1. INTRODUCTION

The general equilibrium theory has evolved into a very active research program, especially from the last quarter of the twentieth century, in which the economic authorities saw in the development of this theory, an empirical application very useful for economic purposes. The result of this intense performance has generated an interesting variety of uses in the field of fiscal, environmental, income distribution or impact economic analysis, including development policies. The starting point of this set of applications it is possible to located in the theory of Arrow and Debreu (1954) with their definition of competitive equilibrium.

In this sense, Computable General Equilibrium models (CGE) have the ability to represent the functioning of markets at macroeconomic level, emboding consistency in microeconomic terms. Depicting and quantifying the functioning of the economy in both a general and a particular framework, and the behaviour of the different economic agents. Allowing, thus, to make sectoral and aggregate evaluations.

These versatile models let the evaluation of impact or shock analysis in the economy too. Therefore, it is possible to face this kind of analysis focusing on techniques used originally in the interindustrial analysis. In this case, the object of this research is the calculation of key sectors in an economy using a general equilibrium model comparing their results with that obtained over the basis of a linear model. The empirical work will be address to the Andalusian economy during the period 1990-2005, and the environment of comparison will be a CGE model in front a linear model based, in both cases, in the use of the Hypothetical Extraction Method´s approach (Dietzenbacher et al., 1993). Allowing us to observe the effects associated to the hypothetical elimination of an economic sector of the system. Providing, thus, an instrument of anlysis very useful for economic decisions.

Early empirical works in this sense are in the works of Cardenete and Sancho (2006, 2012) in which they reconsidered the assessment and notion of strategic sectors within the economy.

The results show sensible differences between linear and CGE models in order to an overestimation of importance of sectors in linear models due to the non-consideration of constraints that have place in the CGE model, a more limitated assesments of impacts and a results closer to the economic reality.

The structure of the chapter is organized as follows, Section 2 provides a conceptual description of the hipothetical extraction method model, in Section 3 the CGE model is presented, Section 4 contains a description of the database used (Social Accounting Matrices), later, in Section 5 thee results of the CGE model in front of the linear model are show, and finally, in section 6, the most relevant conclusions of the work developed are presented.

2. THE HYPOTHETICAL EXTRACTION METHOD

This methodology is focused on the analysis of the multiplier effects pointing to the importance of a sector simulating their absence and measuring counterfactually in terms of lost output. Firstly proposed by Paelinck et al. (1965), later reinforced and filtered by Strassert (1968), Schultz (1977), Cella (1984), Clements (1990), Heimler (1991). In the evolution of the extraction methods it is possible to find in the work of Dietzenbacher et al. (1993) a versión with separated effects in backward (the sectors whose inputs are required) and forward effects (the sectors that receive the outputs), using partial eliminations of every sector. In this sense is considered non-complete hypothetical extraction method, using demand model for backward linkages and supply model to obtain forward linkages, despite this feature (partial extraction), it is considered the more evolved and synthesising version of all. The implicit assumption that consider all the former aproaches is linearity of the elements of the economy.

Under this methodology it is possible to obtain the effects of partial eliminations through the measurement of the difference of the economic activity within and without the activity extracted.

Originally, the detection of key sectors have been directly addressed to extract information from Input-Output Tables (IOTs). These are useful databases to describe intersectoral economic relations, containing certain restrictions inside, which in terms of behavior can lead to biased estimations. Some limitations of the interindustrial model were identified by Diamond (1974,1976). These works revealed the apparent lack of influence on the analysis of key sectors when final demand is left unexplained. Diamond argued these problems closing the Input-Output model by the insertion of demand within the subsystem and using alternative coefficient vectors. However, this models that not contain a breakdown of components of final demand, so they do not account for the full flow of income within the system.

For this last purpose, it is very useful to use a Social Accounting Matrix (SAM) to realize the pay back for the income factors to their owners and, in this sense, closing the circular flow of income. A SAM comprises a more detailed economic structure and lets a more complete comprehesion of the economy as a whole, incorporating and modeling households and primary factors as active elements of the economy. This extensión is a valuable contribution, but keeping the linearity of the system.

When the assumption of linearity is put aside and and the classic dichotomy[1] pointed out by Oosterhaven (1996) is questioned. It appeared the alternative to analyze and find equilibrium price and quantity simultaneously through a CGE model. This is what propose Cardenete et al (2013), where they performed a sequential extraction sectors and recomputed in each extraction levels of gross output and output sector through the equations of behavior of the economic agents comparing their results with a benchmark equilibrium. This extension of method of extraction not only changed output levels (as might be expected), but the order of the effects on the output when compared with the interindustrial (linear) model. Similarly, using a set of CGE simulations, Cardenete and Sancho (2012) modeled also the matrices of multipliers that are critically dependent on resource constraints and adjustments of general equilibrium, proving the existence of a limited and suggestive empirical evidence of missing links in linear models, which should be incorporated, for a broader assessment of changes in the system.

For the application of Hypothetical Extraction Method, the starting point will be the elements of interindustrial analysis, an economy with a matrix A of technical coefficients and an exogenous vector of final demand D. Be X the vector of gross output, partitioning the matrix and subscript vectors representing economic flows between sectors of the economy, the total output could be expressed as:

[1] Equilibrium in prices and quantities are independently determine of each others.

$$X = AX + D = \begin{pmatrix} A_{11} & A_{12} & \cdots & A_{1j} & \cdots & A_{1n} \\ A_{21} & A_{22} & \cdots & A_{2j} & \cdots & A_{2n} \\ \cdots & \cdots & \ddots & \cdots & \cdots & \cdots \\ A_{j1} & A_{j2} & \cdots & A_{jj} & \cdots & A_{jn} \\ \cdots & \cdots & \cdots & \cdots & \ddots & \cdots \\ A_{n1} & A_{n2} & \cdots & A_{nj} & \cdots & A_{nn} \end{pmatrix} \begin{pmatrix} X_1 \\ X_2 \\ \vdots \\ X_j \\ \vdots \\ X_n \end{pmatrix} + \begin{pmatrix} D_1 \\ D_2 \\ \vdots \\ D_j \\ \vdots \\ D_n \end{pmatrix} \qquad (1)$$

Supposing that hypothetically a sector j is extracted in the sense that ceases to sells or purchase products or inputs from other sectors, the levels of final demand D require a vector of gross output $\bar{X}$ such as:

$$\bar{X} = \bar{A}_{(-j)}\bar{X} + D = \begin{pmatrix} A_{11} & A_{12} & \cdots & 0 & \cdots & A_{1n} \\ A_{21} & A_{22} & \cdots & 0 & \cdots & A_{2n} \\ \cdots & \cdots & \ddots & \cdots & \cdots & \cdots \\ 0 & 0 & \cdots & 0 & \cdots & 0 \\ \cdots & \cdots & \cdots & \cdots & \ddots & \cdots \\ A_{n1} & A_{n2} & \cdots & 0 & \cdots & A_{nn} \end{pmatrix} \begin{pmatrix} \bar{X}_1 \\ \bar{X}_2 \\ \vdots \\ \bar{X}_j \\ \vdots \\ \bar{X}_n \end{pmatrix} + \begin{pmatrix} D_1 \\ D_2 \\ \vdots \\ D_j \\ \vdots \\ D_n \end{pmatrix} \qquad (2)$$

Where $\bar{A}_{(-j)}$ is the matrix of technical coefficients once made the hypothetical removal of the sector j. Solving the reduced forms of the equation (1) and (2) and using $\Delta X_{(-j)}$ to denote the differential output after removing j sector:

$$\Delta X_{(-j)} = X - \bar{X} = \left((I - A)^{-1} - \left(I - \bar{A}_{(-j)}\right)^{-1}\right) D \qquad (3)$$

The difference vector $\Delta X_{(-j)}$ in equation (3) indicates the loss of sectoral output if the sector j is hypothetically eliminated. A chain of extractions in every sector is performed: $\bar{A}_{(-1)}, \bar{A}_{(-2)}, \bar{A}_{(-3)}, \dots, \bar{A}_{(-n)}$ and the differential output is evaluated. It is clear that a higher aggregate output lost associated with the extracted sector, it reveals a greater relevance of interconnections of it in the economy. In this sense it can be called as key sector and the links with other sectors are significant for the economy (Miller and Lahr, 2001).

Note that in equation (3) the vector D remains constant, the difference vector $X - \bar{X}$ shows that the scope of extraction sectors decreases total levels of required inputs to continue to provide the final demand D.

So, when the technological matrix A is replaced, even hypothetically by a matrix $A_{(-j)}$, a chain of reactions in quantity and price allocation will take place in order to reach this new (hypothetical) equilibrium. When this chain of reactions is studied under a general equilibrium model we can estimate shock induced effects and to identify which sectors, if removed, could promote the most changes. In this case, the consideration of final demand as endogenous can capture the effects of income settings. As an exogenous shock, usually derived from an economic policy measure, it can be visualized as a monetary injection into the system, eliminating flows from one sector to the others can be considered an impact, all the sectors react to the absence of one of them.

Linear models justify the provision of the necessary inputs of extracted sectors appealing to a foreign sector that acts as a perfect substitute supplier, so, there are no supply constraints. However, integrating this technique in a CGE model, supply constraints are incorporated in the system and this fact brings us closer to reality. The inherent complexity of the model will miss the original linearity and require numerical calculations for resolution. In this case consumers, firms, labor and capital will have supply constraints inside the circular flow of income (Shoven & Whalley, 1984).

Supply constraints and price interconnections explain the differences between the results of linear models regarding CGE. So an initial injection within a sector is not able to activate other output increases. More primary factors are needed to meet the additional demand for a sector requirements substracting them from somewhere in the economy, and triggering sectoral output variations not covered by other models.

So, the Hypothetical Extraction Method, using a SAM a starting point, is a versatile approach to evaluate the performance of different sectors in linear and non-linear models.

3. THE CGE MODEL

Technically, a CGE is an abstract mathematical-computational representation that captures the interrelationships between economic sectors and the behavior of the different agents of the economy in a consistent and systematic way. This kind of models, which are based on the optimization of economic agents, technological specifications or macroeconomic identities, are commonly based on the assumption of perfect information, and allows to study the effects, both direct and indirect, of an exogenous change economic policy or the impact of a shock on the economic system determining its results. The CGE have a neoclassical structure of agents' behavior in which prices clear markets absorbing excess of demand.

They provide new perspectives on resource allocation and income distribution, being especially suitable for the assessment of impacts on the economy and widely used in specific areas such as the evaluation of tax systems, trade policy, or social or environmental impacts among other fields of application. At the same time, the large amount of different studies under this methodology have demonstrated the potential of these models as predictive tools when they face economic shocks.

3.1. The base model

The CGE model applied to achieve the objective proposed remains the traditional doctrine of walrasian equilibrium present in the works of Scarf and Shoven (1984), Ballard et al. (1985) or Shoven and Whalley (1992), extended with the inclusion of public and foreign sector. Production technology is given by a nested production function, yielding domestic output combining labor and capital as primary factors, through a Leontief technology. So, we will start from a price model to culminate in a general equilibrium model applied, following Cardenete and Sancho (2003). The asumption respect activity levels of public and external sectors is to consider they are fixed, while relative prices and activity levels of productive sectors are considered like endogenous variables, a representative consumer is included in the model in a scenario of perfect competition, using the SAM of Andalucia for each period of analysis.

