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ESTIMATING AND COMPARING MULTIPLIER MATRICES: THE ROLE OF RESOURCES AND THE ROLE OF TECHNOLOGY.

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1. Introduction

The modern welfare state is characterized by the large intervention of the government in the economy. This intervention can be quickly and easily measured using some selected ratios over gross domestic product, GDP. In Spain, for instance, the level of government expenditures in the acquisition of final goods and services has raised from 17.3 percent in 1998 to 21.1 percent in 2009, as a percentage of GDP. In the same period, total government spending has gone from 41.1 percent to 45.8 percent of GDP. Given this volume of intervention, the immediate question is the effectiveness of these policies for managing the economy and the business cycle. The own nature of the welfare state rests on entitlements, that is, mandatory outlays such as medical, education and social insurance that are considered as citizens' rights. Discretionary policies not linked to entitled rights remain the area where the government can prioritize its expenditure patterns. For this prioritization, however, an evaluation of the likely economic effects of public demand for final goods and services, once all pull and push interactions are fully internalized, is indispensable.

The usual tool in the economists' toolkit is the concept of multiplier. A multiplier is an evaluation of the general equilibrium effects of an exogenous injection in the economy. These injections will be seen here as the result of a government decision on how much to demand and from what sectors. In an economy composed by N productive sectors such injections can be addresses to any of the N sectors. Since sectors are different in their technology and their collateral interactions with the remaining economic sectors, a same injection will likely produce different overall results. The standard multiplier concept comes from the pioneering contribution of Leontief (1941) in his demand-driven interindustry model. Leontief's model can be seen to be a simple general equilibrium model where the underlying assumptions yield a very convenient and operational linear structure. The linearity of the interindustry model allows a quantification of the multiplier effects based upon easily computed matrix data. Under the linearity, however, lies an assumption of available as needed non-produced inputs. The economy will always produce whatever it is demanded, regardless of any restrictions imposed by the availability of resources. This implicit excess capacity assumption is certainly restrictive (Robinson, 2006).

Most modern formulations accept and adopt this assumption even when trying to reformulate the multiplier concept itself (Pyatt, 1985, Oosterhaven & Stelder, 2002, de Mesnard, 2002, Dietzenbacher, 2005). In fact, the highly regarded reference work in input-output economics of Miller & Blair (2009) devotes a full chapter to the study of multipliers without questioning this excess capacity assumption. With different methodological proposals, multipliers have nonetheless been routinely computed from the demand side with little concern to the actual role of supply. Some exceptions to this rule can be found in Bresinger et al (2010) and Guerra & Sancho (2011). The first authors use a SAM (Social Accounting Matrix) linear model where supply constrains for some outputs are exogenously fixed. This approach, however, does not seem go to the root of the problem since the actual restrictions in supply have to do with given levels of inputs rather than with fixed levels of output. The question should be studied at the level of output producing resources not at the level of outputs themselves since outputs are nothing but a consequence of mixing available inputs given the technology. The second authors, in turn, study the effects of liquidity constraints in the financing of public final demand. Under financing constraints, multipliers may or may not be positive, depending on the combined, and in fact countervailing, volume and substitution effects.

Here we want to reexamine in a quantitative manner the concept of multiplier from the production perspective and do so under the full weight of the restrictions that operate at the level of production. From a methodological perspective, the interest in re-evaluating the role of multipliers is double. First, we focus our attention on the fact that expenditure multipliers reflect the influence of government intervention in the economy, at least from a demand perspective. Second, and under a more general outlook, the concept of strategic or key sector itself should perhaps be reexamined.

In Section II we discuss the role of constraints and its effects under a dual approach, namely, the traditional Leontief one and a more comprehensive approach based on a computational general equilibrium model. Section III presents and discusses some of the results, which are obtain using official data compiled for Spain for 2006. Section IV concludes. In an Appendix we provide extensive and detailed information on multiplier matrices built under different sets of conditions.

II. Constraints in a general equilibrium model

Given its building assumptions, it is known that the Leontief model is inherently linear. Let us consider the case of an N good economy where q_j represent total output in sector j, x_j stand for final demand in sector j, and a_{ji} is the minimal amount of good j needed in the production of 1 unit of good i. The technical coefficients a_{ji} can be compactly represented in a $N \times N$ matrix $\mathbf{A}$. The output of a sector is used for two purposes, one is the satisfaction of final demand, and the other is the fulfillment of the production requirements that make that level of final demand feasible in the aggregate.

