



Studying the informal aspects of the activity of countries with Social Accounting and Socio-Demographic Matrices.

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Abstract

Social Accounting Matrices (SAMs) and Socio-Demographic Matrices (SDMs) are presented as tools that offer specific features for studying the activity of countries in several different areas, as well as for supporting policy decision processes.

Based on methodological principles 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). Approaches based on SAMs and SDMs will be presented as a way of capturing the relevant network of linkages and the corresponding multiplier effects, which can then be used for the subsequent modelling of the activity of the countries to be studied. As an example of socio-economic studies that can be undertaken using approaches based on both SAMs and SDMs, the study of the activity of household unincorporated enterprises, also described as informal, will be illustrated with an application to Portugal. In that application, three scenarios will be briefly presented, involving, on the one hand, two changes in incomes and, on the other hand, a change in expenditures. The macroeconomic effects of those changes will be summarised in the form of changes in the macroeconomic aggregates: Gross Domestic Product, Gross National Income and Disposable Income.

Keywords: Social Accounting Matrix; Socio-Demographic Matrices; Informal Economy.

JEL Classification: E01; E16; J11

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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 which is not only capable of highlighting specific aspects of that activity, but also offers the chance to experiment with different interventions with regard to its functioning.

A proposal was made for the development both of a basic SAM and of a standard SDM in Santos, 2013. Together with an explanation of possible alternative taxonomies, this presentation shows how these matrices can be used as an alternative support for studies being carried out in several areas, as well as for the work of those taking part in the policy decision process. Drawing upon the presentation made in that work, this paper seeks to illustrate a way of using those tools for studying the informal aspects of the activity of countries.

Section 2 outlines the main features of the SAM and SDM-based approaches, adopting a methodological framework which is based on Richard Stone's works. According to this methodological framework, SAMs and SDMs can describe the activity of countries either empirically or theoretically, depending on whether they are presented respectively in a numerical or an algebraic version, respectively.

Using the example of an application for Portugal, Section 3 shows how those approaches can be used as an alternative support for studying the informal aspects of the activity of countries at a macroeconomic level, as well as for the work of those involved in the policy decision process.

Some concluding remarks will be made in Section 4.

2. Approaches based on SAMs and 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, both 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 which 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).

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 (2012; 1985) and Santos (2013; 2012; 2009).

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 has. Thus, the study of the SDM-based approach will be based only on Stone’s work.

According to Stone, 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 the next section. 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.

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 one 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 or worked on otherwise. The matrix format will also allow for the use of matrix algebra in possible mathematical treatments associated with the above-mentioned empirical work, enabling experimentation with different interventions with regard to the functioning of reality.

3. Studying the informal aspects of the activity of countries with SAMs and SDMs

As mentioned above, this paper is supported by another study (Santos, 2013), which was not included here, owing to its length. That work includes a description and the methodological details necessary for the construction of the numerical versions of the SAM and SDM that are presented here. In turn, the description of the algebraic version of the SAM, used in the construction of the three scenarios

presented below, can be found in Section 2.2.1 of Santos, 2012. Therefore, those two working papers should also be consulted for a better understanding of this Section.

Chapter 25 of the 2008 SNA (System of National Accounts) identifies in the activity of countries a part “that reflects the effort of people without formal jobs to engage in some form of monetary economic activity” (ISWGNA, 2009: 471), in which the household unincorporated enterprises, operating within the production boundary of the SNA², sell or barter on the market most or all of their output; in other words, they have market output. Because they operate on a small scale, at a low level of organisation, with little or no division between factors of production, the income that is generated by their activity is the so-called mixed income. Thus, as is mentioned in Chapters 7 and 24 of the 2008 SNA, the mixed income is the compensation of the owner(s) of an unincorporated enterprise or members of the same household that may contribute with unpaid labour inputs of a similar kind to those that could be provided by paid employees. Since the household unincorporated enterprises may operate with or without paid employees, the distinction can be established respectively between employers’ mixed income and own-account workers’ mixed income. Employers and own-account workers are often named self-employed.