The equations for the model are the following:

3.1.1 Production

The production technology is determined by a nested production function. The domestic output of sector j, denoted by Xd_j, is obtained by combining, through a Leontief technology of outputs from other sectors and value added (VA_j).

The model has 25 productive sectors from the SAM of Andalusia for each period:

$$Xd_j = \min\left(\frac{X_{1j}}{a_{1j}}, \frac{X_{2j}}{a_{1j}}, \dots, \frac{X_{25j}}{a_{25j}}, \frac{VA_j}{v_j}\right) \qquad j = 1,2,\dots,25 \qquad (4)$$

Being X_{ij} the corresponding quantities of good i required for the domestic production of good j; a_{ij} are the technical coefficients obtained from the accounting multipliers matrix of the SAM and they depict the proportion of purchases from sector i to sector j for the production of a unit of good j. The value added by the sector j is determined by VA_j, and v_j represents the mínimum quantity of value added required to produce a unit of good j.

Inside the Value Added, in a second level it is possible to find the technology of combination (fixed coefficients) of primary factors labor (L) and capital (K):

$$VA_j = min\left(\frac{K_j}{k_j}, \frac{L_j}{l_j}\right) \quad j = 1,2,\dots,25 \qquad (5)$$

The total output of sector j, Q_j, it is obtained from a combination of domestic output in a Leontief technology production. Following the Armington (1969) hypothesis for imports $Xrow_j$, in this domestic production and imports are considered like imperfect substitutives:

$$Q_j = \min(Xd_j, Xrow_j) \qquad j = 1,2,\dots,25 \qquad (6)$$

3.1.2 Consumption

The representative consumer has a demand function formulated by Cobb-Douglas preferences. The objective of this agent (h), it is to maximice its welfare, subject to a budget constraint. The disposable income it is distributed between current consumption (C_{jh}) or future consumption (S_h) materialized by savings:

$$Max\ U_h(C_{jh,}, S_h) = \left(\prod_{j=1}^{n} C_{jh}^{\alpha_{jh}}\right) S_h^{\beta_h} \qquad j = 1,2,\dots,25 \qquad (7)$$

$$s.t.\ YDISP_h = p_j C_{jh} + invp\ S_h$$

Where α and β are the coefficients of participation corresponding to different goods or savings, respectively, and, in this sense, the demand elasticity of goods and savings. The market demand is the sum of individual demand of consumers, according to a walrasian market. The final demand is consisting of investements, exports and final consumption from households.

Being p_j the price of good j and $invp$ the price of investment goods for the consumer h. The aggregation of the disposable income for all the households will determine the disposable income for the whole economy. The financing of those incomes comes from the sell of primary factors that consumers own (work and capital) from their initial endowments. They pay taxes, receive transfers, consume public goods and make net transfers with the rest of the world, investing and saving too. The disposable income for consumption will aggregate gross income less direct taxes:

$$YDISP = wL + rK + ipc\ TSP + TRM - ID\ (rK + ipc\ TSP + TRM) - ID(wL - CO\ wL) - CO\ wL \qquad (8)$$

Or, in other terms:

$$YDISP = (1 - ID)(rK + ipc\,TSP + TRM) - (1 - ID + ID\,CO - CO)w\,L \qquad (9)$$

Where w y r are the prices of labor and capital factor, respectively, and ipc will be the consumer price index. So, every consumer will maximize the utility from C_{jh} and S_h, subject to the budget constraint of its available income.

3.1.3 Public Sector

The government collect taxes from the rest of economic agents to finance its activity, affecting, in this way the disposable income. In the other hand, make transfers to the private sector to redistribute incomes and demand goods and services for the rest of the economy. The difference between expenses and revenues will determine the public déficit or surplus (an endogeneus variable in the model).

The fiscal revenues from production come from:

$$RIP = \sum_{j=1}^{n} \tau_j \left(\sum_{i=1}^{n} a_{ij}\, p_i X d_j + \left((1 + CP_j) w\, l_j + r\, k_j \right) VA_j \right) \qquad (10)$$

Where RIP is the indirect collect taxes and τ_j the tax rate over production of j sector, CP_j the employers' contribution and a_{ij} the technical coefficients of intermediate domestic goods.

The government will collect from employees' contribution (CO) too:

$$RP = \sum_{j=1}^{n} CP_j\, w\, l_j\, VA_j \qquad (11)$$

$$RO = CO\, w\, L \qquad (12)$$

The imports are subject to a tariff ψj. The total revenues for this concept will be RT:

$$RT = \sum_{j=1}^{n} \psi_j\, prm\, a_{mj}\, Q_j \qquad (13)$$

Where a_{mj} will be the technical coefficients from imports and y prm a weighted index price for foreign products.

The indirect taxes will be determined for:

$$RIVA = \sum_{j=1}^{n} \sum IVA_j (1 + \tau_j) \left(\sum_{i=1}^{n} a_{ij}\, p_i X d_j + \left((1 + CP_j) w\, l_j + r\, k_j \right)\, VA_j \right) + \sum_{j=1}^{n} IVA\, (1 + \tau_j)\, prm\;\, a_{mj}\, Q_j \qquad (14)$$

Where IVA_j is the indirect tax for the good j, that levy both domestic and external production.

The collect of direct taxes comes from:

$$RD = ID(w\,L + r\,K + ipc\,TS + TRM - CO\,L\,w) \qquad (15)$$

Where ID is the income tax rate taking into consideration every kind of income: Labor (L), Capital (K), Transfers received from Public Sector (TSP) and Transfers received from the rest of the world (TRM) less employees' contribution ($CO\ L\ w$).

Finally, the total revenues R for the Government:

$$R = RIP + RO + RP + RT + RIVA + RD \qquad (16)$$

In this model the public expenses will be a constant and the public déficit will be determined endogeneusly, its function will be:

$$DP = R - TSP\,ipc - \sum_{j=1}^{n} DG_j\,P_j \qquad (17)$$

3.1.4 Foreign Sector

The assumption is that the Andalusian economy is a small economy and so, the level of foreign demand will be exogeneus. The total exports will not be influenced by domestic variables. The imports will follow the Armington hypothesis (1969) and will be considered as imperfect substitutes of domestic production. So the imports will be endogeneus and the foreign sector could have a déficit endogeneus determined:

$$DPRM = prm\sum_{j=1}^{n} IMP_j - TRM - prm\sum_{j=1}^{n} EXP_j \quad j = 1,2, \dots 25 \qquad (18)$$

Where IMP_j represents the imports of *j* sector, EXP_j the exports of *j* sector, TRM the foreign transfers and prm the weighted price index of foreign products. The déficit / surplus of foreign sector will be $DPRM$.

3.1.5 Saving and Investment

The Investment is exogeneus determined (INV_j), and the saving is defined from the utility fucntion of the representative consumer, for that is a so-called saving driven model. Public Deficit (DP) and Foreign Deficit ($DPRM$):

$$\sum_{j=1}^{n} INV_j\,pinv = S\,pinv + DP + DPRM \quad j = 1,2, \dots 25 \qquad (19)$$

Where $pinv$ is a price index form investment goods.

3.1.6 Prices and model calibration

The prices will be endogenus determined through the following equation:

$$P(j) = (1 + II_j)\left(\textstyle\sum_{j=1}^{n} a_{ij}\,q_j(1 + s_j)wL_j + rK_j + (1 + t_j)\,prm\,M_j\right) \qquad (20)$$

II_j represents the indirect taxes in production, s_j the employer's contribution of *j* sector, t_j the ad valorem imports tariff, prm and $P(j)$ the imports price products and the unit cost of production, respectively.

Obtaining the final price as:

$$q_j = p_j(1 + IVA_j) \tag{21}$$

The value of technical coefficients, the tax rate and the coefficients of utility function has been calibrated for replicate the values of the different SAMs like benchmark equilibrium for the economy.

For the calibration the required calculations are:

$$a_{ij} = \frac{m_{ij}}{X_j} \tag{22}$$

Where a_{ij} is the value of the technical coefficient calculated through the m_{ij} element of the SAM, and X_j the total output of j sector. For the rest of tecnical coefficients (labor, capital and foreign sector), the calculus will be similar:

$$L_j = \frac{m_{lj}}{X_j} \tag{23}$$

$$K_j = \frac{m_{kj}}{X_j} \tag{24}$$

$$M_j = \frac{m_{mj}}{X_j} \tag{25}$$

Representing m_{lj}, m_{kj} y m_{mj} the components of labor, capital and foreign vector, respectively, for the construction of vectors L_j, K_j, M_j.

Finally, the indirect tax rate for the j sector is calculated as:

$$Tax_j = \frac{T_j}{BI_j} \tag{26}$$

Being T_j the sum of indirect taxes, employer's contribution, Value Added Tax, production taxes and tariffs. Besides, BI_j will be the taxable income of every sector.

The price considered as numeirare is the salary, recomputing, internally, changes and relative prices for the rest of goods, services and factors in the adjust to the equilibrium.

3.1.7 Solving the model

So, the economic structure shaped in a non-linear equations system reproduces the behaviour of every economic agent. Inside the framework of the comparative static full use of production factors is considered. The activity levels of government and foreign sector will be fixed, allowing the performance of prices and levels of activity of productive sectors.

Equilibrium is achieved when consumers maximize their utility, productive sectors maximize their net benefits. The public sector will redistribute resources among the economic agents, matching their income with payments to sectors. In this balance, the amounts offered will be equal to the demanded ones in all markets.

The proposed model is susceptible to evaluate changes in the structure of the system in the productive sectors and total output of the economy, and is capable to provide the detection of key sectors and their interconections in an economic system.

The extraction of every productive sector $A_{(-j)}$ will be held in the system with the subsequent recomputation of a new equilibrium afther that shock. Sequential extractions will allow to obtain different results for every extraction in terms of Sectoral Output, Total Output and Gross Domestic Product in a conterfactual view. So, it will be possible to compare with the early structure before extraction, observing the implications of each sector. So, it is necessary a technological change in production given the matrix A of equation (1) respect counterfactual matrix $A_{(-j)}$ in equation (2), respecting, in any case the rest of the structure equation model that represents the economy.

4. DATABASE

The data used in the calibration process will come provided by the SAMs developed for the Andalusian economy from 1990 to 2005, specifically for 1990 it will be uses the one elaborated by Cardenete (1998), for the year 1995 will use the one built by Cardenete and Moniche (2001). For year 2000 we will work with the one given by Cardenete et al. (2010) and the SAM made for Cardenete et al. (2010) for the year 2005.

These Social Accounting Matrices will be the baseline scenario for model calibration and they have a structure of 25 productive sectors and 12 endogenous accounts as shown in Table 1.

Changes in the values of matrix components allow to analyze the effects of political or shock applied in the model, which in this case will be changes resulting from the hypothetical extraction of one domestic sector of the production structure. These instruments (SAMs) consistently meet the conditions of the Walrasian general equilibrium in which the sum of rows is equal to the sum of columns.