If in addition there is proportionality between the level of output and the level of inputs, a condition known as constant-returns-to-scale, the equilibrium or balance between availability of goods (supply) and uses of goods (demand) can be represented by.

$$q_j = x_j + \sum_{i=1}^{N} a_{ji} \cdot q_i \qquad (j = 1, 2, ..., N) \tag{1}$$

We transform (1) to matrix notation:

$$\begin{bmatrix} q_1 \\ q_2 \\ \vdots \\ q_N \end{bmatrix} = \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_N \end{bmatrix} \cdot \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1N} \\ a_{21} & a_{22} & \cdots & a_{2N} \\ \vdots & \vdots & \ddots & \vdots \\ a_{N1} & a_{N2} & \cdots & a_{NN} \end{bmatrix} \cdot \begin{bmatrix} q_1 \\ q_2 \\ \vdots \\ q_N \end{bmatrix} \tag{2}$$

which in compact form can be writen as:

$$q = x + \mathbf{A} \cdot q \tag{3}$$

The reduced form of the equilibrium condition (3) is now easily obtained using simple algebra. First:

$$q - q \cdot \mathbf{A} = (I - \mathbf{A}) \cdot q = x \tag{4}$$

From here either in absolute values or in differential ones we can solve and obtain the solution for quantities.

$$\begin{aligned} q &= (I - \mathbf{A})^{-1} \cdot x = \mathbf{M} \cdot x \\ \Delta q &= (I - \mathbf{A})^{-1} \cdot \Delta x = \mathbf{M} \cdot \Delta x \end{aligned} \tag{5}$$

In (5) matrix **M** represents the so-called multiplier matrix since it provides information on the effects on equilibrium quantities of a change in final demand. In calculus notation:

$$\frac{\partial q_j}{\partial x_i} = m_{ji} \qquad (j, i = 1, 2, \ldots, N) \tag{6}$$

In a more complete equilibrium model, such as CGE models, endogenous variables include both quantities *q* and prices *p*. Final demand is now made endogenous by incorporating feedbacks between prices and private demand, for instance, which follow the rules of demand theory. Some components of final demand remain exogenous. This is the case of discretionary demand for goods and services by the government, including both demand for public consumption and demand for public investment. Let us retain the notation *x* to represent this exogenous *N* vector which is part of final demand but depends on policy decisions. Since CGE models are non-linear by construction the implicit multiplier matrix should made this dependence explicit.

In fact, it can be mathematically shown (Cardenete & Sancho, 2011) that this multiplier matrix takes the form:

$$\mathbf{M}(q, p, x) = \left(I - \left(\Delta_{qq} + \Delta_{qp} \cdot \left(I - \Delta_{pp} \right)^{-1} \cdot \Delta_{pq} \right) \right)^{-1} \cdot \left(\Delta_{qx} + \Delta_{qp} \cdot \left(I - \Delta_{pp} \right)^{-1} \cdot \Delta_{px} \right) \tag{7}$$

where Δ_{qx}, for instance, represent the matrix of partial derivatives of quantities *q* regarding exogenous demand *x* computed at the equilibrium correspondence, and similarly for the rest of notation. The new multiplier matrix **M**(*q*, *p*, *x*) can be seen to be square of dimension $N \times N$ and its elements capture the effects on quantities q of a small change in public demand x:

$$\frac{\partial q_j}{\partial x_i} = m_{ji}(q, p, x) \qquad (j,\ i = 1, 2, \ldots, N) \tag{8}$$

These derivatives cannot be observed directly and a numerical approach is therefore needed. This is what we do here: We take a benchmark equilibrium solution and perturb it with a small change in public demand. A new counterfactual equilibrium is computed and we then compare benchmark quantities with counterfactual ones. By sequentially modifying public demand for each and all of the N goods, we generate a $N \times N$ matrix that collects the multiplier values at each of the (j,i) nodes.

