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The Social Accounting Matrix, the reduction of borrowing through the reduction of government consumption and its effect on the Greek economy

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Ο Πίνακας Κοινωνικής Λογιστικής, η μείωση του δανεισμού μέσω της μείωσης της κρατικής δαπάνης και η επίδρασή της στην Ελληνική Οικονομία

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ABSTRACT

The aim of this paper is to calculate the impact of the reduction or elimination of net borrowing on the Greek economy. The assumption made for this calculation is that a reduction of net borrowing leads to a reduction of government consumption. The effects on the Greek economy of reducing borrowing are calculated by using the Social Accounting Matrix. The results show that a reduction of borrowing must be replaced by a significant increase in production and the resulting reductions relate primarily to sectors in which the state has sizeable participation, such as education, health, security, public administration and defence services.

KEY WORDS: Input-Output Table, Input-Output Analysis, Sectoral Analysis and Social Accounting Matrix, Greek Economy

ΠΕΡΙΛΗΨΗ

Σκοπός της εργασίας είναι να υπολογίσει τις επιπτώσεις στην ελληνική οικονομία που θα επιφέρει η μείωση ή η εξάλειψη του καθαρού δανεισμού. Η υπόθεση που γίνεται για τον υπολογισμό αυτόν είναι ότι η μείωση του καθαρού δανεισμού οδηγεί στην μείωση της κρατικής κατανάλωσης. Ο υπολογισμός των επιπτώσεων στην ελληνική οικονομία από την μείωση του δανεισμού πραγματοποιείται με την χρήση του Πίνακα Κοινωνικής Λογιστικής. Τα αποτελέσματα δείχνουν ότι την μείωση του δανεισμού πρέπει να την αντικαταστήσει σημαντική αύξηση της παραγωγής και ότι οι μειώσεις που προκύπτουν αφορούν κυρίως στους κλάδους στους οποίους το κράτος έχει μεγάλη συμμετοχή, όπως η εκπαίδευση, η υγεία, η ασφάλεια, η δημόσια διοίκηση και η άμυνα.

ΛΕΞΕΙΣ-ΚΛΕΙΔΙΑ: Πίνακας Εισροών-Εκροών, Ανάλυση Εισροών-Εκροών, Κλαδική Ανάλυση και Πίνακας Κοινωνικής Λογιστικής, Ελληνική Οικονομία

1. Object of the study

The aim of this paper is to calculate the effects of net borrowingf on the Greek economy, with the help of the Social Accounting Matrix (SAM) for Greece for the year 2010. One way of calculating the effect of net borrowing of the Greek economy is to reduce government consumption by the amount of borrowing and ascertain the changes that result for the Greek economy. The aforesaid calculation is based on the assumption that if there was no borrowing, government consumption would have to be reduced.

As is well known, by combining the SAM with input-output analysis, it is possible to develop an extended input-output model, which can then be used to analyse economic and social policy (Miller and Blair, 2009). At the same time, the main characteristic of a SAM is its incorporation of transactions and transfers related to distribution of income in the economy.

The first part of this paper presents the subject-matter of the study. The second part focuses on the principal method used to construct the SAM. The third part presents the method used to estimate the effects of eliminating net borrowing by reducing government consumption, the calculation model, functioning of the model, the specification of vector $\overline{f}$, solution of the model, further assumption, the calculation of the SAM multiplier and describes the 2010 SAM for Greece. The fourth part sets out the paper's results with respect to the calculation of the effects of net borrowing by reducing the government's consumption spending by the amount of borrowing. The final part presents the conclusions.

2. Principal methodology for constructing the SAM

The circular flow of income and expenditures in an economy was used as the foundation for developing the System of National Accounts. When this system is combined with the input-output accounts, a more comprehensive picture of the economy is achieved. The input-output accounts incorporate the relations between industries that are active in the production as well as in the consumption of goods and services. The SAM can be constructed by including in the aforesaid structure a more detailed treatment of labour, households and institutions. This process expands the structure as a whole by providing a more in-depth perspective that takes into account the role of labour and households in the economy (Miller and Blair, 2009).