Within the framework of the proposed SAM, this compensation of employers and own-account workers can be added to the compensation of employees, thus completing total compensation of labour in the gross added value of the activity of countries, together with the corresponding contribution to the functional distribution of the generated income. In turn, when we think of the institutional distribution of the generated income, the disaggregation of the households may follow what which is defined in Chapter 4-G of the 2008 SNA, in other words in accordance with their main source of income (ISWGNA, 2009: 82-84). The following groups could be studied: employees; employers and own-account workers; recipients of property and transfer income. However, after it is generated, this income follows a path during which it is distributed among institutions and accumulated by institutions, and this factor should not be neglected, otherwise a part of the network of linkages underlying the activity of countries would be missed.

In this respect, we should bear in mind the two general principles recommended by Pyatt and Round regarding the taxonomy to be adopted in the SAMs’ design: “the classifications adopted for factors, for goods and non-factor services, and also for institutions need to be developed jointly” (the activities would certainly be included here, if they had been included in the SAM used in the article³); and the

² As defined in Chapter 6 of the 2008 SNA (ISWGNA, 2009: 98-101).

³ The inclusion of separate accounts for production activities was not considered important in the context of the article (Pyatt and Round, 2012: 252).

“classification system should be designed in such a way that any underlying duality is apparent” (Pyatt and Round, 2012: 267). Respecting these principles avoids overlooking important parts (which may even be crucial) of the network of linkages, which we have been referring to.

Thus, in the basic structure proposed for a SAM, which is summarised in Table 2, the identification of the informal aspects of the activity of countries involves both production, and institutional accounts, and their corresponding blocks, with special attention being paid to the factors account in the former case and to the (current, capital, and eventually the financial) account of households, in the latter case.

If we assume that the above-mentioned informal part of the activity of countries is observed by the corresponding national accounts, its study will require the disaggregation of those accounts, and so the consistency with the whole system will automatically be guaranteed. Otherwise, those accounts will need to be extended further, and the whole system will need to be adjusted.

Whether in the case of disaggregation or in the case of extension, in the factors accounts, both formal labour (employees) and informal labour (employers and own-account workers) should be identified, with adjustments being made for activities and for products, if these are considered important. In turn, in the institutional accounts, formal and informal households should also be identified. Formal households will be those that, according to their main source of income, are employees or recipients of property and transfer income. The informal households will be those that, according to their main source of income, are employers or own-account workers.

In turn, in the SDM structure that we are proposing, those who participate in the labour market and in the supply side of the goods and services market represent the active population, which can be employed or unemployed. Within the employed category, we will identify employees as being formal, and employers and own-account workers, as being informal. Thus, in a study of the informal aspects of the activity in a specific space, namely, a country, the consideration of its population and the above described groups should involve the economic activity of those groups and also the corresponding origin and the destination of their income.

Under the current System of National Accounts (SNA 2008), all of the population in a country is represented by households – one of the five institutional sectors identified by that system, the others being: financial and non-financial corporations, government and non-profit institutions serving households. In keeping with what was stated above, when all of the population of a country is studied 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, especially by

age groups. In turn, the flows (expressed in currency units) representing households' production, consumption and income, can be studied within a SAM framework.

From what has just been said and bearing in mind the support offered by the already-mentioned working papers – Santos, 2012 and 2013 – SAMs and SDMs, and their underlying approaches, allow for the study of a wide range of different aspects involved in the informal aspects of the countries' activity (and many other areas), that can be identified in accordance with the purposes of each specific study. Let's suppose that, in studying a possible increment of the informal aspects of the activity of countries, we wish to identify some macroeconomic effects of increases in the compensation of the informal labour on one hand, and, on the other hand, in either the incomes or the expenditures of the informal households. That possible increment can be seen both as an effort to correct a possible undervaluation of the activity of the household unincorporated enterprises by the national accounts, and also as an alternative to absorb a part of existing unemployment.

Given such a purpose, our attention necessarily has to be focused, on one hand, on those who are active and informally employed and, on the other hand, on the corresponding flows of income that are received and then spent by the group whose main source of income comes from the corresponding activity – the informal households. The following exposition, illustrated by the example of an application to Portugal, will show a simple possible way of using the tools presented above in a study with that particular purpose.

Table 1 shows a SDM for Portugal in 2009, with a disaggregation which allows for the identification of those who are informally employed, as described above, in columns and rows 4, 8 and 12, grouped by age levels. Because the numbers of the 15-24 age group, column and row 4, are insignificant, our attention will be focused on the other two groups.

