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USING THE SOCIAL ACCOUNTING MATRIX TO UNDERSTAND THE GREEK ECONOMIC CRISIS

Charalampos ECONOMIDIS
PANTEION UNIVERSITY OF SOCIAL AND POLITICAL SCIENCES

Apostolos ECONOMIDES
PANTEION UNIVERSITY OF SOCIAL AND POLITICAL SCIENCES

ABSTRACT

The aim of this paper is to compile a Social Accounting Matrix for 2010, a decisive year for the period of crisis of the Greek economy. This SAM can facilitate our understanding of the crisis. More specifically, the SAM shows the changes in the various types of income of institutional agents. From the data contained in the SAM, it emerges that while National income and Disposable income have both declined, this decline is not evenly distributed across each institutional agent. In particular, for the period in question, although the income of Households and General Government shows a decrease, the income of Non-financial and Financial institutions marks an increase.

Keywords: Social Accounting Matrix, Input-output Tables and analysis, Greek economic crisis

JEL Classification: D57, E16

Introduction

The aim of this paper is to compile a Social Accounting Matrix (SAM) for the year 2010. For the purpose of this compilation, the Symmetric Input-Output Table (SIOT) and annual accounts for 2010 of the Hellenic Statistical Authority (HSA) were used.[1] In Greece, many efforts have been made to construct Social Accounting Matrices, which have been used for a variety of purposes (Skountzos et al. 1985).

This particular matrix relates to the period of the crisis and can facilitate our understanding of it[2].Moreover, the matrix depicts the changes in the various types of income as well as its distribution, which is important for attempts to understand the crisis

The second part of the paper presents the main characteristics of the SAM. The third part focuses on SAM basic concept. The fourth part deals with the relationship between the SAM and National Accounts Identities. The fifth part presents a comparison of Input-Output Tables: 2005, 2008, 2009 and 2010.The sixth part presents a comparison of main aggregates of Annual Accounts for 2008 and the SAM for 2010. The final part presents the conclusion.

Characteristics of the Social Accounting Matrix

The SAM constitutes an organized, in table form, presentation of the transfers and transactions which take place within an economy, between its different sectors, factors of production and institutional agents. At the same time, it presents the connection between that economy and the rest of the world. The construction of Social Accounting Matrices enables the development of an enlarged input-output model that may be used to shed more light on economic and social policy (Miller and Blair 2009, 500), while in addition, the main characteristic of a SAM is the incorporation in it of transactions and transfers relating to income distribution in the economy (Miller and Blair 2009, 499-500)
In compiling a SAM, an effort is made to develop highly detailed accounts with respect to what is destined for product and resource markets and, in particular, to describe the characteristics of the workforce, of government policy such as

[1] In the course of compiling the SAM, a number of issues were discussed with the officers of HAS and in particular with Nikolaos Stroblos, whom we would like to thank.
[2] Nevertheless, it has to be taken into account that SAM reflects at the same time both a comprehensive and a inter-sectoral situation in a particular point in time which means that is a static analysis.

taxation and transfers and other forms of income distribution (Miller and Blair 2009, 499-500).

The SAM 2010 covers 67 economic sectors. The institutional agents included are Households, Non-financial institutions, Financial institutions and Government.

Social Accounting Matrix: Basic Concept

According to Miller and Blair (2009, 499) the circular flow of income and expenditures in an economy has been used as the foundation for developing the System of National Accounts (SNA). When the SNA is combined with the Input-Output Accounts, a broader picture of the economy is achieved. I-O Accounts incorporate the transactions and transfers (in terms of activity) among industries engaged in the production (both intermediate and final) as well as the consumption of goods and services. By including a more detailed specification of Labor, Households and Social Institutions in the above framework, it is possible to develop a Social Accounting Matrix (SAM).

The resulting matrix is thus formulated in such a way that its rows and columns correspond to a set of macroeconomic accounting balance equations (Miller and Blair 2009, 501).