As already noted, this SAM is the result of adding information to the system of the circular flow of income and expenditures of production and consumption. Moreover, this SAM also includes savings, investment, imports, exports and the role of government. At the same time, the SAM presents the linkage with the industries of the economy by creating an input-output system.

This expansion of account information can be seen in the following list of Eurostat "Annual Accounts" that have been added to the SAM.

1. Production (industries) 2. Income generation (original categories of inputs) 3. Distribution of initial income (institutional agents) 4. Secondary income distribution (institutional agents) 5. Use of disposable income (institutional agents) 6. Capital (institutional agents) 7. Gross fixed capital (industries) 8. Financial (financial data) 9. Rest of world (current, capital).

The Annual Accounts together with the Symmetric Input-Output Table for the Greek economy in 2010 are the main sources used for the construction of the Social Accounting Matrix for that year (Economides and Economidis, 2017).

The SAM tables supplement the construction of Leontief-type tables with additional tables that relate to the factors of production and the various kinds of income. The productive sectors, factors of production and various kinds of income are treated as endogenous, in contrast with other categories such as government, investment and foreign trade, which are considered exogenous with respect to the production system (Round, 1988), (Panethymitakis, 1991).

The SAM resulting in this paper has been constructed in such a way that the rows and columns of the matrix constitute a set of macroeconomic accounting balance equations.

The SAM for 2010 covers 64 industries. The institutional agents included are Households, Non-Financial Corporations, Financial Corporations and General Government.

3. The method used to estimate the effects of eliminating net borrowing by reducing the government's consumption spending by the amount of borrowing

The methodology used here derives from the Input-Output Analysis of W. Leontief specifically for the closed and open Input-Output models and the calculation of multipliers (see Miller and Blair, 2009). It is also based on the methodology for the construction of SAMs and specifically on the calculation of SAM multipliers, primarily by Pyatt and Round (1979), Stone (1985), Round (1988), and Financial Social Accounting Matrix by Aray, Pedauga and Velazquez (2017). In particular, the following papers may be considered as presenting a methodology for eliminating net borrowing: Santos (2004, 2003).

It has also been used in Greece for the calculation of multipliers and path analysis by Panethimitakis (1991), while the SAM has been used for issues relating to taxation and Labour market (Sarris, Zografakis and Karfakis, 2004), the end of fiscal deviations and their implications (Zografakis and Spathis, 2010), as well as for the study of inter-industry relations and income (Skountzos et al., 1985).

3.1 The calculation model

This section refers primarily to the reason why the SAM is divided into two parts, one endogenous and the other exogenous (Miller and Blair, 2009). From the calculation model, as explained below, it emerges that in order to be able to calculate the SAM multipliers, one part of the SAM must be exogenous and one endogenous.

Examining one of the main uses of Input-Output Analysis, Miller and Blair (2009, p. 513) assessed the effect on an economy of changing one element and studied a variety of summary measures referred to as multipliers that can be calculated by using the Leontief inverse matrix.

One of the main issues in deciding to use multipliers in each analysis was the question of which sector would be regarded as exogenous to the input-output model and which sector would be incorporated endogenously into the structure of the model. Naturally, a similar decision must be taken when constructing SAM multipliers.

Because SAMs are designed to include transactions and transfers between all the economic agents in a system, the decision as to which transactions and transfers are treated as exogenous for modeling purposes is a crucial one. According to Round (1988), the government, capital and

"rest of world" are very often viewed as exogenous in the construction of SAMs used for modeling and especially for the calculation of multipliers.

The SAM is defined as the matrix $\bar{Z}$ that is similar to the matrix of endogenous transactions in a closed input-output model. As in a fully closed Leontief model, this matrix $\bar{Z}$ is a square matrix in which the sums of rows and columns are identical and symbolized by $\bar{x}$.

Again, in a manner comparable to the basic input-output framework, part of the economy is defined as exogenously specified as in the "open" input-output model. For this purpose, we define $G = \begin{bmatrix} \bar{Z} & F \\ W & B \end{bmatrix}$

Where **F** is the matrix of exogenous final expenditures, **W** the matrix of exogenously created income and **B** the matrix of exogenous income allocations to final expenditures.