Thus, when reading column 8 it can be seen that the opening stock of the informally employed, aged 25-64, measured in thousands of individuals, was 915 (8.6 % of the total population and 75.7 % of the total informally employed); of these, 3 either died or emigrated, 876 remained in the same situation throughout the year, 6 became unemployed and 30 moved to the informally employed 65 and over age group. Reading along the row (8) for the same group it can be seen that the closing stock was 878, which is composed of (approximately) 1 thousand individuals who moved from the informally employed 15-24 age group and (approximately) 876 who did not change their status.

In the case of the population aged 65 and over that is informally employed, from the reading of column 12, shows that it is represented by 293 thousands of individuals (2.8 % of the total population and 24.2 % of the total informally employed); of these, 37 either died or emigrated and 256 remained in the same situation throughout the year.

Table 1⁴: SDM for Portugal in 2009.

(Unit: 10³ individuals)

		Outside World		Population in Portugal by age group, economic activity and market participation								
				0-14	15-24					Inactive	Total	
					Active			Unemployed	Total			
					Employed							
					Formal	Informal	Total					
		1	2	3	4	5	6	5				
Outside World		1	5					5	5	5		
Population in Portugal by age group, economic activity and market participation		0-14		2	105	1 510						
		15-24		Active		Employed		Unemployed	Total	Inactive	Total	
				Formal	3	10	362					
				Informal	4		0					
				Total		10		362				
				Unemployed		5		18	18			75
				Total		10						456
		Inactive		6		110			614			
		Total		10		110			1 070			
		25-64		Active		Employed		Unemployed	Total	Inactive	Total	
				Formal	7	16	42					
				Informal	8		1					
				Total		16		43				
				Unemployed		9			3			
				Total		16						47
		Inactive		10					100			
		Total		16					146			
		65&more		Active		Employed		Unemployed	Total	Inactive	Total	
				Formal	11	0						
				Informal	12							
Total				0								
Unemployed				13								
Total				0								
Inactive		14										
Total		0										
Opening Stock		15	10 623	1 625	423	1	424	83	508	714	1 221	

Source: Statistics Portugal (*INE*).

⁴ This table is Table 9 of Santos (2013), showing the active population disaggregated in accordance with its participation in the labour market and in the supply side of the goods and services market, with two further levels of disaggregation, constructed from the same sources of information and adopting an identical methodology, with the required adaptations.

Table 1 (continued): SDM for Portugal in 2009.

 (Unit: 10³ individuals)

		Population in Portugal by age group, economic activity and market participation														Closing Stock	
		25-64							65&more								
		Active					Inactive	Total	Active					Inactive	Total		
		Employed			Unem-ployed	Total			Employed			Unem-ployed	Total				
		Formal	Informal	Total			Formal	Informal	Total								
7	8		9	10		11	12	Total	13		14		15				
Outside World	1	11	3	13	9	22	3	25	4	37	41	0	42	39	81	10 638	
Population in Portugal by age group, economic activity and market participation	0-14															1 615	
	15-24	Active	Empl. Formal														373
			Empl. Informal														0
			Total														373
		Unemployed															94
	Total															466	
	Inactive															724	
	Total															1 190	
	25-64	Active	Empl. Formal														3 485
			Empl. Informal														878
			Total														4 363
		Unemployed															434
		Total															4 797
		Inactive															1 156
	Total															5 952	
	65&more	Active	Empl. Formal														33
			Empl. Informal														286
			Total														319
		Unemployed															1
		Total															320
Inactive																1 561	
Total															1 881		
Opening Stock	15	3533	915	4 448	343	4 791	1 133	5 924	33	293	326	0	326	1 527	1 853		

 Source: Statistics Portugal (*INE*).

Table 2, shows a SAM for Portugal in 2009, with a disaggregation that allows the identification of the flows of income that are received and spent by informal households, through their current account, as well as, the compensation of informal labour (employers and own-account workers).

Thus, in row and column 4 the aggregate factors income related to informal labour can be seen, i.e. the above referred gross mixed income, which amounts to 17,745 million Euros and represent 11.2% of total aggregate factors income. From the reading in column it is also possible to see that 81.3% of the gross mixed income (14,418 million Euros) is received by the informal households, being the remaining 18.7% being received by the formal households, as characterized above.