The adjustment to a new equilibrium after the external shock in public demand is absorbed is examined using a set of alternative scenarios. This will allow us to check the role played by the availability of resources as well as the substitution possibilities in the technology that governs production. We consider a classical Leontief scenario and obtain the standard Leontief inverse **L** (in this case **M** = **L**). Next we restrict the use of primary factors, labor and capital, in a scenario with empirically assigned substitution elasticities following the guidance of the econometrics literature. We then allow for unemployment to be variable, again using an empirical elasticity value. Finally we convert the CGE model into a universal Leontief model by fixing all substitution elasticities to be equal to zero; we also relax the availability of labor so we can compare the results with those of the standard flex CGE model. In practice this means estimating the CGE marginal multiplier values in (8) by using en empirical derivative:

$$m_{ji} = \frac{\partial q_j(x/u)}{\partial dx_i} = \lim_{\Delta x_i \to \infty} \frac{\Delta q_j}{\Delta x_i} = \lim_{\Delta x_i \to \infty} \frac{q_j(x + \Delta x_i / u) - q_j(x/u)}{\Delta x_i} \tag{9}$$

In expression (9) $q_j(x/u)$ symbolizes the parametrical dependency of equilibrium quantities *q* on exogenous public demand *x*, conditional to the characteristics of the labor market as represented by unemployment *u*.

III. Data and model details.

III.1. The SAM database

The 2006 Social Accounting Matrix for Spain includes a total of 38 accounts, including 26 productive sectors, two primary factors (labour and capital), a capital (savings/investment) account, a government account that collects three broad categories of taxes (an income tax, a payroll tax, and 4 distinct indirect taxes), a private consumption and a foreign sector. Because all agents and accounts satisfy a budget constraint, the matrix structure is such that column sums and row sums coincide for each account. A simplified scheme representing the SAM-2006 is presented below.

Most of the information used in compiling the SAM-2000 comes from the symmetric Input-output Table published by the National Statistics Institute. Data on taxes comes from the Table and the disaggregation in the National Product and Income Accounts for the same year. The allocation of income to Households is also taken from the information contained in the National Accounts. The net transfers from abroad include the balance between purchases of non-residents within the national territory and the outlays of residents abroad. It is therefore interpreted as a source of income for the representative consumer in the underlying model. Private and Foreign Savings are obtained taken from the Income Accounts and Trade data, respectively. Total savings include public savings as well and the total is checked to verify the savings and investment closure rule. From the SAM, GDP is computed both from the income and expenditure sides to verify aggregate mutual consistency. For a thorough view of SAM compilation using Spanish data Uriel *et al* (2005) is a good reference.

SAM-2006	**Production**	**Factors**	**Households**	**Government**	**Capital**	**Foreign**
Production	*Intermediate demand*		*Private demand*	*Public demand*	*Investment demand*	*Exports*
Factors	*Value added*					
Households		*Factorial income*		*Net transfers*		*Net transfers*
Government	*Indirect taxes*	*Payroll taxes*	*Income taxes*			
Capital			*Savings*	*Savings*		*Savings*
Foreign	*Imports*					

III.2. The CGE model

Producers

Production takes place under a constant-returns-to-scale technology. Gross output X_i for the set of tradable goods is a CES aggregate between domestic output q_i^D and imports q_i^M :

$$q_i = \theta_i \left(\alpha_i \cdot (q_i^D)^{\rho_i} + (1-\alpha_i) \cdot (q_i^M)^{\rho_i} \right)^{\frac{1}{\rho_i}} \tag{10}$$

We therefore use the well established and already classic Armington (1969) assumption. For non tradable goods we have $q_i = q_i^D$. Domestic production for good *i* combines in fixed proportions value-added VA_i and intermediate inputs q_{ji}. Value-added, in turn, is also a CES aggregator between labour *L* and capital *K*:

$$q_i^D = \text{Min}\left\{ \frac{VA_i}{v_i}, \left\{ \frac{q_{ji}}{a_{ji}} \right\}_{j=1,\dots,n} \right\} \tag{11}$$

$$VA_i = \eta_i \cdot \left(\beta_i \cdot (L_i)^{\delta_i} + (1-\beta_i) \cdot (K_i)^{\delta_i} \right)^{\frac{1}{\delta_i}}$$

Production plans are the result of profit maximization under the technological restrictions that, given the assumptions, reduces to cost minimization. All technical coefficients $\mu_i, \alpha_i, \eta_i, v_i, a_{ji}$ in (10) and (11) are obtained from the database by way of calibration.