Table 1 – Structure of Social Accounting Matrices for Andalusia (1990-2005)

1	Agriculture	20	Construction
2	Livestock and forestry	21	Trade
3	Fishing	22	Transport and communications
4	Extractives	23	Other services
5	Refining	24	Sale services
6	Electricity	25	Non sale services
7	Gas	26	Labor
8	Water	27	Capital
9	Food industry	28	Consumption
10	Textile and leather	29	Gross Capital Formation
11	Wood industry	30	Employers' contribution
12	Chemicals	31	Production net taxes
13	Mining and steel	32	Tariffs
14	Metal industry	33	Value Added Tax
15	Machinery	34	Income Tax
16	Vehicles	35	Employees' contribution
17	Construction materials	36	Public Sector
18	Other transport equipment	37	Foreign Sector
19	Other manufactured goods		

Source: Own elaboration from Cardenete (1998), Cardenete and Moniche (2001), Cardenete et al. (2010) and Cardenete et al. (2010)

5. RESULTS

5.1 Total Output

Table 2 shows the results over the total output of the systematic extraction of each sector following the proposed CGE. It is possible to observe both the total output after the computation extraction and its variation in relative terms respect the baseline (Gross Regional Product). For example, the elimination of Trade (21) sector in 1990 would reduce a 20,37% out of the Total Output.

Table 2: Change in Total Output after the extraction of each sector

	1990		1995		2000		2005	
Sector	Total Output	% Change	Total Output	% Change	Total Output	% Change	Total Output	% Change
1	36.109.961	-3,93	53.091.095	-2,06	82.667.120	-4,12	117.783.500	-2,44
2	37.331.434	-0,68	53.517.766	-1,27	86.054.110	-0,19	120.430.400	-0,25
3	37.225.187	-0,97	54.091.149	-0,21	85.985.120	-0,27	120.528.500	-0,17
4	39.002.614	3,76	56.328.429	3,92	91.583.510	6,23	123.842.300	2,58
5	35.872.820	-4,57	52.806.636	-2,58	81.991.670	-4,90	116.172.300	-3,77
6	37.498.107	-0,24	54.293.667	0,16	85.626.520	-0,68	119.613.800	-0,92
7	37.404.950	-0,49	54.191.609	-0,03	86.009.690	-0,24	120.638.300	-0,07
8	37.493.016	-0,25	54.134.482	-0,13	86.000.100	-0,25	120.327.900	-0,33
9	33.015.963	-12,17	48.180.887	-11,11	75.733.680	-12,16	111.622.000	-7,54
10	36.647.038	-2,51	53.709.194	-0,92	82.866.810	-3,88	117.505.800	-2,67
11	37.139.495	-1,20	54.783.780	1,07	87.165.110	1,10	121.928.100	0,99
12	37.419.609	-0,45	55.087.141	1,63	85.626.950	-0,68	120.712.600	-0,01
13	37.699.205	0,29	54.014.514	-0,35	85.321.090	-1,04	119.921.000	-0,67
14	37.332.161	-0,68	54.407.805	0,37	86.062.940	-0,18	120.478.200	-0,21
15	37.457.803	-0,35	55.350.396	2,11	87.833.280	1,88	124.243.200	2,91
16	37.489.218	-0,26	53.950.116	-0,47	85.273.050	-1,09	120.095.000	-0,52
17	37.577.416	-0,03	54.440.872	0,43	86.856.520	0,74	121.986.700	1,04
18	36.894.096	-1,85	53.642.566	-1,04	85.639.670	-0,67	119.914.100	-0,67
19	37.559.879	-0,08	53.699.073	-0,93	83.374.930	-3,30	117.503.000	-2,67
20	30.419.771	-19,07	44.694.337	-17,55	71.035.810	-17,61	92.858.840	-23,08
21	29.933.600	-20,37	36.967.004	-31,80	74.971.810	-13,04	100.654.800	-16,63
22	35.276.568	-6,15	52.525.723	-3,10	83.664.720	-2,96	117.988.200	-2,27
23	31.802.928	-15,39	44.401.073	-18,09	79.591.400	-7,68	112.674.800	-6,67
24	35.042.395	-6,77	49.226.311	-9,19	72.320.490	-16,12	100.641.700	-16,64
25	35.484.800	-5,60	49.394.450	-8,88	69.927.070	-18,89	97.410.010	-19,31
Initial GRP	37.588.751		54.205.420		86.215.970		120.728.100	

Source: Own elaboration

A stable pattern of behaviour is noted in relation to the weight of economic activities throughout the periods. Economic activity is dominated by activities like Trade (21), Sale services (24), Other services (23) and in the last years Non sale services (25). Out of tertiary activities, it is relevant to highlight the importance, in terms of potential loss total ouput of Food industry (9) as the sole representative of industrial activity with significant presence in the economy, representing its elimination a loss of 12,16% of the total output in year 2000. However, in the last period has lost weight and activities such as Construction (20) has gained importance. The absense of Construction (20) in 2005 would generate a drop of 23,08% in 2005 and the elimination of Non sale services (25) would reduce the total output about 19% both in 2000 and 2005.

There are activities whose hypothetical elimination would generate increases in Total Output. This odd result, revealed in Cardenete and Sancho (2012), mathematically is justified by iterative recomputaciones in searching equilibrium, else, economically it could be explained for the effects of resource reallocations after a sector extraction and the presence of supply constraints in the model against traditional linear models, what involves the the substitutability of resources (Cardenete et al., 2013). Also offering clues about the susceptibility of generate improvements of productivity in them. This effect is observed in Extractives (4), Textiles and leather (11), Machinery (15), Wood industry (11) Chemical (12) and Construction materials (17) mainly.

It is remarkable the importance of Trade (21), with an impact of 31,8% in lost total output in 1995 and has been declining in subsequent periods when the economy has been driven from other activities such as Construction (20), Sale services (24) or Non sale services (25), with impacts in 2005 of 16,64% and 19,31% respectively.

5.2 Sectoral Output

At sectoral level, the five more relevant impacts for each period in terms of lost output for each sector in abolute an relative values are shown in table 3, where it is figured the lost of output[2] of one sector when other sector is extracted[3].

Table 3: Sectoral impact from extracting sectors (thousand euros)

Period	Extracted sector	Impacted sector	Lost Output	%
1990	9 - Food industry	1 - Agriculture	1.504.964	35,58
	5 - Refining	4 - Extractives	1.235.795	41,55
	21 - Trade	9 - Food industry	1.040.178	10,92
	20 - Construction	17 - Construction materials	1.026.192	61,58
	22 - Transport and communications	16 - Vehicles	640.270	21,42
1995	9 - Food industry	1 - Agriculture	2.985.876	47,70
	5 - Refining	4 - Extractives	1.504.063	53,53
	17 - Construction materials	20 - Construction	1.384.251	43,73
	21 - Trade	9 - Food industry	1.286.707	17,99
	21 - Trade	22 - Transport and communications	1.214.688	16,00
2000	21 - Trade	9 - Food industry	4.500.360	17,14
	5 - Refining	4 - Extractives	4.445.460	63,22
	9 - Food industry	1 - Agriculture	3.014.498	32,96
	20 - Construction	17 - Construction materials	3.051.546	65,96
	21 - Trade	9 - Food industry	2.576.250	12,82
2005	17 - Construction materials	20 - Construction	4.479.027	69,25
	21 - Trade	9 - Food industry	3.127.830	11,11
	20 - Construction	15 - Machinery	2.992.090	20,78
	9 - Food industry	1 - Agriculture	2.305.383	22,37
	21 - Trade	23 - Other services	2.167.850	8,40

Source: Own elaboration

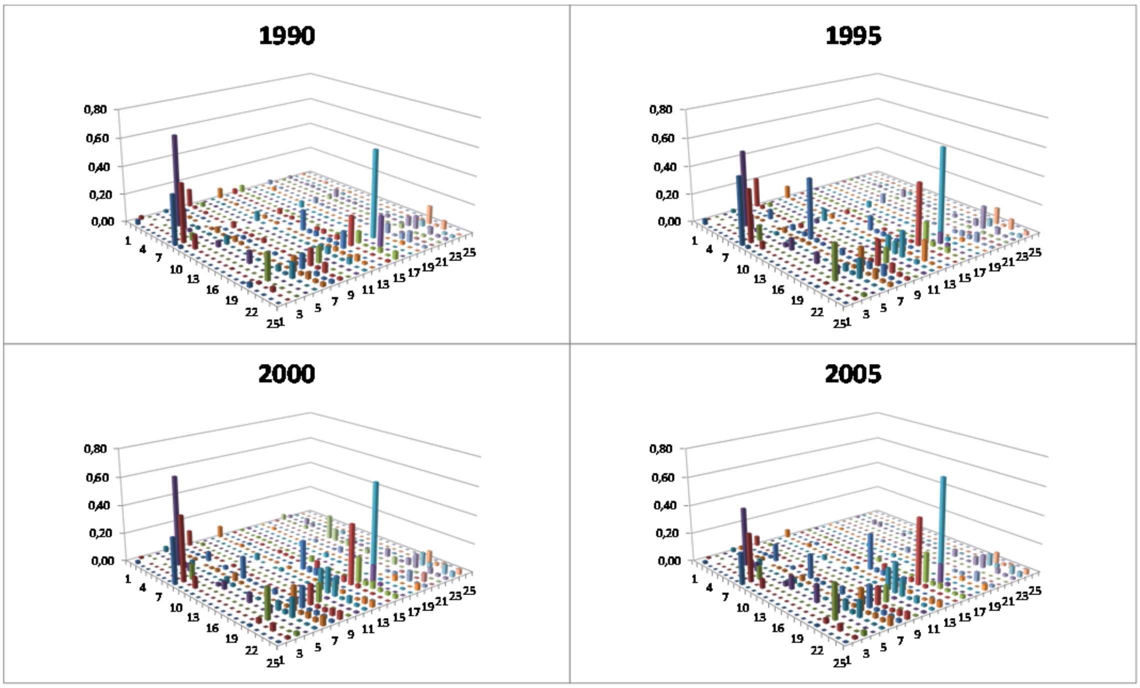
So, for the period 1990, the biggest counterfactual impact would be over Agriculture (1) when Food industry (9) is extracted, that impact of 1.504.964 thousand of euros, a lost that involves a drop in agricultural activity of 35,58%. Similarly, it can be interpreted for the rest of the table.

It is remarkable that along the whole period, the largest hypothetical impacts are linked to the same activities, which represents an evidence of structural stability. Thus, consistent relationships between Food industry (9) with Agriculture (1), Construction (20) with Construction materials (17) and Trade (21) with Food industry (9) are observed in every period. Mainly, the removal of Construction materials (17) would cause a lost of 69,25% in Construction (20) output in 2005 or elimination of Food industry (9) would reduce a 22.37 % in Agriculture (1) output in the same period. This structure of relationships is keeping stable throughout the considered period. At same time a concentration of the economic activity in just a few activities is observed.

Figure 1: Landscape associated to the relative impact of hypothetical extraction of each sector

[2] In Annex tables from 5 to 8 the output loss associated to the extraction of each sector is presented for each year.

[3] Excluding the feed-back effect, the effect associated to the lost of output of one sector when the same sector is extracted.



Fuente: Elaboración propia

In relative terms the landscapes in figure 1 show the stable relative economic structure in terms of lost sectoral output when a sector is eliminated for each period. Stability in quantitative and qualitative terms is observed.