In turn, row and column 7 show, respectively, the receipts (or incomes) and the expenditures of the current account of the group of households whose main source of income is the compensation of informal labour⁵. Since the row and column totals are equal, they represent the aggregate income of that group, amounting to 30,601 million Euros, and the corresponding totals of receipts and expenditures. This amount represents 12.1% of the total aggregate income. Reading along the row, one can see that this income is derived from the compensation of labour and capital – 26,374 million Euros (86.2 %) – while the remaining part came from current transfers within households, from the rest of the world and from other institutional sectors – 4,227 million Euros (13.8%). Reading down the column, one can see that this income was mainly spent on final consumption – 15,935 million Euros (52.1%), transferred in the form of current transfers: within households, to the government (namely in the form of current taxes on income, wealth, etc), to the rest of the world and to other institutional sectors – 3,643 million Euros (11.9 %). In reading the column, one can also see that the part of the aggregate income that was not spent on final consumption or transferred, was saved, and this amounts to 11,023 million Euros (36.0%), which represent a significant proportion, especially when compared with that of the formal households: 2.1%.

⁵ For a better understanding of the following reading, see Santos (2013) – Section 4.

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Table 2⁶: SAM for Portugal in 2009

(Unit: 10⁶ Euros)

Outlays (expenditures)			PRODUCTION							
			PRODUCTS	ACTIVITIES	FACTORS			Total		
Labour		Capital								
			Formal	Informal						
Incomes (receipts)			1	2	3	4	5			
PRODUCTION	PRODUCTS		1	0	162 661	0	0	0		
	ACTIVITIES		2	311 365	0	0	0	0		
	FACTORS	Labour	3	0	85 888	0	0	0		
		Informal	4	0	17 745	0	0	0		
	Capital		5	0	45 770	0	0	0		
	Total			0	149 403	0	0	0		
INSTITUTIONS	CURRENT ACCOUNT	Households (by source of income)	6	0	0	81 724	3 327	8 591	93 641	
		Informal	7	0	0	4 033	14 418	7 922	26 374	
		Total		0	0	85 757	17 745	16 513	120 015	
	Enterprises (nonfinancial corporations)		8	0	0	0	0	14 615	14 615	
	Financial corporations		9	0	0	0	0	5 990	5 990	
	Government		10	19 694	522	0	0	- 34	- 34	
	NonProfitInstitutionsServingHouseholds(NPISH)		11	0	0	0	0	837	837	
	Total			19 694	522	85 757	17 745	37 921	141 423	
	CAPITAL ACCOUNT	Households		12	0	0	0	0	0	
		Enterprises (nonfinancial corporations)		13	0	0	0	0	0	0
		Financial corporations		14	0	0	0	0	0	0
Government		15	0	0	0	0	0	0		
NonProfitInstitutionsServingHouseholds(NPISH)		16	0	0	0	0	0	0		
Total			0	0	0	0	0	0		
FINANCIAL ACCOUNT		17	0	0	0	0	0	0		
REST OF THE WORLD		18	59 823	- 1 222	370	0	16 649	17 019		
TOTAL				390 882	311 365	86 127	17 745	54 571	158 443	

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

⁶ This table is Table 3 of Santos (2013) showing the other factors' account disaggregated by informal labour and capital (rows and columns 4 and 5) and households' current account disaggregated by main source of income (rows and columns 6 and 7), represented in italic font. In this disaggregation the data that could not be taken from the integrated economic accounts, are in italic font and were estimated, adopting the same structure of the same account in the SAM worked upon in Santos (2009).

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Table 2 (continued): SAM for Portugal in 2009

(Unit: 10⁶ Euros)

