 individuals)

Age group	Total Population			Deaths	Births (surviving)	Immigrants	Emigrants
	Active	Inactive	Total				
2008							
0-14	–	1,624.600	1,624.600	0.575	104.594	5.541	5.314
15-24	507.500	713.800	1,221.300	0.514	–	9.508	5.480
25-64	4,791.300	1,132.500	5,923.800	17.599	–	14.254	9.210
65 and over	326.000	1,527.000	1,853.000	85.572	–	0.415	0.353
Total	5,624.800	4,997.900	10,622.700	104.260	104.594	29.718	20.357
2009							
0-14	–	1,615.000	1,615.000	0.579	99.491	5.941	4.409
15-24	466.300	723.900	1,190.200	0.501	–	10.332	4.547
25-64	4,796.700	1,155.700	5,952.400	17.694	–	15.600	7.648
65 and over	319.700	1,561.100	1,880.800	80.425	–	0.434	0.295
Total	5,582.700	5,055.700	10,638.400	99.199	99.491	32.307	16.899

Source: Statistics Portugal *(INE)* – Demographic Statistics, Labour Force Survey.

D. Methodology adopted in the construction of the numerical version of the SDMs for Portugal in 2009

The SDMs at the two levels of disaggregation were constructed from the inflows and outflows identified in Table D – constructed from Table C. From Table D, the inflows are represented in the rows and the outflows in the columns of the SDMs (Tables 8 and 9), whose diagonals (represented in italic font) are calculated in the matrices themselves through the difference between the closing stock and the other flows in a row or between the opening stock and the other flows in a column.

When information is missing or whenever inconsistencies are found, the following assumptions are adopted:

- the α (scalar), as described in Table 7, is zero;
- all emigrants and immigrants aged 15 and over are active;
- those moving from one age group to another and those surviving in the same age group maintain the same situation regarding their economic activity;
- deaths by economic activity are proportional to the opening activity (inactivity) rates.

Table D. Portugal in 2009 – inflows and outflows of the population by age group (first level of disaggregation) and economic activity (second level of disaggregation)

(Unit: 10^3 individuals)

Age group 0-14: Total			
Inflows		Outflows	
Survivors from last year (Opening Stock)	1,624.600	Deaths	0.579
Births	99.491	Emigrants	4.409
Immigrants	5.941	Movers to the age of 15	110.044
		Survivors into next year (Closing Stock)	1,615.000
Total	1,730.032	Total	1,730.032

Age group 15-24: Total			
Inflows		Outflows	
Survivors from last year (Opening Stock)	1,221.300	Deaths	0.501
Immigrants	10.332	Emigrants	4.547
Entrants from the age of 14	110.044	Movers to the age of 25	146.428
		Survivors into next year (Closing Stock)	1,190.200
Total	1,341.676	Total	1,341.676

Age group 15-24: Active			
Inflows		Outflows	
Survivors from last year (Opening Stock)	507.500	Deaths	0.208
Immigrants	10.332	Emigrants	4.547
		Movers to the age of 25	46.777
		Survivors into next year (Closing Stock)	466.300
Total	517.832	Total	517.832

Age group 15-24: Inactive			
Inflows		Outflows	
Survivors from last year (Opening Stock)	713.800	Deaths	0.293
Entrants from the age of 14	110.044	Movers to the age of 25	99.651
		Survivors into next year (Closing Stock)	723.900
Total	823.844	Total	823.844

Age group 25-64: Total			
Inflows		Outflows	
Survivors from last year (Opening Stock)	5,923.800	Deaths	17.694
Immigrants	15.600	Emigrants	7.648
Entrants from the age of 24	146.428	Movers to the age of 65	108.086
		Survivors into next year (Closing Stock)	5,952.400
Total	6,085.828	Total	6,085.828

Age group 25-64: Active			
Inflows		Outflows	
Survivors from last year (Opening Stock)	4,791.300	Deaths	14.311
Immigrants	15.600	Emigrants	7.648
Entrants from the age of 24	46.777	Movers to the age of 65	35.018
		Survivors into next year (Closing Stock)	4,796.700
Total	4,853.677	Total	4,853.677

Age group 25-64: Inactive			
Inflows		Outflows	
Survivors from last year (Opening Stock)	1,132.500	Deaths	3.383
Entrants from the age of 24	99.651	Movers to the age of 65	73.068
		Survivors into next year (Closing Stock)	1,155.700
Total	1,232.151	Total	1,232.151

Age group 65 and over: Total			
Inflows		Outflows	
Survivors from last year (Opening Stock)	1,853.000	Deaths	80.425
Immigrants	0.434	Emigrants	0.295
Entrants from the age of 64	108.086	Survivors into next year (Closing Stock)	1,880.800
Total	1,961.520	Total	1,961.520

Age group 65 and over: Active			
Inflows		Outflows	
Survivors from last year (Opening Stock)	326.000	Deaths	41.457
Immigrants	0.434	Emigrants	0.295
Entrants from the age of 64	35.018	Survivors into next year (Closing Stock)	319.700
Total	361.452	Total	361.452

Age group 65 and over: Inactive			
Inflows		Outflows	
Survivors from last year (Opening Stock)	1,527.000	Deaths	38.968
Entrants from the age of 64	73.068	Survivors into next year (Closing Stock)	1,561.100
	1,600.068	Total	1,600.068

Outside World			
Inflows		Outflows	
Deaths	99.199	Births	99.491
Emigrants	16.899	Immigrants	32.307
Survivors into next year (Our Country's Closing Stock)	10,638.400	Survivors from the last year (Our Country's Opening Stock)	10,622.700
Total	10,754.498	Total	10,754.498

Source: Table C.