The SAM of this paper represents the outcome of a process that adds information to the circular flow of income and expenditures, production and consumption. This process results in the inclusion in the SAM of Savings, Investment, Imports, Exports (which reflect the Balance of Payments) as well as the role of Government. Similarly, the Consumption Account is linked to the various industries of the economy, which are in turn linked to the input-output analysis. The process thus expands the framework as a whole, providing a more detailed view with respect to the role of Labor and Households within the economy (Miller and Blair 2009, 502).

This expansion of the accounting information can be seen in the following list of the accounts that have been added to the SAM:

1. Production (industry)
2. Generation of income (primary input categories)
3. Allocation of primary income (institutional sectors)
4. Secondary distribution of income (institutional sectors)
5. Use of disposable income (institutional sectors)
6. Capital (institutional sectors)
7. Gross fixed capital formation (industry)

8. Financial (financial assets)
9. Rest of the world (current, capital)

The transformation of Generation of Income Account to Allocation of Primary Income and then to Use of Disposable Income and its Secondary Distribution Accounts is evaluated by using the following Distribution Accounts.

D4: Property Income
D5: Current Taxes (on Income, Wealth etc.)
D6: Social Contributions
D7: Current Transfers (Other)
D8: Capital Transfers

All Distribution Accounts are linked to the creation and distribution of Income as elaborated in the Fourth (4^{th}) Quadrant of the SAM (Appendix Table A-2).

Social Accounting Matrix and National Accounts Identities

This particular SAM was constructed on the basis of the "European System of Accounts 1995" (ESA 95) and specifically as presented in Table 8.20 of ESA 95 (Eurostat 1997).

A comparison between Table A-1[3] and Table A-2 [4]of the Appendix shows that the construction of the SAM corresponds to the aggregates of National Accounts and its consistency can be checked on the basis of National Accounts Identities.

More specifically, on the basis of Table 8.20 and the data for SAM 2010 which were calculated, the following holds:

<u>0.Goods and services (products)</u>

I=1. Product + Taxes less subsidies on products + Imports of goods and services = Intermediate consumption + Final consumption + Changes in inventories + Gross fixed capital formation + Exports of goods and services.

351,385 + 26,930 + 70,020 = 156,163 + 203,803 -230 + 39,185 +49,414 (= 448,335)

[3] Table A-1 makes a schematic presentation of a Social Accounting Matrix
[4] Table A-2 focuses on the presentation of Quadrille 4 from the complete Social Accounting Matrix for Greece for the year 2010.

1.Production (industries)

II=2. Intermediate consumption +Taxes less subsidies + NET VALUE ADDED (BASIC PRICES) + Consumption of fixed capital = Product.

156,163 + 159,575 + 35,647 = 351,385

II.1.1 Generation of income (primary input categories)

III=3a. GENERATED INCOME, NET (BASIC PRICES) + Compensation of Employees to the rest of the world = NET VALUE ADDED + Compensation of Employees from the rest of the world.

159,322 + 453 = 159,575 + 200

II.1 Allocation of primary income (institutional sectors)

IV=3b. Property income + NATIONAL INCOME, NET + Property income and taxes less subsidies on production to the rest of the world = Taxes less subsidies on products + GENERATED INCOME, NET (BASIC PRICES) + Property income + Property income and taxes less subsidies on production from the rest of the world.

41,335 + 180,270 + 11,794 = 26,930 + 159,322 + 41,335+ 5,812=233,399

II.2 Secondary distribution of income (institutional sectors)

V=4. Current transfers+ DISPOSABLE INCOME, NET + Current transfers to the rest of the world = NATIONAL INCOME, NET + Current transfers+ Current transfers from the rest of the world.