Households

There is one representative consumer whose demand for good *i* comes from assigning disposable income m_H between consumption C_i and savings S_H using either a Cobb-Douglas aggregator:

$$U(C_1, C_2, \dots, C_n, S_H) = \prod_{i=1}^{n} C_i^{\gamma_i} \cdot S_H^{\gamma_S} \tag{12}$$

or a Leontief one:

$$U(C_1, C_2, ..., C_n, S_H) = \text{Min}\left(\left\{ \frac{C_i}{\gamma_i} \right\}_{i=1,2,...,N}, \frac{S_H}{\gamma_S} \right) \quad (13)$$

with non-negative utility coefficients normalized by

$$\sum_{i=1}^{N} \gamma_i + \gamma_S = 1 \quad (14)$$

Maximizing utility under the income constraint yields demand for current consumption and for future consumption (savings). Facing an income tax rate of t_H, disposable income turns out to be:

$$m_H = (1 - t_H) \cdot \left(\omega \cdot (1 - u) \cdot \bar{L} + r \cdot \bar{K} + NTX + NTH + b_u \cdot \omega \cdot \bar{L} \cdot u \right) \quad (15)$$

The first two terms are households' factor rents from selling the endowments of labour $\bar{L}$ and capital $\bar{K}$ in the factors markets. The third and fourth terms are aggregates of net external and government transfers to the household, and the fifth term represents unemployment benefits as a proportion $0 < b_u < 1$ of unused labour income (as weighted by the unemployment rate u). The consumer faces prices p_i affected by ad-valorem indirect tax rates t_i.

Non-produced inputs

In the CGE model the supply of capital is fixed but mobile among sectors. In the labor market, however, there is the possibility of the labour endowment not being fully used. We incorporate this feature using a wage curve (Blanchflower and Oswald, 1994) that reflects the relationship between the real-wages and unemployment. The specific implementation is adopted from Kehoe et al. (1995):

$$\frac{\omega}{cpi} = \left(\frac{1-u}{1-\bar{u}}\right)^{\frac{1}{\varepsilon}} \tag{16}$$

where ε is an elasticity governing the relationship between the real wage and the unemployment rate. In expression (A.5) *cpi* is a consumers' price index whereas $\bar{u}$ represents the benchmark unemployment rate.

Government

The government collects indirect taxes and income taxes. This tax revenue T allows the public sector to buy goods for public consumption and investment, represented by x, and undertake net social transfer operations with other agents in the economy G_{NT} (such as unemployment compensation and other net transfers). The expenditure for public goods is taken to be fixed, thus government's savings S_G is endogenous and equal to its deficit G_D (or surplus, if positive) since tax receipts and net transfers are endogenous:

$$S_G = G_D = T - G_{NT} - x \tag{17}$$

with $G_{NT} = NTH + b_u \cdot \omega \cdot \bar{L} \cdot u$.

Foreign Sector and Macroeconomic Closure Rule

The trade balance might be positive (surplus) or negative (deficit). Furthermore, macroeconomic consistency rules establish that the trade balance has to be translated into foreign sectors' savings S_F , which is a component of total savings.

$$S_F = P_q \cdot (q^M - \bar{E}^X) + NTX \tag{18}$$

The external sector's savings corresponds to the difference between total imports q^M and total exports $\bar{E}^X$, in value terms, plus net transfers from the foreign sector NTX. The price of the trade balance P_q is a price index that refers to a weighted average of traded goods valued at final gross prices.

The model's macroeconomic closure rule refers then to the balance between investment and savings. Total investment I is determined by all economic agents' savings and is given by:

$$I = S_H + S_G + S_F \tag{19}$$

Total investment is sectorally distributed, in turn, using a fixed coefficient technology. When the government increases public expenditure, even in the differential terms implicit in the computation of multipliers, this tends to increase the government deficit, reducing overall savings and driving down investment levels.