However, the **F** columns are only categories of final demand which have been chosen to be treated exogenously, such as capital expenditures, government expenditures or exports. The **W** and **F** rows must include only categories that have been chosen to be exogenously specified, in this case the value added categories such as capital inputs, government subsidies and imports.

The defining of **F**, **W** and **B** means that the choice has been made to treat certain categories of final demand and value added endogenously; in this case they are included in the matrix partition $\bar{Z}$ which comprises the endogenous portion of the SAM. The row and column indices of $\bar{Z}$ are industries plus each category of final demand and value added which has been chosen to be treated as endogenous.

Lastly, the construction of a SAM model requires a distinction to be made in $\bar{Z}$ between inter-industry transactions and transactions with the categories of final demand and value added. For this purpose, we further partition as $\bar{Z} = \begin{bmatrix} Z & 0 & \bar{C} \\ \bar{V} & 0 & 0 \\ 0 & \bar{Y} & \bar{H} \end{bmatrix}$

where $\bar{C}$ is the matrix of endogenous final-demand expenditures, $\bar{V}$ the matrix of endogenous value-added inputs, $\bar{Y}$ the endogenous matrix of transactions distributing income to value-added categories and $\bar{H}$ the endogenous matrix of transactions distributing institutional and household income to final-demand sectors.

The matrix of SAM coefficients is then defined as $S = Z\bar{x}^{-1}$, where the partitions of **S** that correspond to the partitions of $\bar{Z}$ are defined by

$$S = \begin{bmatrix} A & 0 & C \\ V & 0 & 0 \\ 0 & Y & H \end{bmatrix} \quad (1)$$

A is the matrix of interindustry technical coefficient, **C** is the matrix of endogenous final expenditure coefficients, **V** is the matrix of endogenous value-added input shares, **Y** is the matrix of endogenous coefficients distributing income to value-added categories and **H** is the matrix of endogenous coefficients for distributing institution and household income.

Miller and Blair also define **S** as the sum of the two matrices **Q** and **R**

$$\mathbf{S = Q + R} \quad (2)$$

$$Q = \begin{bmatrix} A & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & H \end{bmatrix} \quad (3)$$

$$R = \begin{bmatrix} 0 & 0 & C \\ V & 0 & 0 \\ 0 & Y & 0 \end{bmatrix} \quad (4)$$

3.2 Functioning of the model

The next step is to calculate the 2010 SAM coefficients and the SAM multiplier for Greece.

In the case of the Greek economy, **A** corresponds to the technical coefficient table, i.e. those coefficients deriving from the data of the first quartile of the Social Accounting Matrix when divided by the total output of each industry (64 x 64), **C** stands for the coefficients of endogenous final consumption expenditure of households and of non-profit institutions serving households (64 x1), **V** stands for the coefficients per unit of endogenous wages, profits and taxes in value-added categories (3 x 64), **Y** stands for the endogenous coefficients of wages, profits and taxes in primary input categories (9 x 3), and **H** stands for endogenous coefficients of each institutional agent in the various kinds of income (9 x 12).

The relevant basic model is as follows

$$\bar{x} = S\bar{x} + \bar{f} \quad (5)$$

$$\bar{x} = \begin{bmatrix} x \\ v \\ y \end{bmatrix} \quad (6)$$

where **x** is the vector, each element of which is the total output of the corresponding sector (1 x 64), **v** is the vector of value added of the corresponding sector (1 x 3), and **y** is the vector of the different kinds of total income of each institutional agent (1 x 9).

Furthermore,

$$\bar{f} = \begin{bmatrix} f \\ w \\ h \end{bmatrix} \quad (7)$$

where **f** is the vector of exogenously specified demand (64 x 3), **w** is the vector of exogenously specified value-added inputs (3 x 3), and **h** is the vector of that part of income which we take as exogenously given (9 x 3).

3.3 Specification of vector $\bar{f}$

We have constructed the **S** matrix of coefficients on the basis of the SAM, in which we treat Government, Capital account and Exports (Current and Capital) and Imports (Current and

Capital) as exogenous variables Round (1988). We thus calculate the multiplier **M**, which we multiply by the vector of $\overline{f}$.

Here the vector of $\overline{f}$ is defined as the exogenous vector of Government, Capital account and Exports (Current and Capital).