Outlays (expenditures)			INSTITUTIONS									
			CURRENT ACCOUNT									
			Households (by main source of income)			Enterprises (nonfinancial corporations)	Financial corporations	Government	NonProfitInsti- tutionsServing Households (NPISH)	Total		
			Formal	Informal	Total							
Incomes (receipts)			6	7		8	9	10	11			
PRODUCTION	PRODUCTS		1	90 271	15 935	106 206	0	0	37 160	3 568	146 934	
	ACTIVITIES		2	0	0	0	0	0	0	0	0	
	FACTORS	Labour	Formal	3	0	0	0	0	0	0	0	
			Informal	4	0	0	0	0	0	0	0	
		Capital		5	0	0	0	0	0	0	0	
	Total			0	0	0	0	0	0	0		
INSTITUTIONS	CURRENT ACCOUNT	Households (by...source of income)	Formal	6	499	155	655	1 662	4 855	26 330	86	33 588
			Informal	7	112	35	146	168	370	2 668	9	3 361
			Total		611	190	801	1 830	5 226	28 998	95	36 949
		Enterprises (nonfinancial corporations)		8	1 663	167	1 830	0	613	171	0	2 613
		Financial corporations		9	4 734	555	5 289	519	131	42	32	6 013
		Government		10	28 838	2 386	31 224	5 684	671	8	22	37 610
		NonProfitInstitutionsSer- vingHouseholds(NPISH)		11	259	65	324	154	50	1 997	0	2 525
		Total			36 105	3 363	39 468	8 187	6 690	31 215	150	85 711
	CAPITAL ACCOUNT	Households		12	2 705	11 023	13 728	0	0	0	0	13 728
		Enterprises (nonfinancial corporations)		13	0	0	0	8 903	0	0	0	8 903
		Financial corporations		14	0	0	0	0	5 283	0	0	5 283
		Government		15	0	0	0	0	0	- 11 695	0	- 11 695
		NonProfitInstitutionsSer- vingHouseholds(NPISH)		16	0	0	0	0	0	0	0	- 354
	Total			2 705	11 023	13 728	8 903	5 283	- 11 695	- 354	15 865	
	FINANCIAL ACCOUNT		17	0	0	0	0	0	0	0	0	
	REST OF THE WORLD		18	1 065	280	1 345	240	110	1 726	0	3 421	
	TOTAL			130 146	30 601	160 747	17 331	12 082	58 407	3 363	251 931	

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Table 2 (continued): SAM for Portugal in 2009

(Unit: 10⁶ Euros)

Outlays (expenditures)			INSTITUTIONS							REST OF THE WORLD	TOTAL	
			CAPITAL ACCOUNT						FINANCIAL ACCOUNT			
Incomes (receipts)			Households	Enterprises (nonfinancial corporations)	Financial corporations	Government	NonProfitInstitutionsServingHouseholds (NPISH)	Total		17	18	
			12	13	14	15	16	17				
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	3	0	0	0	0	0	0	0	239	86 127
		Formal	4	0	0	0	0	0	0	0	0	17 745
	Informal	4	0	0	0	0	0	0	0	0	0	
Capital	5	0	0	0	0	0	0	0	0	8 800	54 571	
Total			0	0	0	0	0	0	0	9 039	158 443	
INSTITUTIONS	CURRENT ACCOUNT	Households (by source of income)	6	0	0	0	0	0	0	0	2 916	130 146
		Formal	7	0	0	0	0	0	0	0	866	30 601
		Informal	7	0	0	0	0	0	0	0	0	0
	Enterprises (nonfinancial corporations)	8	0	0	0	0	0	0	0	103	17 331	
	Financial corporations	9	0	0	0	0	0	0	0	79	12 082	
	Government	10	0	0	0	0	0	0	0	615	58 407	
	NonProfitInstitutionsServingHouseholds(NPISH)	11	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	12	0	0	53	139	0	192	- 9 004	177	5 093
		Enterprises (nonfinancial corporations)	13	0	0	0	795	0	795	11 407	924	22 029
		Financial corporations	14	0	0	53	24	0	77	- 4 157	0	1 202
		Government	15	3	95	28	0	2	129	17 135	1 118	6 687
NonProfitInstitutionsServingHouseholds(NPISH)		16	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	17	0	0	0	0	0	0	36 659	37 209	73 868		
REST OF THE WORLD	18	- 2 179	2 122	3	315	8	268	20 987	X	100 297		
TOTAL			5 093	22 029	1 202	6 687	844	35 856	73 868	100 297	X	

This SAM represents all the nominal flows (measured by the national accounts) that occurred in Portugal in 2009. Therefore, from this, one can calculate aggregates, indicators and balancing items, representative of the macroeconomic level of the activity of the Portuguese economy for that year. This is the case with what is normally considered to be the main macroeconomic aggregate - Gross

Domestic Product at market prices (GDP_{pm}), which amounts to 168,504 million Euros. Since our SAM does not identify the institutional sectors in the production accounts, the part corresponding to our group of study cannot be identified in that amount, although such a calculation is possible in the case of both Gross National Income and Disposable Income. Therefore, in the case of total Gross National Income, which has an amount of 161,639 million Euros, the share of informal households was 16.3%, while in the case of total Disposable Income, with an amount of 162,800 million Euros, the share of informal households was 16.6%.