Equilibrium

In the CGE model, equilibrium is described by a vector of prices $p*$ for the N commodities, factors' prices $(\omega*, r*)$, a vector $q*$ of total output, a level of gross capital formation $I*$, a level of public deficit S_G^*, unemployment rate $u*$, and a level of tax revenues $T*$ that fulfil the following equilibrium conditions:

i) Markets for all goods clear: Total equilibrium output is fully used in intermediate demand, households' demand, gross capital formation, public consumption and net exports.

ii) The market for capital clears. The market for labour may not clear but demanded labour is equal to adjusted labour endowment by benchmark unemployment (rigid case) or level endogenous (flexible case).

iii) Total tax revenues coincide with total tax payments by all agents facing the different tax instruments. Tax payments depend upon the different tax bases, which are endogenously determined.

iv) Total equilibrium investment equals total equilibrium savings

v) The final price of each commodity in the economy must equal the sum of the values of all the inputs used to produce it. This valuation principle reflects the constant-returns-to-scale assumption and perfect competitive markets. Thus in equilibrium producers make zero profits and prices coincide with average costs.

Because of Walras' Law, we need to select a *numeraire* to solve the system for relative prices. The selected price is labor's net rental price.

Calibration

Technical and behavioural coefficients for all agents are determined by way of calibration. Two polar labour market elasticities are considered. In the rigid case we take $\varepsilon = 0$ whereas $\varepsilon = \infty$ in the flexible case. Calibration entails selecting numerical values for coefficients so that when used in the model they reproduce the observed empirical data in the SAM as an equilibrium (Mansur & Whalley, 1984). This equilibrium is referred as benchmark or initial equilibrium. The GAMS software module computes the benchmark equilibrium and uses it as an internal basis for subsequent simulation runs. This guarantees very fast compilation and execution time and in practice yields convergence in all studied cases.

IV. Multiplier matrices.

Tables 1 through 3 show a summary of the main results. Table 1 presents the aggregate multiplier values for 26 sectors for 5 different multiplier matrices. Each value accrues the column sum that is generated by a unitary policy injection into the system undertaken by the government. In column one of Table 1 we have the usual multiplier values obtained from the classical Leontief inverse (i.e. $\mathbf{M} = \mathbf{L}$). The remaining matrices report marginal multiplier values computed from several CGE scenarios. Thus $\mathbf{M}(1)$ gives us multiplier values for a set of empirically relevant elasticities under a fix unemployment condition. $\mathbf{M}(2)$ in contrast assumes unemployment to be responsive to economic conditions while maintaining the same set of substitution elasticities. $\mathbf{M}(3)$ and $\mathbf{M}(4)$ report values for a CGE universal Leontief model where unemployment is fixed (case $\mathbf{M}(3)$) or variable (case $\mathbf{M}(4)$). Tables 2 and 3 provide information on a decomposition of the total multiplier value distinguishing between on and off diagonal effects. This distinction allows us to check whether the impact of the equilibrium re-allocations fall mainly on the receiving sector, or not.

A look at the results indicates that overall effects are substantially different depending on the version of the model. Under the excess capacity Leontief assumption a common unitary injection in all sectors at once would rise total gross output in 54,3 units. The same unitary injections under the CGE $\mathbf{M}(1)$ scenario, for instance, would increase output at a much lower rate, i.e. only 3,75 units. We can see the presence of negative multiplier values, a result unheard of in classical input-output economics. In fact, when we look at Tables 2 and 3 we see that own effects are remarkably stable whereas off-sector values are mostly negative, a consequence of the strong substitution effects affecting the counterfactual equilibrium in the rest of sectors. These substitution effects are the result of the supply constraints imposed on the availability of primary factors. Even when the labor market is endowed with some flexibility, results are still conditioned by the degree of complementarity between aggregate labor and aggregate capital levels. A comparison of columns **M**(1) and **M**(3) shows that under a common rigid labor market scenario, substitution effects acting via prices (active in **M**(3) but not in **M**(4)) reduce the aggregate multiplier impulse (3,75 versus 8,24). The situation reverses when we compare **M**(2) with **M**(4), both with a flexible labor market, since now the impulse is higher under **M**(2) (2,32 versus 0,62). This situation describes a possible crowding-out scenario explained by the fact that in this flexible scenario the real wage rate does not adjust as quickly, reducing household's income and affecting in turn private demand.

It is finally worth commenting that standard Leontief and universal Leontief produce critically different results (54,28 in **L** versus 8,2 and 0,62 in **M**(3) and **M**(4), respectively). The presence of the excess capacity assumption, rather than sharing a common fixed coefficient structure in production, seems to be the driving force in explaining the substantially different multiplier values.