108,496 + 178,719 +3615 = 180,270 + 108,496 + 2,064 =290,830

II.4 Use of disposable income (institutional Sectors)

VI=5. Final consumption+ Adjustment for the change in the net equity of households on pension funds - SAVING, NET + Adjustment for the change in the net equity of households on pension funds to the rest of the world = DISPOSABLE INCOME, NET + Adjustment for the change in the net equity of households on pension funds + Adjustment for the change in the net equity of households on pension funds from the rest of the world.

203,803 + 0 – 25,084+0 = 178,719 + 0 + 0

Capital (institutional Sectors)

VII=6/7a. Changes in inventories + Capital transfers + Net fixed capital formation + Net acquisitions of financial assets + Capital transfers to the rest of the world = - SAVING, NET+ Capital transfers + Net incurrence of liabilities+ Capital transfers from the rest of the world.

-230 + 3,797 +3,538 + 0 + 218 = -25,084 + 3,797 + 24,473 + 4,137=7,323

Gross fixed capital formation (industries)

VIII=7b. Gross fixed capital formation = Consumption of fixed capital + Net fixed capital formation.

39,185 = 35,647 + 3,538

III.2 Financial (financial assets)

IX=8. Net incurrence of liabilities = Net acquisitions of financial assets + NET LENDING OF THE REST OF THE WORLD

24,473 = 0+ 24,473

Rest of the Word: Current

X=14/15. Exports of goods and services + Compensation of employees from the rest of the world + Property income and taxes less subsidies on production from the rest of the world+ Current transfers from the rest of the world + Adjustment for the change in the net equity of households on pension funds from the rest of the world + CURRENT EXTERNAL BALANCE.

49,414 + 200 + 5,812 + 2,064 + 0 + 28,392 = 85,882

Imports of goods and services + Compensation of Employees to the rest of the world + Property income and taxes less subsidies on production to the rest of the world + Current transfers to the rest of the world + Adjustment for the change in the net equity of households on pension funds to the rest of the world.

70,020 + 453 + 11,794 + 3,615 + 0 = 85,882

Rest of the Word: Capital

XI=16/17. Capital transfers from the rest of the world + NET LENDING OF THE REST OF THE WORLD.

4,137+ 24,473 = 28,610

Capital transfers to the rest of the world + CURRENT EXTERNAL BALANCE

218 + 28,392 = 28,610

Comparison of Input-Output Tables: 2005, 2008, 2009 and 2010

A comparison of the input-output tables for 2005, 2008, 2009 and 2010 shows the following:

Table 1: Comparison of Input – Output Tables: 2005, 2008, 2009, 2010. Mio Euro

	Value Added at Basic Prices	Net Operating Surplus at Basic Prices	Compensation of Employees at Basic Prices	Total Intermediate Consumption at Basic Prices	Imports at Basic Prices	Total Supply at Basic Prices
2005	172,595	80,040	69,313	142,677	60,295	375,567
2008	200,035	94,264	82,926	178,698	87,373	471,106
2009	205,901	90,535	84,914	168,107	68,577	442,586
2010	195,222	81,425	80,493	156,163	67,864	419,249

In conclusion, we can say that the data for 2005, 2008, 2009 and 2010[5] for the Greek economy show an increase in main aggregates between 2005 and 2008, a downturn in the two-year period 2008-2009 (declining growth of aggregates) and in 2010 a significant and sharp decrease that reflects the recession in the Greek economy.

[5]The data for 2005, 2008, 2009 and 2010 are from the Symmetric Input-Output Tables of the corresponding years. There is also an issue regarding the comparison of data due to the fact that they are not at constant prices, but of greater interest here is the trend that can be ascertained.

More specifically, Value Added showed a 15.80% increase between 2005 and 2008, compared to a rise of just 2.9% in the period 2008-2009. In 2010, Value Added decreased by 5.18%.

Intermediate Consumption rose by 25.25% between 2005 and 2008, while in the period 2008-2009 it fell by 5.93%, and by a further 7.11% in 2010.

Up to 2009, Compensation of Employees increased by 22.50%, while the following year, 2010, decrease of 5.20%.