5.3 Linear model versus CGE

For a more complete view of the application of CGE model (Non-linear) based in behaviour equations for the different agents it seems desirable to obtain a better comprehension of the results throughout the comparison with a linear approach based on interindustrial models[4]. In this sense the results are yield in table 4.

In quantitative terms, the results of the application of linear model are shown in tables 9 to 12. In table 4 the more significant differences between both models are presented. On it, is possible to observe high impacts of overestimation (surplus of ouput loss of linear model versus non-linear model) of the linear model.

Table 4: Overestimation impacts of the linear model versus the CGE model (thousand euros)

Period	Extracted sector	Impact sector	Overestimation
1990	20 - Construction	13 - Mining and steel	810.805
	14 - Metal industry	21 - Mining and Steel	664.408

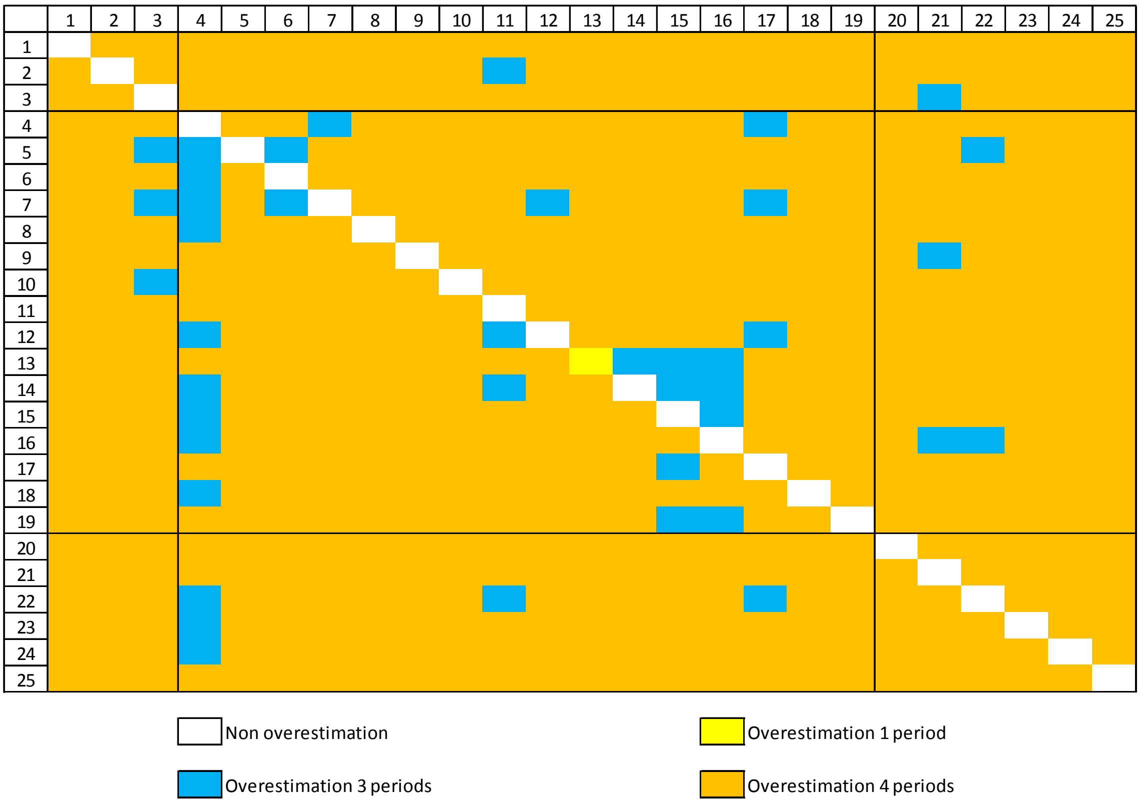
[4] The comparison is made respect to the *backward linkages* of the linear model because of in the base of comparison, the backward linkages use like base the Leontief's Inverse, and so, closer with the extraction method formulated in a CGE model.

	21 - Trade	23 - Other services	361.430
	20 - Construction	23 - Other services	256.855
	20 - Construction	4 - Extractives	215.636
1995	21 - Trade	23 - Other services	480.062
	21 - Trade	1 - Agriculture	409.422
	21 - Trade	6 - Electricity	384.645
	21 - Trade	22 - Transport and communications	380.585
	9 - Food industry	12 – Chemicals	341.661
2000	20 - Construction	22 - Transport and communications	1.249.927
	20 - Construction	4 - Extractives	999.817
	9 - Food industry	21 – Trade	932.478
	21 – Trade	23 - Other services	832.824
	9 - Food industry	22 - Transport and communications	768.931
2005	9 - Food industry	21 – Trade	5.157.945
	24 - Sales services	20 – Construction	2.947.402
	10 - Textile and leather	21 – Trade	1.837.549
	19 - Other manufactured goods	21 – Trade	1.623.683
	1 – Agriculture	21 – Trade	1.347.672

Source: own elaboration

The largest overestimations occur in those sectors with a representative presence in the regional economy, so, Trade (21) and Construction (20), like impact or impacted sector. So the higher the presence in the economy, the higher the impact of overestimation of linear model. In absolute terms is the economic activity with higher levels of activity overestimated in every period is Mining and steel (13) in 1990 when Construction (20) sector is extracted, with a total of 810.805 thousand euros, in 1995 the extractraction of Trade (21) overestimated the loss output of Other services (23) in 480.062 thousand euros. In 2000 is Construction (20) in front of Transport and communications (22) the interrelation more overestimated and in 2005 Trade (21) is the more oversimated activity when Food industry (9) is extracted with a total of 5.157.945 thousand euros. In this regard and being aware of the economic reality in Andalusia has been based in Construction, Tertiary activities, Agriculture and Food Industry. These are the sectors more affected of overestimation when the linear model is applied.

Figure 2: Overestimation map lineal model versus CGE



Source: own elaboration

In figure 2 it is possible to observe the overestimation cell by cell of every period. Synthetically 90% of productive cells are overestimated in linear method. Just the elements in the main diagonal (governned by the feed-back effects in the linear model and not present in the CGE model) are not affected by overestimation. The rest of elements are overestimated at less in 3 out of 4 periods considered.

So, it is possible to observe a systematic presence of overestimations along the complete period and in every economic interrelation, so it is possible to conclude that linear models, with the asumption of not limited supply of resources, tend to amplify the impact of a sectoral extraction versus a CGE model that contemplates them. Alghough both analysis keep the same structure of key sectors.

6. CONCLUSIONS

The Computable General Equilibrium models performance the functioning of every agent in the economy by behaviour equations. These models let to use Social Accounting Matrices as database for calibration and so, the analysis of key sectors embeded in industrial analysis under linear perspectives. This versatility allows to implement this originally used technology in linear models to a CGE analysis, adapting to the features required by the model. An this case, an impact analysis is proposed and applied to the extraction of one sector in the economy, the so-called Hypothetical Extraction Method applied, in this case, to a CGE model.

A General Equilibrium Model replicates the behavior of each economic agent under a holistic approach, ensuring the conditions of behavior of agents, technological feasibility and resource constraints and abandoning the implicit assumptions of linearity proposed by interindustrial models.

The analysis is computed for the economy of Andalusia of period from 1990 to 2005, getting a counterfactual output of each sector and the total economy when one of the economic activities is extracted and after all the adjustments in the economy have been done, offering, thus, a broader view of the impact of a sector.

The results obtained show an economy in which the largest impacts in total output come associated to the hypothetical extraction of tertiary activities: Principally Trade (21), join as Other services (23) and Sale services (24). In the last years Non sale services (25) has increased its importance in the regional economy. Out of Tertiary sector, relevants activities are reduced to Construction (20), Food Industry (9) and Agriculture (1).

All the activities clustered in sector services present at less in any period levels of relative importance above 15% over total output to a hypothetical extraction of the sector, just with the exception of Transport and communications (22), so the concentration of the activity is high and so, the dependence of the regional economy of this sectors is very large.

On the other hand, Trade (21) and Construction (20) are the sector with biggest individual impact in the rest of activity sectors, Trade in a transversal way with all the activities, and Construction with Construction materials (17) specially, with loss of output above 60%. At the same time is remarkable the link between Refining (5) and Extractives (4) with impacts of elimination above 50% of sectoral output.

Finally, the comparison of this approach versus a lineal technique yield a overestimation results provided through the lineal model. The justification of this overestimation is due to the unlimited resources availability and so the model do not let the adjust of productive factors through the process of determination of prices and quantities. This reason explains increases of total output after hypothetical extractions of several activities such as Extractives (4), Chemicals (12) or Construction materials (17). Providing, in this field, a new approach for orienting processes to determinate productivity gainings at sectoral level (Hanson and Rose, 1997).

For that, the CGE model contributes to reconsider the empirical calculation of key sectors, as a sector impulse, given resources constraints, it implies extract resources from other sectors of the economy, which provoke an important redistribution and distorting in other parts of the economy in order to compensate the eliminate sector and the possible benefit of shocks in the economic policy (Cardenete and Sancho, 2012).

The applied results of this methodology shed light step forward in the process of elaboration of useful tools for the design and assesment of economic policy providing mechanisms of economic analysis methodology based, collecting extensive information of underlying complexity in the economic structure (Whalley, 1985).

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8. ANNEX

Table 5: Loss Output per sector after the extraction of column sector for 1990 in a CGE Model