In line with the above-mentioned purpose, for a better study of changes resulting from the increment of the informal aspects of the activity of countries, three scenarios will be presented: scenario A, involving an increase in gross mixed income (the total compensation of the informal labour); scenario B involving an increase in the part of the gross national income relating to the compensation of informal labour received by informal households; and scenario C, involving an increase in final consumption of informal households. The numerical SAM and SDM presented above will enable the identification of those changes. Algebraic SAMs, representing accounting multipliers (as described in Section 2.2.1 of Santos, 2012) will enable the quantification of the macroeconomic effects of those increases, which will be summarised in the form of the changes occurring in the three above-mentioned macroeconomic aggregates: GDP_{pm} , Gross National Income and Disposable Income, as shown in Table 3.

In scenario A, our attention was focused, on one hand, on cell (4,2) of the SAM, which represents the gross mixed income, or the total compensation of the informal labour, amounting to 17,745 million Euros, and, on the other hand, on the sum of the totals of columns 4, 8 and 12 of the SDM, which represent the opening stock of the informally employed, amounting to 1,209 thousand individuals. An increase of 20% was then applied to the informally employed, who became 1,451 thousand individuals. Assuming that the gross mixed income *per* informally employed remained the same, the new total amount in cell (4,2) of the SAM became 21,294 million Euros, which represents an increase of 3,549 million Euros in the total compensation of informal labour, or gross mixed income.

In scenarios B and C, increases of 20% were applied, respectively, to the part of the gross national income relating to the compensation of informal labour, received by informal households and to the final consumption of the informal households. That represent increases of 2,884 million Euros in SAM's cell (7,4), in the former case, and of 3,187 million Euros in SAM's cell (1,7), in the latter case.

Considering as exogenous the accounts whose outlays are affected by the increases in each scenario, as well as the financial and the rest of the world accounts, from the running of the accounting

multipliers, calculated from the SAM for Portugal in 2009, the effects of such increases on the endogenous part of the SAM are summarized by the changes in the macroeconomic aggregates represented in Table 3.

Table 3. Percentage changes in macroeconomic aggregates in the three scenarios of possible increases in informal aspects of the activity of Portugal in 2009

		Scenario A	Scenario B	Scenario C
Gross Domestic Product (GDP) at market prices - Total		2.23	3.64	3.10
Gross National Income (GNI)	Total	2.33	4.88	2.98
	Informal Households	10.93	12.41	2.95
Disposable Income (DI)	Total	2.27	4.76	2.90
	Informal Households	9.55	11.11	3.22

Source: Own calculations.

Thus, the effects of an increase in gross mixed income (scenario A) were felt mainly at the level of the part of informal households in GNI and in DI. The totals of those aggregates, as well as, that of GDP, felt much lower or very identical effects.

In turn, the effects of an increase in compensation of informal labour received by informal households (scenario B) were felt in an identical form as the previous, but with higher impacts.

The effects of an increase in the final consumption of informal households (scenario C) were felt in a more undifferentiated manner in the selected aggregates, although in terms of totals they are higher than those verified with an increase in gross mixed income.

As far as the algebraic version of SAM used in the construction of the above scenarios is concerned, the accounting multipliers are based on assumptions that limit the results and the subsequent analysis of the constructed scenarios, as shown by Santos (2012). However, this methodology is very simple to apply and, from the author's point of view, it represents a good way of exemplifying the aspects that were aimed to be highlighted in this paper. On the other hand, some types of algebraic versions of the SDM could also have been adopted, together (or not) with the SAM, but that is left for the next opportunity.

Much work can be undertaken with SAM and SDM-based approaches in studies in this, and many other different areas.

Using a SAM-based approach, a study carried out with the current, capital and financial accounts of informal households, for instance, would make it possible to conduct other studies in the area of microfinance, namely about the role played by microcredit in the activity of that group and in the

generation of its income and that of the whole economy. Such a study could be complemented and improved by also using a SDM-based approach, from which the behaviour of the stocks and flows of the part of the population linked to the owners of household unincorporated enterprises could be introduced.