3.4 Solution of the model

$$\boxed{\overline{x} = (Q + R)\overline{x} + \overline{f}} \quad (8)$$

$$\boxed{\overline{x} = S\overline{x} + \overline{f}} \quad (9)$$

The solution of the system $\overline{x} = S\overline{x} + \overline{f}$ is the following:

$$\boxed{\overline{x} = S\overline{x} + \overline{f}, \quad \overline{x} - S\overline{x} = \overline{f}, \quad I - S\ \overline{x} = \overline{f}, \quad \overline{x} = \ I - S\ ^{-1}\overline{f}}$$

for inverse **(I-S)$^{-1}$.**

Lastly, the overall SAM multiplier matrix is **M = (I-S)$^{-1}$**

We calculate the multiplier **M**, which we multiply by the vector of $\overline{f}$. This calculation gives $\overline{x}^2$. One way of calculating the effect of net borrowing of the Greek economy is to reduce government consumption (proportionally in the sectors that comprise it) by the amount of borrowing and ascertain the changes that result for the Greek economy. The assumption being that if there were no borrowing, government consumption would have to be reduced.

The vector of exports includes net lending/net borrowing, which in 2010 amounted to €24,472 million, so $\overline{x}$ is affected by net borrowing[3].

We then exclude net borrowing from the Government Consumption and ascertain what changes have been made to $\overline{x}$.

3.5 Further assumptions

The Appendix1 contains the schematic presentation of a Social Accounting Matrix for 2010 at basic prices and in EURO millions (Eurostat, 1996), which shows the data used for the calculation of the multipliers.

Of the 88 columns and rows of the Social Accounting Matrix, we considered 76 sectors to be endogenous and the sectors 73,77,81 General Government, 82, 83,84, 85,86 Capital account 87, 88 (columns for Current Exports, Capital Exports) and sectors 87, 88 rows (rows for Current Imports, Capital Imports) exogenous.

The multiplier table is 76x76. Of the 76 sectors, we do not take into account sector 65 (Total) and sector 66 (Total intermediate consumption).

In Table 1, three categories stand out:

a) From 1 to 64, the industries of production.
b) From 65 to 67, the remuneration of the factors of production and taxes.
c) From 68 to 76, the Allocation of primary income, Secondary distribution of income, Use of disposable income, (without Government Accounts, Capital Account and Exports).

4. Results

Table 1. The effect of proportionately reducing government consumption by the amount of Net borrowing on the sectors output of the SAM (Million, Euro)

			Final demand	Final demand-new	Output	Output new (after reducing government spending	Difference	%
1	CPA_A01	Products of agriculture, hunting and related services	1,451	1.451	10,325	9,094	1,231	12%
2	CPA_A02	Products of forestry, logging and related services	6	6	148	128	20	14%
3	CPA_A03	Fish and other fishing products; aquaculture products; support services to fishing	368	368	1,221	1,100	122	10%
4	CPA_B	Mining and quarrying	65	65	8,748	7,850	898	10%
5	CPA_C10-C12	Food products, beverages and tobacco products	2,072	2.072	20,637	17,877	2,761	13%
6	CPA_C13-C15	Textiles, wearing apparel and leather products	158	158	5,882	5,024	858	15%
7	CPA_C16	Wood and of products of wood and cork, except furniture; articles of straw and plaiting materials	63	63	1,730	1,543	188	11%
8	CPA_C17	Paper and paper products	438	438	2,116	1,879	237	11%
9	CPA_C18	Printing and recording services	59	59	1,039	848	191	18%
10	CPA_C19	Coke and refined petroleum products	4,453	4453	17,672	15,845	1,827	10%
11	CPA_C20	Chemicals and chemical products	906	906	5,679	4,943	736	13%