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	4.237.532	142.452	1.286	0	0	0	0	0	1.504.964	88.878	1.491	1.016	0	0	0	0	0	0	0	24.239	132.565	0	8.949	0	3.239
2	29.960	1.192.612	307	0	0	0	0	0	495.156	168	113.645	2.067	0	0	0	0	6.563	48	932	0	18.090	0	36.926	0	487
3	0	0	812.382	0	0	0	0	0	40.130	0	0	0	0	0	0	0	0	0	487	0	151.647	0	2.638	0	1.551
4	0	0	0	1.909.085	1.235.795	280.949	38.795	6	6.022	0	126	78.480	3.324	1.875	0	0	165.483	78	30	3.798	0	0	0	0	0
5	68.606	4.604	16.870	9.664	3.400.064	28.855	66.003	577	38.044	5.355	14.845	205.793	7.531	2.308	2.212	1.797	32.365	1.160	2.326	129.632	54.806	358.558	17.195	4.682	13.030
6	46.795	6.695	0	27.683	10.205	1.850.023	1.202	26.150	69.609	19.064	27.148	66.772	36.716	7.633	5.307	12.219	59.182	7.813	10.944	14.190	192.588	41.031	80.223	38.110	47.823
7	24	1.340	0	0	2.116	0	267.565	0	2.656	6	733	5.716	3.858	793	138	12	4.387	114	66	6.383	27.034	240	7.014	3.215	6.040
8	25.825	3.696	0	3.065	156	938	18	204.699	8.522	1.316	1.436	2.987	902	5.938	198	349	1.545	361	475	4.706	23.878	3.810	13.535	1.785	3.522
9	0	268.124	21.883	0	0	0	0	0	9.572.843	1.436	2.608	1.268	0	0	0	0	1.382	0	0	0	1.040.178	0	24.750	0	14.226
10	2.284	739	13.805	0	0	0	0	204	7.609	2.773.827	5.577	1.707	385	391	481	2.482	793	643	3.348	1.935	15.753	5.764	8.030	7.495	9.189
11	4.616	1.497	10.343	1.731	144	475	54	409	117.726	6.605	1.769.782	11.936	3.257	3.119	8.552	1.983	15.584	9.220	72.139	85.608	20.032	19.010	68.870	3.366	12.934
12	207.776	11.335	8.066	33.086	0	24	42	4.033	66.604	11.437	40.622	2.931.184	12.892	10.283	10.061	6.491	18.271	10.500	60.618	81.948	48.159	51.957	123.436	49.151	9.442
13	0	0	751	4.670	0	0	0	0	0	3.041	367	9.827	1.699.296	245.844	40.274	55.882	9.520	42.750	35.087	203.749	0	6	0	0	228
14	48.147	2.999	3.215	3.239	2.801	30	0	1.376	49.602	9.051	26.925	6.611	3.606	1.296.029	32.112	36.944	6.827	40.454	2.897	271.387	1.551	3.113	9.742	962	17.393
15	112.984	6.124	10.199	16.275	6	835	6	3.360	19.761	10.836	5.061	17.387	14.761	4.387	2.315.820	11.395	16.143	37.762	2.122	196.086	22.502	27.340	75.685	17.898	124.265
16	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	2.988.977	0	0	415	0	0	640.270	1.959	0	2.753
17	0	0	0	7.380	0	0	0	30	77.380	0	3.871	6.665	9.857	1.503	4.105	2.356	1.669.179	1.310	1.010	1.026.192	12.880	12	2.867	0	1.034
18	0	0	29.173	12	6	30	0	30	391	66	60	78	12	54	186	30	18	1.223.120	12	938	1.040	3.624	27.641	3.059	1.869
19	53.226	1.172	15.879	4.159	126	391	48	379	73.167	21.853	13.925	15.368	186	2.939	23.476	15.873	5.541	4.580	1.740.525	116.158	16.444	75.331	131.862	10.746	26.204
20	20.044	6.118	0	18.788	5.644	10.211	2.152	12.056	16.372	4.832	3.474	7.098	2.759	2.711	24.179	1.112	7.687	4.670	1.178	7.620.852	93.283	35.255	83.943	40.412	33.452
21	153.817	77.218	37.798	24.059	44.132	26.030	41.879	4.321	369.628	141.244	97.100	45.112	60.877	41.860	91.083	37.756	61.177	67.848	34.186	440.927	13.307.700	119.968	219.015	77.302	92.448
22	117.846	53.923	28.476	65.378	94.720	49.710	20.633	2.957	338.238	58.593	68.353	84.959	33.891	36.487	47.324	32.395	125.828	33.398	34.174	385.946	535.309	5.880.723	311.469	98.897	101.439
23	25.068	6.010	24.617	21.258	41.698	27.466	1.515	8.619	180.610	38.940	42.684	35.814	9.929	31.697	38.549	34.156	38.898	78.841	33.464	250.069	495.174	181.031	11.898.285	216.539	208.695
24	50.948	13.397	7.603	19.725	55.287	2.428	859	2.098	36.175	8.240	11.894	1.040	7.633	4.664	11.612	2.200	10.043	715	4.267	61.291	467.407	56.772	225.163	3.643.540	22.267
25	2.933	896	0	2.446	0	0	0	0	24	0	0	0	0	0	0	0	0	78	0	0	114	0	0	0	2.110.706

Source: Own elaboration

Table 6: Loss Output per sector after the extraction of column sector for 1995 in a CGE Model

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	6.258.417	251.247	78	0	0	0	0	0	2.985.876	120.912	1.190	10.776	0	0	0	0	0	0	0	102	34.414	0	3.276	1.899	15.945
2	3.919	1.858.684	0	0	0	0	0	0	695.726	0	96.763	823	0	0	0	0	1.022	0	0	6	17.117	0	10.932	0	20.338
3	0	0	421.832	0	0	0	0	0	43.964	0	0	0	0	0	0	0	0	0	246	0	104.684	0	1.292	0	8.120
4	6.485	0	42	2.813.254	1.504.063	281.863	60.372	0	19.347	126	30	78.973	234.437	355	775	0	210.456	66	228	161.907	4.357	4.135	84	36	66
5	83.913	21.582	14.106	16.432	3.670.014	31.902	186	1.497	76.593	5.391	8.300	40.622	13.084	5.704	1.947	2.404	26.360	1.749	5.680	173.861	78.552	471.314	30.856	27.376	18.752
6	60.762	17.111	811	33.050	27.989	2.860.992	3.113	26.739	99.251	17.273	24.101	52.769	48.502	11.726	9.556	7.314	53.316	10.247	32.587	55.275	473.796	42.059	182.449	60.167	70.054
7	0	0	12	397	8.084	54	117.901	138	4.484	992	3.288	50.233	2.777	1.821	523	288	4.892	956	1.178	3.810	5.187	2.272	8.588	1.893	1.136
8	58.671	7.056	78	739	1.821	1.827	1.478	280.456	7.909	601	1.106	2.164	980	349	246	397	1.424	397	835	6.930	49.217	7.344	17.345	6.641	5.223
9	17.646	336.963	12.255	367	24.599	2.122	0	0	12.777.620	3.282	1.094	3.660	6	96	72	307	13.974	36	307	2.819	1.286.707	0	75.932	168	35.285
10	313	0	5.457	2.158	5.650	517	6	0	83.264	2.980.419	2.969	3.504	2.578	950	4.381	72	5.439	22.087	38.369	54	16.780	1.689	19.869	9.442	24.629
11	0	1.623	2.254	1.917	325	1.256	150	625	190.190	8.270	2.221.172	14.298	7.236	6.419	9.857	3.089	19.869	4.375	236.853	184.499	397.293	16.660	58.376	13.330	9.490
12	420.288	51.152	3.215	16.894	9.748	3.997	1.352	3.450	142.716	8.372	33.128	4.748.434	11.870	11.642	13.613	7.182	53.454	6.491	165.338	159.100	61.490	10.860	675.411	58.274	23.055
13	0	0	1.208	613	240	0	0	78	415	1.106	601	4.682	3.098.512	314.822	71.382	79.219	20.032	65.655	138.984	42.528	8.426	415	505	1.250	30
14	4.676	811	343	1.148	2.771	144	6	2.584	48.622	7.975	12.892	6.437	10.211	1.908.478	29.089	8.564	7.555	4.213	30.123	834.331	8.655	7.182	10.740	2.188	926
15	50.263	9.075	11.347	32.683	42.468	25.543	902	13.318	55.912	12.910	14.178	34.781	53.658	17.327	6.130.991	23.824	31.205	53.508	22.274	905.936	188.099	52.216	227.693	25.591	9.340
16	23.698	3.919	0	48	0	0	0	18	0	0	0	0	0	282	1.172	2.081.515	571	2.073	0	0	160.308	45.809	120	3.792	0
17	0	0	0	932	391	0	0	84	97.508	865	1.340	3.396	7.993	8.937	14.466	367	2.190.298	1.557	7.747	1.384.251	54.896	13.276	2.067	1.478	1.010
18	0	0	1.346	0	0	0	0	0	451	0	0	0	0	12	0	0	6	1.011.972	0	0	0	24.401	0	84	42
19	10.205	2.122	2.771	3.462	361	938	54	3.889	197.420	14.821	7.693	33.320	1.599	19.347	53.051	7.729	29.155	6.713	2.922.469	59.807	102.082	82.182	189.752	19.713	29.930
20	80.974	19.154	1.382	2.350	1.965	4.610	48	3.889	11.918	1.839	1.304	1.478	1.064	1.208	2.104	920	2.675	1.587	3.137	12.174.816	125.810	19.160	93.734	63.257	76.040
21	236.636	37.137	10.962	15.284	53.232	18.902	986	4.219	199.692	20.266	27.695	16.943	11.467	11.131	30.315	12.952	79.201	13.487	49.782	300.254	20.552.324	324.937	246.120	73.414	139.681
22	65.312	27.352	16.101	61.309	122.132	38.242	1.575	6.719	417.565	39.889	52.024	102.773	85.079	37.671	38.176	17.255	175.087	16.498	80.620	375.422	1.214.688	7.572.476	360.776	95.290	67.512
23	29.888	12.158	8.510	16.612	139.837	40.683	3.804	15.146	348.972	25.862	13.643	48.658	14.791	13.186	34.510	18.259	36.211	34.125	46.488	255.208	914.987	214.513	17.267.967	177.449	435.746
24	5.986	499	974	24.455	41.716	10.638	192	5.030	58.160	13.294	6.635	12.675	2.104	10.584	9.538	2.266	9.622	7.020	18.914	96.306	821.529	104.215	523.620	7.193.820	198.256
25	643	222	835	156	0	0	0	222	4.225	6	36	138	18	0	0	0	409	24	126	168	926	204	18.451	36	4.904.631

Source: Own elaboration

Table 7: Loss Output per sector after the extraction of column sector for 2000 in a CGE Model