4. Summary and concluding remarks

The Social Accounting Matrix (SAM) and the Socio-Demographic Matrix (SDM) are tools that can be used for studying 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.

Using the example of a numerical version, the analysis of the activity of Portugal in 2009 was focussed on the study of the informal aspects of the activity of countries. Using an algebraic version of the SAM, the performance of a number of experiments allowed for the analysis of three scenarios that resulted from changes in that same reality. In that example, our attention was focused on household unincorporated enterprises. In the case of that population group, identified in SDM, our attention was focused on the so called ‘informally employed’, who are the owners’ household unincorporated enterprises, also known as employers and own-account workers, whether they operate with, or without, paid employees. In turn, in the SAM, our attention was focused, on one hand, on the flows of income generated by the informally employed, or the informal labour and, on the other hand, on the aggregate income that was received and expended by informal households – those whose main source of income is informal labour.

With our working tools, for the year being studied, it was possible to quantify the flows of the population of the country, by age groups and the corresponding participation in the labour market and in the supply side of goods and services market. On the other hand, for those groups (not by age), it was also possible to identify the amounts and the underlying structures of the corresponding generated, received and expended income. From the three scenarios that were experimented some macroeconomic effects of possible increments of the informal aspects of the activity of Portugal in 2009 were identified. Those increments were understood both to be an effort to correct a possible undervaluation of the informal aspects of the activity of the studied country, and as an alternative to absorb a part of the existing unemployment.

Our experiments involved increases of 20%: in the number of the informally employed (informal labour) and in the corresponding generated income - scenario A; in the part of the gross national

income relating to the compensation of informal labour received by informal households - scenario B; and in the final consumption of informal households - scenario C.

The effects of those increases were summarised outside the matrix format through the quantification of changes in the GDP_{pm} , Gross National Income and Disposable Income. Greater changes, either in totals, or the parts corresponding to informal households, highlight the impact in scenario B. The benefits of scenarios A and C are greater for the parts corresponding to the informal households in the former, and for the total economy in the latter.

Criticisms can be made, not only of the way in which the above experiments were performed, but also of the constraints imposed by the accounting multipliers (SAM-based model). This was, however, just a simple example of what can be done with the working tools of the SAM and the SDM. With this presentation, from the working papers that supported it (Santos, 2012 and 2013) and the references given, the author hopes to have been able to draw attention to the potentialities of the SAM and SDM-based approaches and to show that much more can be done beyond the example presented. The importance of the informal aspects of the activity of countries varies from country to country; however, such aspects should not be neglected in those countries where the market output and monetary economic activity are increasing, or in countries that are largely dependent on the market but have high rates of unemployment and high levels of taxation and bureaucracy for registered enterprises, such as Portugal. The assessment of the importance of these informal aspects is only possible if they are included in the whole activity of those countries, using, for instance, both a SAM and a SDM. In such a case, the national statistics offices should pay special attention to these aspects, in order to produce meaningful information.

References

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

Pyatt, G. (1988), "A SAM Approach to Modeling", *Journal of Policy Modeling*, 10, 327-352.

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

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

Pyatt, G. and Round, J. (1985), "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.

Santos, S. (2013) Socio-Economic Studies with Social Accounting and Socio-Demographic Matrices. An application to Portugal. Working Paper No.16/2013/ DE (Departamento de Economia) /UECE (Unidade de Estudos sobre a Complexidade em Economia) - ISEG (Instituto Superior de Economia e Gestão) /UL (Universidade de Lisboa), 44p.

Santos, S. (2012) "A SAM (Social Accounting Matrix) approach to the policy decision process". Working Paper No.28 /2012/ DE (Departamento de Economia) /UECE (Unidade de Estudos sobre a Complexidade em Economia) - ISEG (Instituto Superior de Economia e Gestão) /UTL (Universidade Técnica de Lisboa), 83p.

Santos S. (2009), *From the System of National Accounts (SNA) to a Social Accounting Matrix (SAM)-Based Model. An Application to Portugal*, Edições Almedina, Coimbra-Portugal, 194p.

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

Stone, R. (1986a), "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.

Stone, R. (1985), "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.

Stone, R. (1982), "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.

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

Stone, R. (1975), "Towards a System of Social and Demographic Statistics", *Studies in Methods*, Series F, N°18, United Nations, New York, 198p.

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

Stone, R. (1971), “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.

Stone, R. (1966), “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.