			Final demand	Final demand-new	Output	Output new (after reducing government spending	Difference	%
12	CPA_C21	Basic pharmaceutical products and pharmaceutical preparations	482	482	5,046	4,011	1,035	**21%**
13	CPA_C22	Rubber and plastics products	380	380	2,444	2,170	274	11%
14	CPA_C23	Other non-metallic mineral products	290	290	3,368	3,227	140	4%
15	CPA_C24	Basic metals	1,959	1,959	6,475	6,074	401	6%
16	CPA_C25	Fabricated metal products, except machinery and equipment	1,171	1,118	5,850	5,114	735	13%
17	CPA_C26	Computer, electronic and optical products	2,114	2,114	3,123	2,939	183	6%
18	CPA_C27	Electrical equipment	1,175	1,175	2,592	2,437	155	6%
19	CPA_C28	Machinery and equipment n.e.c.	3,149	3,149	3,459	3,421	38	1%
20	CPA_C29	Motor vehicles, trailers and semi-trailers	883	883	2,216	2,021	195	9%
21	CPA_C30	Other transport equipment	4,912	4,912	5,594	5,506	88	2%
22	CPA_C31_C32	Furniture; other manufactured goods	912	912	3,452	2,814	638	18%
23	CPA_C33	Repair and installation services of machinery and equipment	27	27	591	445	146	**25%**
24	CPA_D35	Electricity, gas, steam and air-conditioning	185	185	8,932	7,636	1,295	15%
25	CPA_E36	Natural water; water treatment and supply services	0	0	817	678	139	17%

			Final demand	Final demand-new	Output	Output new (after reducing government spending	Difference	%
26	CPA_E37-E39	Sewerage; waste collection, treatment and disposal activities; materials recovery; remediation activities and other waste management services	231	231	2,814	2,455	359	13%
27	CPA_F	Constructions and construction works	18,514	18,514	22,423	21,944	479	2%
28	CPA_G45	Wholesale and retail trade and repair services of motor vehicles and motorcycles	905	905	6,378	5,564	814	13%
29	CPA_G46	Wholesale trade services, except of motor vehicles and motorcycles	4,844	4,844	24,120	21,298	2,822	12%
30	CPA_G47	Retail trade services, except of motor vehicles and motorcycles	2,505	2,505	12,557	10,744	1,813	14%
31	CPA_H49	Land transport services and transport services via pipelines	1,264	639	6,558	5,026	1,532	**23%**
32	CPA_H50	Water transport services	14,581	14,581	15,207	15,123	84	1%
33	CPA_H51	Air transport services	402	402	2,357	2,064	293	12%
34	CPA_H52	Warehousing and support services for transportation	737	737	8,406	7,866	540	6%
35	CPA_H53	Postal and courier services	16	16	1,480	1,257	223	15%
36	CPA_I	Accommodation and food services	0	0	19,294	16,459	2,835	15%
37	CPA_J58	Publishing services	966	966	4,493	3,935	557	12%

			Final demand	Final demand-new	Output	Output new (after reducing government spending	Difference	%
38	CPA_J59_J60	Motion picture, video and television programme production services, sound recording and music publishing; programming and broadcasting services	648	491	2,396	1,980	416	17%
39	CPA_J61	Telecommunications services	287	287	7,994	6,854	1,140	14%
40	CPA_J62_J63	Computer programming, consultancy and related services; information services	1,084	1,071	2,204	1,985	219	10%
41	CPA_K64	Financial services, except insurance and pension funding	323	323	11,045	9,249	1,795	16%
42	CPA_K65	Insurance, reinsurance and pension funding services, except compulsory social security	321	321	2,377	2,100	277	12%
43	CPA_K66	Services auxiliary to financial services and insurance services	0	0	1,576	1,416	160	10%
44	CPA_L68B	Real estate services (excluding imputed rent)	164	164	29,463	25,116	4,347	15%
45		imputed rent	298	298	6,405	5,476	929	15%
46	CPA_M69_M70	Legal and accounting services; services of head offices; management consulting services	504	504	5,284	4,904	380	7%
47	CPA_M71	Architectural and engineering services; technical testing and analysis services	473	247	846	497	348	**41%**
48	CPA_M72	Scientific research and development services	136	136	3,025	2,619	406	13%