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	9.169.434	196.690	183	0	0	0	0	246	3.014.498	11.849	28	12.302	0	6	6	0	0	0	106	288	111.451	918	5.582	14.319	47.675
2	25.953	1.973.069	0	77	0	0	0	187	910.610	1.696	157.574	2.968	0	0	33	0	713	0	1.132	16	66.766	551	95.507	1.286	32.507
3	0	43	897.851	0	0	0	0	86	97.029	0	3	0	0	2	0	0	0	0	15	5	196.256	64	227	2.996	22.585
4	11.501	0	1.242	7.029.501	4.445.460	319.140	380.007	0	9.703	44	0	157.965	405.993	78	136	0	485.812	32	4.506	389.058	6.688	723	858	10.972	3
5	340.398	29.001	34.814	92.034	8.960.668	346.489	3.605	2.029	57.272	5.091	22.422	406.484	192.498	10.036	5.530	817	117.543	5.011	15.302	556.340	243.674	1.170.578	55.393	88.777	94.072
6	113.116	13.418	1.569	35.320	52.497	2.883.296	16.749	34.619	62.595	12.453	10.661	158.681	43.145	10.553	7.861	8.102	91.033	4.293	35.792	50.213	486.822	67.008	109.285	80.041	181.787
7	1.392	54	2.857	5.867	5.388	38.787	587.879	336	14.869	214	585	89.525	8.417	5.540	2.586	1.879	20.060	2.181	2.176	26.901	85.267	10.451	15.769	14.747	10.518
8	71.932	1.100	189	1.304	3.253	4.030	2.379	658.767	10.456	946	351	4.604	1.933	568	793	664	3.845	831	1.691	10.909	91.287	15.164	17.461	29.144	35.060
9	12.380	363.160	16.810	60	0	0	0	300	20.200.770	19.730	20	9.260	0	50	0	0	0	0	110	110	2.576.250	840	135.020	22.160	160.980
10	3.485	23	12.127	51	23	1.145	3	76	1.613	6.147.305	3.355	417	30	909	1.338	389	1.579	989	68.202	2.799	66.579	7.372	28.039	22.128	61.444
11	1.577	648	7.794	184	42	687	118	862	177.815	5.375	3.931.776	15.534	84.573	4.278	13.574	1.694	32.264	3.063	572.902	684.532	476.867	62.251	180.819	69.816	48.882
12	723.020	18.274	4.884	33.524	156.192	17.311	88	9.009	33.955	33.820	66.582	8.919.887	141.519	20.317	30.971	10.712	103.869	43.623	328.732	333.869	203.083	39.444	116.872	353.147	379.633
13	0	0	0	3.008	42.960	75	0	5.309	794	119	79	17.636	4.062.262	835.652	152.985	189.420	22.682	101.335	236.280	10.731	927	8.847	2.418	16.836	311
14	10.479	1.545	3	7.015	7	20.510	87	638	43.641	33.196	27.756	7.204	15.477	2.453.000	154.595	13.369	11.139	21.905	101.438	1.030.588	64.645	14.574	24.011	11.169	7.684
15	93.854	13.789	11.263	94.425	58.170	77.392	14.274	8.722	61.007	8.173	11.496	46.844	353.546	19.688	9.242.056	61.214	57.032	109.564	32.217	1.650.604	286.673	427.129	222.303	205.423	255.329
16	37.755	3.401	0	2.873	0	0	0	8	0	0	0	0	0	426	1.796	5.946.403	82	4.954	697	140	735.505	119.680	1.483	14.318	14.258
17	0	57	0	528	0	7.581	0	64	163.098	0	455	719	130.099	16.828	36.494	2.787	4.633.597	3.870	8.980	3.051.546	43.030	8.984	10.649	45.307	6.319
18	0	12	24.878	2.144	0	0	0	419	0	0	0	0	0	0	36	0	0	1.518.518	90	27	482	57.017	3.502	2.942	68.780
19	13.530	1.418	2.062	3.132	4.075	3.061	2.857	1.668	135.894	12.898	13.863	67.075	271.094	15.341	147.453	28.133	23.072	2.846	6.693.267	85.564	157.141	70.719	494.858	85.123	127.348
20	205.780	25.490	0	1.850	40	4.040	360	36.390	18.060	740	920	1.820	4.370	2.650	7.460	350	2.170	3.310	4.560	22.651.240	269.890	106.650	148.080	1.405.040	106.210
21	1.039.420	118.570	193.980	10.660	585.860	14.450	680	2.340	4.500.360	2.297.190	366.740	1.080.200	57.130	101.620	785.510	768.110	113.950	49.000	1.378.890	90.240	26.346.900	202.570	186.350	114.680	128.360
22	253.690	29.510	29.290	582.550	312.770	36.460	14.600	6.920	371.600	49.330	156.950	263.520	152.640	52.190	81.800	42.240	726.630	16.250	154.560	615.400	1.266.020	12.914.140	508.490	250.020	215.090
23	134.440	18.010	7.070	31.500	82.560	92.490	15.390	60.160	431.660	52.490	36.240	149.880	53.090	41.640	99.290	30.170	144.430	56.500	133.150	669.050	1.628.970	673.980	17.788.440	1.188.750	695.030
24	22.130	16.700	2.420	18.470	16.400	12.810	4.180	15.900	108.970	24.180	8.610	44.620	8.770	16.600	18.940	4.620	71.880	22.570	41.980	406.960	1.665.030	431.920	774.080	19.491.040	772.200
25	1.300	180	310	50	2.080	1.020	0	0	3.040	140	290	1.120	70	40	2.150	310	3.330	820	1.240	6.030	30.770	6.010	27.160	9.130	16.386.430

Source: Own elaboration

Table 8: Loss Output per sector after the extraction of column sector for 2005 in a CGE Model

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	10.320.620	201.080	170	0	0	0	0	360	2.305.383	10.860	40	11.420	0	40	140	0	0	0	110	440	110.220	920	5.370	14.080	54.580
2	22.428	2.220.779	0	96	0	0	0	273	748.671	1.581	144.969	2.841	0	0	144	0	884	0	1.224	437	72.219	580	98.151	1.358	39.530
3	0	44	862.465	0	0	0	0	125	79.248	0	40	0	0	40	0	0	0	0	84	437	210.546	176	260	3.143	27.314
4	10.186	0	1.172	4.887.211	1.997.955	275.848	287.252	0	8.894	65	0	156.099	461.639	149	289	0	610.990	43	5.052	614.054	1.057	802	967	12.579	235
5	296.590	29.870	32.800	111.620	11.010.670	507.280	2.880	2.960	48.150	4.770	20.690	392.790	217.050	15.430	5.190	700	146.610	6.620	16.650	798.960	274.280	1.250.511	58.110	95.860	116.550
6	103.669	13.971	1.485	42.826	99.533	4.222.952	13.435	50.872	60.424	12.045	10.034	162.598	49.857	16.547	7.925	7.231	117.202	5.738	40.585	89.294	643.982	78.019	130.187	99.074	252.675
7	1.098	55	2.669	7.163	8.702	54.514	454.272	487	9.518	188	519	77.051	9.043	8.199	2.113	1.529	23.504	2.824	2.185	25.331	70.571	9.419	12.872	12.160	10.385
8	65.851	1.145	179	1.613	6.163	6.021	1.909	971.595	10.063	915	330	4.712	2.232	890	798	592	4.947	1.111	1.914	19.308	120.357	17.623	20.743	35.966	48.609
9	11.070	376.130	15.870	80	0	0	0	440	28.203.270	18.780	40	9.220	0	80	0	0	0	0	120	430	3.127.830	930	151.160	25.650	211.520
10	3.041	24	11.428	48	110	1.678	5	112	1.362	6.518.991	3.098	404	50	1.398	1.260	337	1.972	1.304	74.325	4.045	75.141	7.895	29.527	23.991	76.387
11	1.327	662	7.325	196	110	992	94	1.256	135.928	4.926	4.002.557	14.416	93.764	6.491	12.145	1.434	39.375	4.020	606.250	848.338	473.373	62.669	173.784	68.613	55.946
12	653.510	18.970	4.620	39.910	291.800	25.730	70	13.220	31.560	32.430	62.330	11.976.050	162.440	31.690	30.630	9.480	132.570	58.130	368.590	559.940	256.700	44.860	134.460	421.070	511.300
13	0	0	0	3.688	74.590	108	0	7.741	612	110	72	16.421	5.007.205	1.269.440	137.437	160.689	27.731	133.091	250.618	13.462	925	8.950	2.341	16.676	359
14	9.613	1.609	9	8.825	110	30.668	70	937	42.242	32.130	26.134	7.390	17.893	3.965.683	156.075	11.938	14.350	29.283	115.112	1.840.420	85.700	16.998	28.675	13.861	10.705
15	86.410	14.380	10.670	117.090	110.830	115.890	11.460	12.830	59.630	7.930	10.840	48.260	409.450	30.930	14.428.250	54.780	73.640	146.580	36.670	2.992.090	384.530	501.170	267.860	257.410	358.580
16	32.841	3.502	0	3.586	0	0	0	12	0	0	0	0	0	654	1.683	6.339.632	102	6.549	758	437	829.486	127.487	1.550	15.390	17.597
17	0	58	0	661	0	11.122	0	93	139.081	0	421	699	147.066	25.931	34.531	2.419	6.468.270	5.123	9.814	4.479.027	49.998	9.682	11.318	49.611	7.921
18	0	22	23.466	2.370	0	0	0	614	0	0	0	0	0	0	144	0	0	2.187.792	99	437	560	62.308	3.798	3.294	87.839
19	12.006	1.466	1.945	3.742	7.464	4.515	2.289	2.444	120.115	12.224	12.886	66.207	308.406	23.759	142.106	24.614	29.111	3.777	8.350.553	132.759	187.583	77.938	543.592	96.573	164.484
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31.622.780	0	0	0	0	0
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31.622.780	0	0	0	0
22	229.800	30.650	27.690	565.830	585.650	54.240	11.710	10.150	347.440	47.360	147.050	266.390	175.390	81.470	81.130	37.420	928.690	21.670	173.600	1.041.620	1.613.180	17.580.480	588.210	299.870	291.120
23	123.390	18.760	6.690	37.440	156.780	138.320	12.350	88.420	418.350	50.820	34.120	153.840	61.390	65.320	100.310	26.950	186.120	75.540	151.160	1.197.170	2.167.050	786.690	25.952.680	1.477.280	969.290
24	20.020	17.340	2.280	20.420	30.660	19.040	3.350	23.340	101.540	23.200	8.060	45.040	10.070	25.900	18.750	4.090	91.800	30.090	47.110	685.250	2.112.570	491.960	892.680	27.889.040	1.042.260
25	1.320	180	290	60	4.450	1.590	0	0	3.990	140	280	1.300	80	50	2.540	290	4.600	1.120	1.530	17.300	58.080	8.470	42.990	15.340	23.485.980