V Concluding remarks

We have computed and compared multiplier matrices under different scenarios using a standard Leontief model and a collection of different CGE models. They provide information that allows us to test and quantify the role played by the implicit assumption of excess capacity in input-output economics. The conclusion, even if preliminary, is that the assumption plays a remarkable role in the determination of multipliers. Government projects that are “small” relative to the size of the economy may be well approximated by the standard multipliers since for “small” projects the aggregate general equilibrium constraints may have little incidence. For macro policies, however, such as the implementation of major infrastructures or bail-out programs the standard multipliers will likely exaggerate the economic effects. It is precisely under these situations that resource constraints play a major role that cannot be discarded if we want to provide sound advice to policy officers.

TABLE 1. Aggregate multipliers

	L	***M(1)***	***M(2)***	***M(3)***	***M(4)***
S1. Agriculture	1,4620	-0,5431	-1,0535	1,0536	-1,6564
S2. Fisheries	1,0394	0,3305	0,3238	0,3512	0,3160
S3. Coal	1,0211	0,5179	0,6651	0,0575	0,8391
S4. Petroleum and natural gas	1,0056	0,9825	0,9791	0,9931	0,9751
S5. Non energy extractives	1,0974	0,3106	0,2238	0,5820	0,1212
S6. Petroleum refining	2,0322	1,3076	1,2456	1,5015	1,1723
S7. Electricity	3,1015	0,2129	-0,2273	1,5897	-0,7472
S8. Gas	1,2480	0,8665	0,5692	1,7964	0,2180
S9. Water	1,0640	-0,5126	-0,5095	-0,5225	-0,5057
S10. Foodstuffs and tobaco	2,7998	0,4838	0,4052	0,7296	0,3123
S11. Textiles and Leather	1,3781	0,7127	0,7598	0,5654	0,8155
S12. Wood products	1,5952	0,2936	0,2873	0,3133	0,2799
S13. Chemicals	1,8607	0,6111	0,5836	0,6971	0,5511
S14. Building materials	2,0411	0,0953	0,0408	0,2657	-0,0236
S15. Iron and steel industry	2,2508	0,5351	0,4348	0,8487	0,3163
S16. Metal products	2,0267	0,2699	0,3203	0,1125	0,3797
S17. Machinery	2,1037	0,6224	0,6466	0,5467	0,6752
S18. Vehicles	2,1284	0,8703	0,8735	0,8603	0,8772
S19. Other transportation elements	1,3384	0,5763	0,6350	0,3924	0,7045
S20. Other manufacturing	2,2511	0,2646	0,3071	0,1315	0,3573
S21. Construction	6,2904	-0,0082	0,0119	-0,0711	0,0356
S22. Commerce	3,5528	-1,7232	-1,9333	-1,0660	-2,1815
S23. Transportation and communications	2,8001	-0,3583	-0,5430	0,2195	-0,7613
S.24 Other services	2,2807	-0,6793	-0,6165	-0,8757	-0,5423
S25. Marketable public services	2,2151	-1,1277	-1,5049	0,0522	-1,9505
S26. Non-marketable public services	2,2962	-1,1607	-0,6078	-2,8879	0,0448
Total	***54,2805***	***3,7503***	***2,3166***	***8,2367***	***0,6225***