			Final demand	Final demand-new	Output	Output new (after reducing government spending	Difference	%
49	CPA_M73	Advertising and market research services	136	136	2,044	1,717	327	16%
50	CPA_M74_M75	Other professional, scientific and technical services; veterinary services	45	45	1,411	1,206	205	15%
51	CPA_N77	Rental and leasing services	0	0	160	139	21	13%
52	CPA_N78	Employment services	0	0	1,586	1,379	206	13%
53	CPA_N79	Travel agency, tour operator and other reservation services and related services	76	76	5,981	5,166	815	14%
54	CPA_N80-N82	Security and investigation services; services to buildings and landscape; office administrative, office support and other business support services	22,967	9,415	23,647	9,994	13,653	**58%**
55	CPA_O84	Public administration and defence services; compulsory social security services	7,839	3,228	11,477	6,283	5,194	**45%**
56	CPA_P85	Education services	7,049	2,913	12,969	7,877	5,092	**39%**
57	CPA_Q86	Human health services	704	289	1,027	562	464	**45%**
58	CPA_Q87_Q88	Social work services	368	166	3,795	3,012	783	**21%**
59	CPA_R90-R92	Creative, arts and entertainment services; library, arc hive, museum and other cultural services; gambling and betting services	93	39	609	436	173	**28%**
60	CPA_R93	Sporting services and amusement and recreation services	0	0	3,578	3,049	529	15%

			Final demand	Final demand-new	Output	Output new (after reducing government spending	Difference	%
61	CPA_S94	Services furnished by member-ship organisations	50	50	1,026	891	136	13%
62	CPA_S95	Repair services of computers and personal and household goods	0	0	2,593	2,206	387	15%
63	CPA_S96	Other personal services	0	0	1,272	1,082	190	15%
64	CPA_T	Services of households as employers; undifferentiated goods and services produced by households for own use	0	0	0	0	0	0
	TOTAL_CA				401,031	335,552	65,479	16%
65	Primary input Categories	Compensation of employees	200	200	77,655	57,726	19,929	**26%**
66		Other net taxes on production	0	0	-2,191	-1,950	-241	11%
67		Operating surplus, net	0	0	76,978	65,581	11,397	15%
68	Allocation of primary income	Households	3,801	3,801	141,597	112,989	28,608	**20%**
69		Non-financial Institutions	855	855	25,646	22,001	3,645	14%
70		Financial Institutions	6,703	6,703	17,469	16,135	1,334	8%
71	Secondary Distribution of income	Households	48,259	48,259	189,802	161,496	28,305	15%
72		Non-financial Institutions	0	0	15,180	13,034	2,146	14%
73		Financial Institutions	0	0	8,595	7,745	849	10%
74	Use of Dispos-able Income	Households	0	0	144,954	123,337	21,617	15%
75		Non-financial Institutions	0	0	6,148	5,279	869	14%
76		Financial Institutions	0	0	6,582	5,931	650	10%
	Total		**176,026**	**151,981**	**1,109,445**	**924,857**	**184,588**	**17%**

Table 1 shows the results of multiplying the Final Demand vector –both with a proportionate reduction of the government's consumption spending by the amount of borrowing and without a reduction– by the multiplier matrix. The assumption being that if there were no borrowing, government consumption would have to be reduced. This shows the results with and without a reduction of government consumption spending and the difference between the two indicates a decrease.

a) For the first 64 sectors which correspond to the sectors of production, the difference between €401,031 million and €335,552 million is €65,479 million (16%),
b) For the next three sectors that comprise Value Added, the difference between €152,442 and €121,357 million is €31,085 million (20.4%),
c) For the remaining 9 sectors which correspond to the kinds of incomes, the difference between €555,972 and €467,948 million is €88,024 million (15.8%).

The sectors with the largest reduction are:

a) Production sectors (services) that are mainly government-related.

Sector 54 Security and investigation services; services to buildings and landscape; office administrative, office support and other business support services (58%).

Sector 55 Public administration and defence services; compulsory social security services (45%).

Sector 56 Education services (39%).

Sector 57 Human health services (45%).

Sector 58 Social work services (21%).

Sector 59 Creative, arts and entertainment services; library, archive, museum and other cultural services; gambling and betting services. (28%).

The above serves to illustrate the effects on the sectors in which government intervenes.

b) Sector 65 Primary input Categories/ Compensation of employees (26%).
c) Sector 68: Allocation of primary income/ Households (20%).