Source: Own elaboration

Table 9: Loss Output per sector after the extraction of column sector for 1990 in a Linear model (Dietzenbacher´s approach)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	1.984.699	197.799	7.474	1.079	2.220	1.085	1.218	269	1.639.231	97.098	25.381	3.726	1.898	1.743	3.077	1.492	3.912	2.533	2.731	43.585	338.321	5.454	29.338	3.675	10.582
2	34.559	741.961	3.151	705	1.170	572	373	174	546.847	3.005	122.750	4.149	916	1.000	1.875	844	9.327	1.934	7.415	19.355	90.955	4.360	49.508	2.478	4.891
3	2.295	2.463	196.453	405	901	436	552	86	46.367	1.894	1.579	783	818	724	1.264	585	973	1.000	1.073	7.026	156.649	1.996	6.099	1.244	3.156
4	59.143	11.779	9.236	1.829.959	1.255.038	297.599	66.230	6.592	93.917	11.952	19.989	179.136	18.963	10.964	7.490	6.823	200.477	6.538	10.727	219.434	112.037	155.776	51.984	20.347	24.817
5	104.928	18.806	22.095	19.844	1.132.204	37.341	71.583	2.384	129.968	16.082	28.948	227.052	14.813	10.073	9.957	6.992	50.699	7.477	13.150	220.375	143.788	385.023	65.130	22.076	29.909
6	84.403	20.643	4.107	41.196	44.311	1.114.018	4.681	34.954	160.430	33.404	44.854	96.845	51.951	23.383	14.345	21.594	87.775	17.210	22.316	120.967	304.999	74.655	132.512	59.830	74.169
7	1.271	1.798	218	293	2.540	186	72.068	59	5.663	502	1.391	6.159	4.121	1.738	672	405	4.801	608	529	12.408	29.135	1.370	8.507	3.849	6.732
8	27.252	5.584	349	3.374	2.706	1.636	267	108.963	23.090	2.505	2.663	3.746	1.225	6.399	823	818	2.433	1.009	941	10.425	29.704	5.191	15.436	2.669	4.623
9	24.586	296.536	28.417	3.118	6.803	3.293	4.044	666	1.475.062	15.781	42.770	7.936	6.111	5.461	9.511	4.403	10.662	7.701	6.144	56.056	1.143.742	15.414	62.123	9.697	27.651
10	3.862	1.712	16.204	337	663	242	143	290	14.045	101.818	7.080	2.436	711	825	1.072	3.150	1.495	1.182	4.452	6.399	25.764	8.379	11.777	9.347	11.581
11	12.953	7.882	14.386	3.815	4.126	2.066	590	933	154.414	10.826	555.022	16.647	4.835	5.626	13.075	4.405	20.745	13.072	84.952	129.496	57.606	31.050	93.410	9.056	21.727
12	252.927	30.258	13.365	41.480	30.937	8.284	2.324	5.469	205.383	23.763	54.994	1.017.535	17.355	17.427	17.170	11.388	30.452	17.110	75.359	149.996	122.754	77.134	167.734	65.571	22.796
13	58.953	9.563	13.942	25.971	21.680	6.511	1.720	3.249	84.161	24.411	26.371	49.464	2.407.715	910.252	178.490	236.099	48.569	192.736	135.346	1.014.554	46.817	74.574	51.146	13.313	35.323
14	53.787	8.018	5.390	4.866	6.753	1.494	460	2.006	79.092	11.547	29.149	8.794	4.488	589.189	34.330	38.261	9.104	42.662	5.024	289.933	22.218	15.948	19.958	4.245	22.806
15	132.919	15.422	13.989	20.513	15.456	5.305	1.196	4.460	88.145	17.244	9.874	23.513	17.823	9.470	839.853	14.823	22.790	44.916	4.884	249.335	60.843	40.741	96.641	25.777	144.825
16	18.751	9.687	4.545	9.002	18.198	7.939	3.364	746	58.438	9.145	10.950	13.208	5.209	6.084	7.395	680.523	17.753	5.671	6.115	67.953	80.724	675.180	45.997	14.740	18.740
17	5.954	4.333	769	11.112	8.610	3.439	892	1.915	90.650	1.781	6.040	9.927	11.429	4.527	8.902	3.664	1.227.460	3.301	2.376	1.093.210	42.024	8.386	18.858	7.153	7.999
18	536	300	33.174	233	518	255	78	89	3.841	442	454	421	166	300	529	258	411	77.296	271	3.326	10.862	5.105	32.083	4.490	3.273
19	62.868	8.618	18.648	6.964	7.568	3.140	947	1.008	115.985	26.927	18.486	19.733	1.833	5.060	27.162	18.319	10.429	8.067	652.226	146.363	59.474	88.386	148.931	18.609	36.312
20	29.060	10.250	1.715	21.015	21.864	14.594	3.639	12.652	43.506	8.477	7.579	12.309	4.762	5.338	26.630	2.908	13.199	7.559	3.221	438.260	119.924	43.618	95.927	45.633	40.876
21	189.062	106.126	48.356	33.261	74.302	35.951	46.707	6.938	537.150	158.288	120.803	63.861	69.029	60.263	105.325	48.148	79.703	82.243	47.949	582.427	2.481.028	161.363	277.204	98.708	123.374
22	163.038	84.303	39.480	78.306	158.330	69.067	29.282	6.475	508.204	79.483	95.221	114.892	45.222	52.881	64.249	43.687	154.495	49.190	49.364	590.816	701.740	2.891.825	382.350	127.857	137.382
23	80.353	33.792	47.497	42.927	102.027	52.286	9.370	15.217	371.269	75.108	81.726	73.751	24.754	57.370	71.276	58.503	78.654	125.900	60.102	506.924	856.604	307.278	2.969.790	329.929	328.398
24	65.749	23.040	11.669	23.484	75.222	9.332	4.930	3.025	100.430	18.190	21.699	12.254	11.863	10.440	18.560	6.426	19.672	7.683	9.021	116.444	509.846	78.520	245.314	1.087.746	37.036
25	3.037	1.050	22	2.448	1.611	383	86	9	1.695	86	137	236	27	17	14	11	267	90	22	331	563	208	123	31	6.486

Source: Own elaboration

Table 10: Loss Output per sector after the extraction of column sector for 1995 in a Linear model (Dietzenbacher´s approach)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	3.629.063	366.677	4.542	933	10.241	1.553	69	229	3.271.853	130.181	22.022	14.120	934	805	1.543	620	7.715	1.803	7.029	18.879	443.836	10.447	40.538	5.634	38.571
2	7.321	846.665	1.068	360	2.543	509	33	132	710.263	1.097	98.229	2.343	633	675	1.127	384	3.942	474	12.886	16.194	126.280	4.241	22.671	1.831	25.555
3	1.555	1.763	160.321	126	565	163	11	37	46.785	194	288	198	123	109	224	96	623	105	641	2.559	111.576	2.056	3.396	541	9.402
4	85.637	27.309	8.850	2.621.285	1.549.825	307.355	62.806	6.286	176.203	11.355	15.990	144.108	262.427	44.664	17.745	13.104	254.476	12.580	38.507	500.408	233.149	260.437	104.794	37.301	37.642
5	121.393	42.486	19.048	26.724	1.379.151	45.193	1.115	3.503	222.654	14.030	18.720	61.927	27.604	15.125	8.959	6.183	53.758	5.595	22.987	302.021	267.621	570.156	97.492	48.276	41.809
6	132.127	46.792	3.442	55.261	84.096	2.213.434	6.552	43.017	285.837	33.636	44.680	94.353	84.818	32.953	23.932	16.510	100.192	21.553	72.018	223.100	858.441	105.992	340.703	109.245	138.210
7	5.734	1.379	156	764	8.976	391	103.519	239	11.783	1.380	3.917	50.830	3.202	2.542	1.080	574	6.077	1.259	4.108	13.240	11.634	4.597	18.117	3.210	2.569
8	66.689	12.395	261	1.124	3.573	2.407	1.682	200.381	49.570	2.325	2.244	3.790	1.550	823	682	641	2.658	703	1.981	13.056	66.757	10.477	23.046	8.403	8.175
9	44.403	403.862	15.976	2.597	37.039	5.368	201	684	2.140.389	7.280	25.551	8.222	2.345	2.081	3.781	1.923	25.850	1.892	9.355	57.203	1.559.028	34.844	119.958	9.574	64.250
10	2.558	3.953	7.080	3.047	9.598	1.337	96	190	111.283	307.978	4.310	5.646	3.846	2.263	6.828	528	8.411	27.677	48.616	12.544	44.773	7.444	32.303	13.032	33.529
11	14.020	13.192	3.877	4.012	7.078	3.464	366	1.671	266.060	12.885	1.386.109	22.550	10.541	11.915	19.293	5.613	31.282	7.332	280.601	266.616	528.165	41.127	107.758	24.034	26.346
12	480.917	94.429	5.509	21.598	34.568	10.510	2.303	5.572	484.377	23.258	44.849	2.177.508	18.155	18.857	23.622	10.968	70.222	11.419	196.579	274.298	231.067	43.572	787.573	81.793	65.696
13	8.663	3.144	2.392	2.305	3.944	1.232	102	1.395	36.965	5.020	5.028	11.249	977.873	411.419	103.688	106.166	31.664	88.238	189.403	286.773	48.560	16.310	27.576	7.091	6.795
14	14.969	5.719	810	1.948	5.250	1.226	97	3.221	67.679	9.285	14.211	8.172	11.515	1.073.646	31.617	9.683	9.886	5.485	34.764	876.507	41.134	13.088	27.542	9.337	10.350
15	78.496	22.078	13.481	37.466	71.996	33.896	2.070	15.657	137.918	17.984	19.202	44.670	63.481	28.880	2.023.249	28.802	44.209	60.467	36.269	1.029.823	293.400	82.973	277.797	43.000	35.251
16	26.943	6.322	276	721	1.973	602	41	141	21.484	1.103	1.040	1.155	888	849	1.878	244.619	2.836	2.437	1.391	8.793	174.522	49.461	6.257	5.452	2.506
17	15.337	7.909	572	1.938	3.269	1.379	80	875	124.098	2.105	2.707	5.102	9.874	11.799	17.480	1.225	1.777.068	2.708	11.149	1.547.336	104.177	21.059	23.778	12.787	15.842
18	475	263	1.605	281	722	214	15	39	3.028	202	260	493	409	247	214	100	839	29.801	459	2.589	6.294	27.616	1.860	593	548
19	22.441	12.965	4.068	5.887	9.795	3.665	346	4.933	247.150	18.287	11.102	39.830	5.066	23.038	59.754	9.709	37.661	9.329	945.087	127.741	187.485	98.457	226.803	28.587	45.887
20	103.558	31.041	2.160	3.971	7.869	7.035	247	5.139	88.038	5.361	4.212	4.040	2.678	2.547	3.869	1.727	6.325	2.808	6.516	632.977	191.966	31.441	127.249	80.234	102.128
21	269.443	67.914	14.119	21.993	81.163	27.049	1.827	6.183	424.054	31.659	38.022	30.896	21.638	19.015	39.120	16.795	101.379	18.213	68.276	448.030	2.045.891	368.173	313.745	94.073	175.647
22	128.104	65.799	22.400	76.746	196.856	58.495	3.986	10.604	643.823	54.958	70.611	134.776	111.966	63.756	58.301	27.346	227.230	27.468	124.927	703.477	1.595.272	4.039.655	503.379	135.765	126.302
23	86.777	46.109	15.074	30.028	212.381	62.692	6.064	22.146	575.391	41.838	28.248	80.901	31.413	26.864	54.034	28.046	72.657	49.444	80.811	473.053	1.395.049	344.860	3.752.782	250.919	600.801
24	28.645	9.881	2.954	28.913	70.632	18.403	1.168	6.695	120.635	18.045	11.413	21.896	9.039	14.817	15.254	4.874	23.855	10.669	29.694	168.138	936.493	144.768	570.234	2.042.560	235.485
25	859	475	872	198	347	93	12	251	5.570	76	99	252	76	43	73	36	536	84	247	1.103	3.420	650	18.857	338	27.218