TABLE 2: Principal diagonal multiplier values

	L	*M(1)*	*M(2)*	*M(3)*	*M(4)*
S1. Agriculture	1,0634	1,0534	1,0480	0,8557	1,0416
S2. Fisheries	1,0003	1,0001	1,0001	0,9996	1,0001
S3. Coal	1,0029	1,0023	1,0024	1,0028	1,0025
S4. Petroleum and natural gas	1,0007	1,0006	1,0005	1,0001	1,0005
S5. Non energy extractives	1,0078	0,9999	0,9995	1,0060	0,9990
S6. Petroleum refining	1,1173	1,1152	1,1143	1,0959	1,1132
S7. Electricity	1,2337	1,2134	1,2079	1,1648	1,2014
S8. Gas	1,0012	0,9986	0,9976	0,9903	0,9964
S9. Water	1,0032	1,0009	1,0009	1,0010	1,0009
S10. Foodstuffs and tobaco	1,1950	1,1874	1,1846	1,0920	1,1813
S11. Textiles and Leather	1,1509	1,1483	1,1491	1,1706	1,1502
S12. Wood products	1,2461	1,2275	1,2274	1,2276	1,2274
S13. Chemicals	1,1619	1,1501	1,1496	1,1453	1,1490
S14. Building materials	1,1281	1,0528	1,0512	1,0788	1,0495
S15. Iron and steel industry	1,1124	1,0756	1,0733	1,1030	1,0705
S16. Metal products	1,1003	1,0336	1,0352	1,0131	1,0370
S17. Machinery	1,1203	1,0350	1,0367	1,0109	1,0388
S18. Vehicles	1,2614	1,2250	1,2251	1,2244	1,2253
S19. Other transportation elements	1,1302	1,1182	1,1187	1,1124	1,1193
S20. Other manufacturing	1,1124	1,0645	1,0660	1,0677	1,0678
S21. Construction	1,5764	0,5187	0,5250	0,3913	0,5325
S22. Commerce	1,1028	0,9885	0,9745	0,7002	0,9579
S23. Transportation and communications	1,3238	1,2460	1,2371	1,1535	1,2267
S.24 Other services	1,1918	0,9583	0,9646	0,9321	0,9721
S25. Marketable public services	1,0808	0,9325	0,9052	0,5219	0,8731
S26. Non-marketable public services	1,0141	0,9953	1,0028	1,0920	1,0117
Total	***29,4390***	***27,3415***	***27,2975***	***26,1528***	***27,2456***

TABLE 3: Off-sector multiplier values

	L	***M(1)***	***M(2)***	***M(3)***	***M(4)***
S1. Agriculture	0,3986	-1,5965	-2,1015	0,1979	-2,6980
S2. Fisheries	0,0391	-0,6696	-0,6763	-0,6484	-0,6841
S3. Coal	0,0182	-0,4844	-0,3372	-0,9453	-0,1634
S4. Petroleum and natural gas	0,0049	-0,0181	-0,0214	-0,0070	-0,0254
S5. Non energy extractives	0,0896	-0,6893	-0,7757	-0,4240	-0,8778
S6. Petroleum refining	0,9149	0,1924	0,1313	0,4056	0,0591
S7. Electricity	1,8678	-1,0005	-1,4352	0,4249	-1,9486
S8. Gas	0,2468	-0,1321	-0,4284	0,8061	-0,7784
S9. Water	0,0608	-1,5135	-1,5103	-1,5235	-1,5066
S10. Foodstuffs and tobaco	1,6048	-0,7036	-0,7794	-0,3624	-0,8690
S11. Textiles and Leather	0,2272	-0,4356	-0,3893	-0,6052	-0,3347
S12. Wood products	0,3491	-0,9339	-0,9401	-0,9143	-0,9475
S13. Chemicals	0,6988	-0,5390	-0,5660	-0,4482	-0,5979
S14. Building materials	0,9130	-0,9575	-1,0105	-0,8131	-1,0731
S15. Iron and steel industry	1,1384	-0,5405	-0,6385	-0,2543	-0,7542
S16. Metal products	0,9264	-0,7637	-0,7149	-0,9006	-0,6573
S17. Machinery	0,9834	-0,4126	-0,3901	-0,4642	-0,3636
S18. Vehicles	0,8670	-0,3547	-0,3517	-0,3641	-0,3481
S19. Other transportation elements	0,2082	-0,5419	-0,4837	-0,7200	-0,4148
S20. Other manufacturing	1,1387	-0,7999	-0,7589	-0,9362	-0,7105
S21. Construction	4,7140	-0,5269	-0,5132	-0,4624	-0,4969
S22. Commerce	2,4500	-2,7117	-2,9078	-1,7662	-3,1394
S23. Transportation and communications	1,4763	-1,6043	-1,7802	-0,9340	-1,9880
S.24 Other services	1,0889	-1,6376	-1,5811	-1,8078	-1,5144
S25. Marketable public services	1,1343	-2,0602	-2,4101	-0,4697	-2,8236
S26. Non-marketable public services	1,2821	-2,1560	-1,6107	-3,9799	-0,9669
Total	***24,8413***	***-23,5914***	***-24,9809***	***-17,9163***	***-26,6232***

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