Net Operating Surplus grew by 17.77% between 2005 and 2008, before declining in the next two years by 3.93% and 10.08% respectively.

After an increase of 44.9% in the period 2005-2008, Imports decreased cumulatively in the following years up to 2010 by 22.33%. Nevertheless, the total aggregate change in imports between 2005 and 2010 was an increase of the order of 12.55%.

During the same period, Total Supply followed the same trend as the aforesaid aggregates, rising by approximately 25.44% between 2005 and 2008, before decreasing by 6.05% (2008-2009) and 5.27% (2009-2010).

As for Gross Fixed Capital Formation, the Summary Social Accounting Matrix for 2006 presented by Zografakis (Zografakis and Spathis 2010) shows that aggregate Gross Fixed Capital Formation for that year stood at €42,396 (€8,637 for Households, €26,906 in total for Financial and Non-financial institutions, and €6,853 for Government).
Four years later, according to the Social Accounting Matrix for 2010, it had fallen to €39,185, marking a decrease of the order of 7.57% (Appendix Table A - 1).

As might be expected, in the same period, Savings showed a similar pattern. More specifically, Savings for Households and Financial and Non-financial institutions was positive in 2006 (€10,742 and €19,655 respectively) but negative for Central Government (€-3,959).

In the Social Accounting Matrix for 2010, these magnitudes showed a marked deterioration for Households and Central Government (€-13,234 and €-25,104 respectively), while for Financial and Non-financial institutions the decline was smaller (€13,254) but still significant (32.56%) (Table-2).

Net Generated Income increased in the period 2006-2010. From €152,657 it rose to €159,332 marking an increase of approximately 4.19% (Appendix Table A-1). In contrast, Use of Disposable Income remained virtually unchanged in the same period (€178,266 in 2006, €178,719 in 2010) (Table-2).

Comparison of main aggregates of Annual Accounts for 2008 and the SAM for 2010 at basic prices

The aggregates for 2008 are important because that is when the crisis hit. The aggregates for 2010 are included in the SAM 2010 that has been compiled. The following comparison is made in order to ascertain the course of the Greek economy during the crisis and particularly the figures relating to income, which cannot be estimated using input-output tables but only with the SAM.

Table 2: Comparison of Main Aggregates: 2008, 2010. Basic prices, Mio. Euro

Net national income					
	Households	Government	Financial institutions	Non-Financial institutions	Total
2008	158,191	19,503	5,454	12,582	195,729
2010	143,799	15,433	6,044	14,993	180,270
Net Disposable income					
	Households	Government	Financial institutions	Non-Financial institutions	Total
2008	162,067	22,477	5,929	4,775	196,239
2010	149,819	15,645	6,775	6,479	178,719
Net Savings					
	Households	Government	Financial institutions	Non-Financial institutions	Total
2008	-5543	-19,806	5,929	4,776	-15,744
2010	-13,234	-25,104	6,775	6,479	-25,083
Current External Balance		Net Lending	Final consumption expenditure		
	Rest of the World	Rest of the World	Total		
2008	41,895	-37,900	210,982		
2010	28,392	-24,473	203,803		
Gross fixed capital formation		Property Income			
	Total	Total			
2008	52,607	61,297			
2010	39,185	41,335			

As can be seen, during the period under consideration, all the main aggregates have declined except Net Lending and Current External Balance.

From all the above, it is observed that even though the crisis has severely hit the Greek economy, this was not experienced in the same way across the four Institutions. For example, although Net National Income fell to €180,270 in 2010, the components of Non-Financial and Financial Institutions increased to €14,993 and € 6,044 respectively, while at the same time Households and General Government showed a significant decline. Similar results can be seen for Net Disposable Income and Net Savings (Table 2).

Conclusions

In conclusion, we can say that the input-output Tables data for 2005, 2008, 2009 and 2010 for the Greek economy show an increase in main aggregates between 2005 and 2008, a downturn in the two-year period 2008-2009 (declining growth of aggregates) and in 2010 a significant and sharp decrease that reflects the recession in the Greek economy.