Source: Own elaboration

Table 11: Loss Output per sector after the extraction of column sector for 2000 in a Linear model (Dietzenbacher´s approach)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	3.698.224	286.334	9.186	2.132	18.567	2.185	323	927	3.395.097	78.257	34.178	46.997	7.555	5.084	23.370	21.236	6.908	2.543	46.912	30.453	637.366	16.267	61.765	35.762	103.307
2	42.839	1.318.837	3.649	1.715	8.808	1.746	328	1.016	972.446	27.771	166.016	18.509	8.992	3.986	11.727	9.150	6.838	1.798	47.477	53.843	250.774	15.125	122.599	24.203	57.249
3	10.829	4.313	319.431	547	5.803	574	76	192	137.713	20.353	3.795	10.209	2.006	1.481	7.482	6.949	1.801	716	13.649	6.733	211.206	3.953	5.516	6.395	27.326
4	332.916	42.328	30.677	6.720.880	4.543.337	550.516	397.526	14.680	361.849	66.676	44.285	526.836	586.886	154.395	77.087	56.747	662.520	30.804	140.868	1.388.875	536.931	690.339	158.138	270.202	185.347
5	508.919	64.634	48.566	179.027	4.100.376	390.475	18.709	12.663	468.143	82.173	66.964	535.108	272.633	86.847	65.473	45.029	260.517	23.302	137.432	988.992	656.654	1.285.505	196.952	272.406	231.407
6	192.652	30.463	8.949	49.309	114.465	1.878.665	22.169	40.580	284.495	78.616	29.256	222.711	72.712	33.813	41.729	35.342	125.565	11.679	101.763	220.131	642.293	115.126	161.027	145.173	249.468
7	19.791	2.789	4.198	8.352	17.028	40.978	370.316	1.337	47.734	11.931	4.102	99.819	14.522	10.131	9.016	6.777	26.381	3.901	16.140	63.780	111.557	18.672	25.189	30.006	24.327
8	93.744	5.899	1.576	3.369	10.380	6.056	3.136	366.627	72.839	13.956	3.532	13.940	5.022	2.760	6.369	5.434	8.309	1.823	11.907	28.120	128.497	23.580	27.539	41.722	49.326
9	175.876	445.282	46.065	8.834	84.774	9.450	1.336	2.632	3.766.539	312.095	86.097	158.253	31.003	22.305	108.328	99.569	28.680	11.045	202.729	114.434	3.008.335	65.027	239.929	88.908	256.267
10	10.143	1.526	14.643	1.250	4.044	2.097	217	421	28.318	320.936	5.946	6.882	5.245	3.095	7.456	4.257	4.554	1.903	84.225	16.265	92.489	14.050	42.095	32.443	77.224
11	61.968	16.999	17.020	10.597	33.529	7.762	1.872	5.320	398.845	79.624	2.923.809	69.555	145.890	45.199	70.563	37.629	61.605	13.187	743.300	942.262	717.153	123.404	310.202	208.431	123.360
12	867.263	56.003	13.159	50.185	225.691	36.180	4.161	14.116	478.466	86.862	92.165	3.624.564	202.062	74.414	78.184	40.789	145.766	60.278	435.660	607.783	443.355	121.294	220.854	489.902	506.475
13	30.338	5.394	4.932	13.959	62.865	15.036	1.706	8.174	68.479	26.495	16.071	39.179	1.787.885	913.670	240.791	219.101	41.002	124.226	310.947	521.329	117.914	60.562	59.156	86.538	43.023
14	39.977	7.975	2.669	13.128	16.271	26.088	1.564	4.206	101.036	50.812	34.300	22.110	34.520	1.731.042	175.648	22.979	21.721	28.015	128.520	1.169.686	144.967	45.420	63.611	122.126	40.945
15	198.803	36.037	23.828	140.512	194.718	108.546	25.780	18.583	306.973	73.072	37.843	124.137	427.131	126.507	4.587.859	112.654	132.992	139.630	128.690	2.068.299	585.408	551.294	338.708	454.722	380.921
16	85.340	14.288	7.700	12.392	32.698	3.724	1.070	604	189.875	78.113	16.345	43.213	11.180	7.651	32.004	995.729	17.051	8.434	55.647	44.752	806.616	142.253	26.402	33.455	34.709
17	55.793	13.233	2.466	5.716	13.019	12.202	857	8.375	245.513	20.276	6.754	15.862	152.152	55.231	60.160	18.242	3.937.563	11.751	38.081	3.441.340	187.077	50.597	67.997	337.830	56.555
18	4.188	832	35.635	7.719	8.116	1.174	577	762	13.446	2.720	1.773	4.062	2.537	1.191	1.905	1.275	6.838	226.914	3.558	13.209	23.212	81.621	10.513	8.905	101.822
19	55.716	12.147	6.857	15.880	36.401	13.276	5.266	5.944	253.435	49.919	26.695	103.087	310.785	91.148	194.203	60.265	49.461	19.070	1.900.567	260.490	322.933	129.134	561.415	176.784	196.673
20	317.445	52.427	6.987	18.169	37.821	13.182	2.937	50.613	298.493	65.764	20.577	48.362	21.256	15.055	39.227	23.886	34.811	11.056	59.883	3.043.485	619.410	208.603	297.355	1.850.371	253.821
21	1.332.760	284.450	232.089	65.680	719.398	69.493	8.928	11.841	5.432.838	2.523.676	450.917	1.262.416	247.098	182.704	930.501	865.969	217.940	87.693	1.692.591	807.967	14.648.158	464.979	529.674	392.049	447.762
22	533.272	92.426	61.552	738.109	923.715	135.955	62.204	20.149	1.140.531	265.002	246.110	516.407	340.372	162.251	221.018	141.722	1.012.536	47.672	416.978	1.865.327	2.008.894	7.579.217	777.248	605.401	444.627
23	376.818	76.768	37.474	103.635	266.727	141.964	28.333	81.608	1.193.694	311.296	109.716	356.941	145.385	105.044	237.073	131.629	288.864	89.251	374.449	1.292.657	2.461.794	947.055	7.883.477	1.629.064	1.037.005
24	166.354	48.490	23.331	56.254	126.284	33.205	9.943	23.385	605.898	221.731	56.447	172.571	54.449	45.512	106.713	76.578	144.091	37.098	198.394	688.081	1.975.975	540.273	889.697	4.725.643	916.287
25	4.273	866	734	766	4.013	1.537	112	204	13.323	3.982	1.220	3.777	1.172	659	3.917	1.736	4.753	1.169	4.381	13.660	38.068	8.924	29.087	13.457	96.520

Source: Own elaboration

Table 12: Loss Output per sector after the extraction of column sector for 2005 in a Linear model (Dietzenbacher´s approach)

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
1	2.855.611	230.744	2.554	234	12.548	901	50	656	2.523.306	26.719	11.275	20.275	2.144	2.121	5.589	3.896	2.229	1.224	16.770	12.807	331.690	5.814	29.812	22.332	83.288
2	34.947	1.104.915	1.179	292	7.016	1.090	91	856	788.235	9.822	104.846	8.238	4.242	2.060	3.457	2.021	3.561	1.229	24.321	36.745	157.573	7.613	107.428	15.066	54.650
3	7.346	2.027	302.738	98	7.153	410	18	184	106.873	9.951	1.554	5.604	974	1.141	3.184	2.308	1.001	599	8.862	4.863	198.534	2.314	3.112	5.035	30.211
4	109.642	10.421	7.194	4.364.369	2.180.802	350.928	245.097	8.579	95.787	13.286	7.317	235.796	492.288	99.410	17.755	10.789	542.729	20.004	49.298	1.201.359	199.037	175.072	56.929	144.634	80.316
5	471.610	47.766	31.768	64.644	4.289.486	501.948	8.327	13.931	267.826	37.529	32.147	399.948	255.119	73.432	25.041	13.114	210.172	23.639	83.775	1.169.384	548.843	1.171.141	154.818	245.572	232.802
6	187.711	23.536	5.108	20.566	162.523	2.171.564	13.897	55.555	212.325	47.637	15.704	177.998	67.162	34.790	21.086	14.413	119.265	14.182	84.085	248.708	718.434	102.784	166.508	153.492	319.063
7	11.320	1.190	2.575	3.319	17.541	51.318	317.446	1.432	25.284	4.648	1.500	69.134	11.756	10.806	3.529	2.150	22.463	4.732	8.927	54.951	81.872	12.568	17.984	21.675	20.363
8	99.865	3.953	881	1.191	14.843	7.616	2.006	432.807	50.518	8.195	1.699	9.999	4.161	2.723	3.253	2.183	7.209	2.427	9.327	36.569	142.384	21.991	28.576	47.981	63.984
9	132.820	400.867	26.597	1.734	112.352	7.361	367	2.137	3.871.364	169.476	37.869	95.988	16.144	17.860	49.857	35.855	17.067	10.042	139.697	82.567	3.071.707	39.555	207.331	68.106	276.701
10	7.965	736	10.008	267	4.218	2.215	74	389	17.224	322.942	3.205	3.722	3.222	2.763	3.269	1.403	3.269	2.354	77.742	14.809	84.908	10.714	37.569	30.746	88.400
11	36.902	7.460	9.226	1.999	29.193	5.235	577	4.669	250.497	34.078	2.748.525	36.350	122.781	34.013	27.840	10.474	46.340	12.525	645.673	1.028.360	563.410	86.064	243.629	173.526	107.596
12	872.237	38.319	7.210	19.244	361.621	40.255	1.581	17.080	265.717	48.489	53.037	4.129.747	188.571	70.076	37.424	14.003	129.829	84.695	394.502	793.598	382.329	94.557	198.819	523.687	608.219
13	18.364	2.453	2.090	3.877	91.398	12.934	483	9.707	34.170	11.607	6.855	23.399	2.022.358	1.249.998	128.928	101.063	32.018	183.725	276.576	614.387	71.939	35.958	38.552	73.738	31.403
14	37.694	5.677	1.234	4.755	12.090	32.073	599	5.233	79.490	34.290	21.322	14.429	27.546	2.522.944	112.535	9.927	17.908	41.179	123.330	1.983.751	148.220	35.613	61.395	157.701	43.916
15	182.079	26.440	14.008	55.222	201.548	126.221	13.836	22.685	207.896	38.904	18.319	81.327	421.101	112.622	6.101.346	46.768	105.833	202.833	91.327	3.311.850	578.537	506.772	345.130	531.682	467.992
16	71.956	8.871	3.665	3.421	34.533	2.424	305	403	122.214	39.704	6.894	24.181	5.754	5.977	14.291	977.448	10.076	10.895	37.092	32.243	788.194	121.828	16.246	26.571	31.090
17	47.610	7.887	1.033	1.434	11.793	13.713	298	9.070	189.183	9.537	2.675	8.464	151.442	54.874	31.839	5.892	5.300.327	13.405	26.202	4.827.416	169.979	39.900	62.701	382.510	60.479
18	2.261	350	23.929	2.204	4.579	599	168	881	6.159	924	630	1.707	1.287	714	702	299	3.949	220.870	1.756	10.202	14.355	70.655	8.283	7.268	117.511
19	39.991	6.415	3.462	4.114	35.246	11.433	2.716	6.037	188.556	26.191	13.846	72.871	312.335	82.353	110.961	23.438	38.287	18.441	1.920.943	276.388	282.024	101.555	568.103	166.374	220.027
20	391.915	50.288	4.667	6.339	52.151	16.541	1.578	76.464	253.249	48.271	12.018	38.951	18.712	18.327	25.934	11.637	31.787	17.353	57.738	4.704.032	874.012	241.363	405.234	2.947.402	401.622
21	1.347.672	206.781	159.368	17.195	1.320.586	73.742	3.029	10.511	5.157.945	1.837.549	275.784	1.032.253	178.087	202.678	588.639	427.583	179.190	108.966	1.623.683	777.111	14.318.948	382.863	426.062	325.564	406.863
22	459.801	61.675	36.312	253.619	924.660	111.477	25.388	20.938	812.215	145.441	140.772	351.049	273.078	155.107	109.691	53.441	917.923	52.917	319.018	2.122.402	1.968.965	7.905.025	748.985	581.433	471.334
23	336.236	51.533	20.928	32.807	353.644	170.624	15.536	106.931	954.431	184.482	57.607	255.285	115.394	113.565	130.860	52.953	247.646	126.403	309.877	1.818.021	2.663.475	885.072	9.333.249	1.876.286	1.304.415
24	136.306	34.774	12.825	17.081	149.113	33.953	4.868	29.719	460.701	130.697	27.962	116.628	36.836	48.008	54.702	29.732	121.247	51.436	157.448	948.043	2.173.522	503.637	951.349	5.614.160	1.176.042
25	4.839	726	545	254	7.860	2.083	54	280	14.373	3.268	805	3.416	956	734	2.870	941	4.930	1.844	4.646	26.279	60.586	10.211	43.442	20.566	156.026

Source: Own elaboration