This sector relates to Net national income+Property income

(Property income = Interest+ Distributed income of corporation+Reinvested earning on direct foreign Investment+ Property income attributed to insurance policy holders+Rent).

d) Sector 71: Secondary Distribution of Income/Households (15%).

This sector relates to Total current transfers Households + Total current transfers Non-financial Institutions + Total current transfers financial Institutions + Total current transfers Government + Net Disposable Income + Rest of Word Current transfers.

(Total current transfers = Current transfers Households + Net non-life insurance premiums+ Net non-life insurance claims + Miscellaneous current transfers).

e) Sector 74: Use of Disposable Income/Households (15%).

This sector relates to Final consumption expenditure by Households + Taxes less subsidies on products - Net Saving.

A significant reduction of the households income is observed.

5. Conclusions

The fourth part shows the results of multiplying the Final Demand vector –with a reduction of the government's consumption spending by the amount of borrowing and without a reduc-

tion– by the multiplier matrix. The assumption being that if there was no borrowing, government consumption would have to be reduced.

This shows the results with and without a reduction of government consumption spending and the difference between the two indicates a decrease.

It emerges from the above that in order to replace net borrowing of €24,472 million, production must be increased by approximately for the first 64 sectors which correspond to the sectors of production 16%, for the next three sectors that comprise Value Added 20.4% and for the remaining 9 sectors, which correspond to the kinds of incomes 15.8%.

As noted above, the sectors with the largest reduction are:

a) Production sectors (services) that are mainly government-related.

Sector 54: Security and investigation services; services to buildings and landscape; office administrative, office support and other business support services (58%).

Sector 55: Public administration and defence services; compulsory social security services (45%). Sector 56: Education services (39%). Sector 57: Human health services (45%). Sector 58: Social work services (21%). Sector 59: Creative, arts and entertainment services; library, archive, museum and other cultural services; gambling and betting services (28%).

The above serves to illustrate the effects on the sectors in which government intervenes.

b) Sector 65: Primary input Categories Compensation of employees (26%).

c) Sector 68: Allocation of primary income/ Households (20%). This sector relates to Property income.

d) Sector 71: Secondary Distribution of Income/Households (15%). This sector relates to Total current transfers Households.

e) Sector 74: Use of Disposable Income/Households (15%). This sector relates to Final consumption expenditure by Households + Taxes less subsidies on products - Net Saving (Saving will be reduced, as indicated by the reduction in Sector 74).

A significant reduction of the households income is observed.

The above serves to illustrate the significance of net borrowing.

It is clear from the above what resources the Greek economy needs in order to reduce borrowing.

Notes

1. Many of the calculations were done by Pavlos Mema Panteion University.
2. Here, $\overline{X}$ is not the same as the SAM output because Government, Capital account, exports and imports have been excluded as exogenous variables.
3. In 2010, Gross Domestic Product at current prices totaled €227,318 million. Net borrowing amounted to €24,473 million or 10.67%.

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Appendix 1

Schematic presentation of a Social Accounting Matrix, Basic prices, Mio. euro
(Source: European System of Accounts, ESA 1995. Table 8.20, p. 204)

ACCOUNT			0.Goods and services (products)	TOTAL ECONOMY			
				I. 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 (products)		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

ACCOUNT			0.Goods and services (products)	TOTAL ECONOMY			
				I. 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
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.2 Financial (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

TOTAL ECONOMY				REST OF THE WORLD		TOTAL
II.4 Use of disposable income (institutional Sectors)	Capital (institutional Sectors)	Gross fixed capital formation (industries)	III.2 Financial (financial assets)	Current	Capital	
VI=5	VII=6/7a	VIII=7b	IX=8	X=14/15	XI=16/17	
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	

Matrix **A** derives from the data of cell I vertically and horizontally.
Matrix **C** derives from the data of VI = 5 Final consumption.
Matrix **V** derives from the horizontal data of II.1.1 Generation of Income (primary input categories) or III = 3a.
Matrix **H** derives from the horizontal data of IV = 3b, V = 4 and VI = 5.
Vector **f** derives from the data of VII = 6/7a, VIII = 7b, IX = 8, X = 14/15, XI = 16/17.

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