The comparison of main aggregates of Annual Accounts for 2008 and the SAM for 2010 at basic prices is made in order to ascertain the course of the Greek economy during the crisis and particularly the figures relating to income, which cannot be estimated using input-output tables but only with the SAM.

As can be seen, with the exception of Net lending and Current external balance, all the main aggregates have declined. Nevertheless, this decline was not experienced in the same way across the four Institutions. More specifically, in 2010 Net National Income, Net Disposable Income and Net Savings fell for the entire economy. Nevertheless, these same figures increased for Non-Financial and Financial Institutions while at the same time for Households and General Government they have significantly declined.

From the above, it is concluded that one characteristic of the crisis is that the recession derived primarily from the reduction in income of Households and General Government.

Apart from the above, on the basis of the SAM 2010, certain economic policy issues can be raised. For example, lending appears in the SAM 2010, which means questions can be asked such as “how can lending be reduced?”

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Appendix

Table A–1: Schematic presentation of a Social Accounting Matrix, Basic prices, Mio. euro

ACCOUNT			0.Goods and services (products)	TOTAL ECONOMY			
				1.Production (industries)	II.1.1 Generation of income (primary input categories)	II.1 Allocation of primary income (institutional sectors)	II.2 Secondary distribution of income (institutional sectors)
			I=1	II=2	III=3a	IV=3b	V=4
0.Goods and services (product)		I=1	Trade and transport margins	Intermediate consumption 156,163			
TOTAL ECONOMY	1.Production (industries)	II=2	Output 351,385				
	II.1.1 Generation of income (primary input categories)	III=3a		NET VALUE ADDED (BASIC PRICES) 159,575			
	II.1 Allocation of primary income (institutional sectors)	IV=3b	Taxes less subsidies on products 26,930		GENERATED INCOME, NET (BASIC PRICES) 159,322	Property income 41,335	
	II.2 Secondary distribution of income (institutional sectors)	V=4				NATIONAL INCOME, NET 180,270	Current transfers 108,496
TOTAL ECONOMY	II.4 Use of disposable income (institutional Sectors)	VI=5					DISPOSABLE INCOME, NET 178,719
	Capital (institutional Sectors)	VII=6/7a					
	Gross fixed capital formation (industries)	VIII=7b		Consumption of fixed capital 35,647			
	III.2 Financial (financial assets)	IX=8					
ROW	Current	X=14/15	Imports of goods and services 70,020		Compensation of Employees to the rest of the world 453	Property income and taxes less subsidies on production to the rest of the world 11,794	Current transfers to the rest of the world 3,615
	Capital	XI=16/17					
	TOTAL		448,335	351,385	159,775	233,399	290,830

TOTAL ECONOMY				REST OF THE WORLD		TOTAL
II.4 Use of disposable income (institutional Sectors)	Capital (institutional Sectors)	Gross fixed capital formation (industries)	III.2Financial (financial assets)	Current	Capital	
VI=5	VII=6/7a	VIII=7b	IX=8	X=14/15	XI=16/17	
I Final consumption 203,803	Changes in inventories -230	Gross fixed capital formation 39,185		Exports of goods and services 49,414		448,335
II						351,385
III				Compensation of employees from the rest of the world 200		159,775
IV				Property income and taxes less subsidies on production from the rest of the world 5,812		233,399
V				Current transfers from the rest of the world 2,064		290,830
VI Adjustment for the change in the net equity of households on pension funds 0				Adjustment for the change in the net equity of households on pension funds from the rest of the world 0		178,719
VII SAVING, NET -25.084	Capital transfers 3,797		Net incurrence of liabilities 24.473		Capital transfers from the rest of the world 4,137	7,323
VIII	Net fixed capital formation 3,538					39,185
IX	Net acquisitions of financial assets 0				NET LENDING OF THE REST OF THE WORLD 24,473	24,473
X Adjustment for the change in the net equity of households on pension funds to the rest of the world 0						85,882
XI	Capital transfers to the rest of the world 218			CURRENT EXTERNAL BALANCE 28,392		28,610
TOTAL 178,719	7,323	39,185	24,473	85,882	28,610	

Source: Eurostat.1997, 246, table 8.20.

Year 2010 **Table A- 2:** Social Accounting Matrix- Quadrille 4 Current prices Mio. Euro

					Primary Input Categories			Allocation of Primary Income				Secondary Distribution of Income			
				Intermediate Consumption (Total Economy)	Compensation of employees	Other net taxes on production	Operating Surplus net	Households	Non-financial Corpora-tions	Financial Corporations	General Govern-ment	Households	Non-financial Corpora-tions	Financial Corpora-tions	General Govern-ment
	66	TOT_CA	Total intermediate consumption/ Final use at purchasers' prices	146,881	0	0	0	0	0	0	0	0	0	0	0
Generation of income	67	D1	Compensation of employees	80,492											
	68	D29_M_D 39	Other net taxes on production	-2,342											
	69	B2N_B3N	Operating surplus, net	81,424											
Allocation of primary Income	70		Households		80239		53,258	1,281	6,437	2,975	3004				
	71		Non-financial Institutions				24,832	98	909	367	354				
	72		Financial Institutions				3,346	1,518	1,643	4,711	5470				
	73		General Government (formerly taxes minus subsidies)	9,283		-2342	-12	158	682	246	264				
Secondary Distribution of Income	74		Households					143,799				1,198	1,458	1,457	47,702
	75		Non-financial Institutions						14,993			636	0	368	0
	76		Financial Institutions							6,044		2,323	480	0	0
	77		General Government								15,433	41,683	7,101	247	1,012
Use of Disposable Income	78		Households	7,454								149,819			
	79	Net Disposable	Non-financial Institutions										6,479		
	80	Income	Financial Institutions											6,775	
	81		General Government												15,645
Capital Account	82		Households	10,760											
	83		Non-financial Institutions	19,185											
	84	Net Saving	Financial Institutions	313											
	85		General Government	5,382											
	86	K1	Total Economy (Consumption of Fixed Capital)	35,646											
Rest of the World	87		Current (Number)	70,019	453			1,137	2,398	3,574	4,681	511	478	0	1,839
	88		Capital												
	89		Corrections					1		0				0	
	90	SUPBP	Total	428,860	80,692	-2,342	81,424	147,994	27,064	17,920	29,209	196,172	15,997	8,847	66,200

Use of Disposable Income				Capital Account								
Households (P3_S14)	Non-financial Corporations	Financial Corporations	General Government (P3_S13)	Households	Non-financial Corporations	Financial Corporations	General Government	Total Capital Account	Rest of the World			Total use
									Current	Capital	Corrections	TUBP
156,163	0	0	40,750	16,022	14,657	369	4,605	35,655	49,414			428,863
									200			80,692
												-2,342
	0											81,424
									796		0	147,994
									501			27,063
									1,231		-1	17.,920
14,346				1482	1356	34	426		3,283			29,209
									555			196,171
									0			15,997
									0		0	8,847
									723		-1	66,199
											1	157,274
											0	6,479
											0	6,775
					0						1	15,646
-13,234				0	0	0	618	18,575		1,028	3	17,750
	6,479			0	0	0	931	-11,277		694	1	16,014
		6775		0	0	0	0	-6,683		-0,7		404
			-25103	249	0	0	1,779	23,858		2,414		8,580
										24,472		
											1	85,095
				0	0	0	217		28,392		-1	28,608
-1	0	0	0	-3	0	1	0		-1			
157,273	6,479	6775	15,646	17,751	16,014	405	8,580		85,095	28,608	1	1,440,671

Source: Economides and Economidis 2017