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Abstract

In this paper an attempt is made to identify a "convenient" structure of a policy variable, final demand control, through the use of a multi-sectoral model. The method used relies on a specific spectral decomposition which allows for the quantification of the scale-effect of each structure that the policy variable can assume on the structures of the objective variable. This quantification is of aggregated type since the scalars obtained are valid for all sectoral components of both the policy variable and the objective variable. What is more relevant they are consistent with the multi-sectoral feature of the model, overcoming the objections put forward by the theory of aggregation. In fact the aggregation theory states that if we aggregate sectors we obtain a new model with different structural properties, while, in our case, the aggregated scalar that we obtain for each structure is perfectly consistent with the original model. We call these scalars Macroeconomic Multipliers since they say how many time the modulus of the multi-sectoral policy variable is multiplied when we compare it with the modulus of the effects observed on the multi-sectoral objective variable. Once identified the structures and the associated Macro Multipliers, the policy maker can have a complete picture of the economic structure of the objective variables that can be attained and determine a "convenient" structure of the policy variable choosing either one structure or a combination of the structures identified.

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1 Introduction

Recent developments in the design of data bases from national accounts provide consistent and meaningful sectorization of the major macroeconomic variables (Bulmer-Thomas, 1982). However the traditional tools of analysis provide procedures that do not give a complete account of the effects of changes in the composition (structure) of macroeconomic variable.

In our work we attempt to find which is the best composition of exogenous variable to obtain a particular effect on objective variable. The propagation analysis we propose is based on a decomposition that allows for the identification and quantitative determination of aggregated Macro Multipliers (MM), which lead the economic interactions, and the structures of macroeconomic variables, that either hide or activate these forces. They are aggregated multipliers consistently extracted from a multisectoral framework and their meaning holds both if we speak in aggregated or disaggregated terms. The analysis will be applied to the final demand-total output loop. We will consider the effect of a demand change (control) considered as policy variable on total output. However the same analysis could be generalized to a wider loop where value added and income distribution can also consider. It will identify the most convenient structure for the aims of the policy maker (Ciaschini and Socci, 2006).

In section 2 the discussion on impact multipliers analysis is briefly referred. Section 3 shows the singular values decomposition related to eigenvalues decomposition and define MM approach. Section 4 the deterministic analysis of propagation is performed in order to identify and quantify all the MM that rule the economic interactions. This section determine a "convenient" structure of the policy variable choosing either one structure or a combination of the structures identified

2 Input-Output model and Multiplier analysis

The original Input-Output (I-O) problem is to search the output vector consistent with final demand vector for I-O sectors, given structural interrelation among industry sector. Such a vector conveniently faces the predetermined final demand vector $\mathbf{f}$ by industries, and the induced industrial demand. The equilibrium output vector is given by

$$\mathbf{x} = \mathbf{R} \cdot \mathbf{f} \quad (1)$$

where $\mathbf{R} = [\mathbf{I} - \mathbf{A}]^{-1}$ and $\mathbf{A}$ is the constant technical coefficients matrix, and generally exists, as in general the technology can be expected to be productive, i.e. the technology is such that a part of total output is still available for final uses, after the intermediate requirements have been satisfied. In this case, $\mathbf{A}$ satisfies the Hawkins-Simon conditions. The $\mathbf{R}$ matrix is usually referred to as the Leontief multipliers matrix (Leontief, 1965) and its elements, r_{ij}, show the direct and indirect requirements of industry output i per unit of final demand of product at industry j. Extensive use is made of matrix $\mathbf{R}$ within the traditional multipliers analysis. The $\mathbf{R}$ matrix provides, in fact, a set of disaggregated multipliers that are recognized to be the most precise and sensitive for studies of detailed economic impacts. These multipliers recognize the evidence that total impact on output will vary depending on which industries are affected by changes in final demand. The i^{th} total output multiplier measures the sum of direct and indirect input requirements needed to satisfy a unit final demand for goods produced by industry i. I-O multipliers can be derived from either an open I-O model and a partially closed I-O model. The first set includes type I and type II multipliers. For the determination of type I multiplier all components of final demand are treated exogenously. Type I multiplier will then represent the ratio of direct and indirect output changes to the initial direct change in final demand.

Multipliers can be however determined taking one or more components of final demand as endogenous. If the only final demand component to be treated endogenously is personal consumption expenditures, the multipliers are referred to as type II. In this case the model is said to be partially closed with respect to households. Each type II multiplier will then represent the ratio of the direct indirect and induced changes to the initial direct change. If another final demand component such as state and local government expenditure is also treated endogenously the multiplier is referred as type III (Lee, 1986).

When a final demand component is made endogenous the corresponding part of value added must also be treated endogenously; consequently, personal consumption expenditures have counterpart in value added referred to as wages and salaries; state and local government expenditures a counterpart referred to as taxes etc. The inverse coefficients of the augmented matrix reflect the induced effects of changed incomes on final outputs. Finally income and employment multipliers, type IV multipliers, can be obtained by pre-multiplying the matrix of output multipliers by a row vector of wage to output ratios in the case of income, and employment to output ratio in case of employment (Polenske and Jordan, 1988).

It has to be stressed, however, that all these measures, built starting from matrix **R**, are not independent of structure of the either total output vector, neither which we observe the effects, nor of structure of final demand vector on which we impose the unit demand shock.

The column sum of the **R** matrix in equation 1 implies the consideration of a set of final demand vectors of the type:

$$\mathbf{f}^1 = \begin{bmatrix} 1 \\ 0 \\ . \\ 0 \end{bmatrix}, \mathbf{f}^2 = \begin{bmatrix} 0 \\ 1 \\ . \\ 0 \end{bmatrix}, \cdots, \mathbf{f}^m = \begin{bmatrix} 0 \\ 0 \\ . \\ 1 \end{bmatrix} \tag{2}$$

While the sum of row elements in equation 1 implies the consideration of a final demand structure of the type:

$$\mathbf{f} = \begin{bmatrix} 1 \\ 1 \\ . \\ 1 \end{bmatrix} \tag{3}$$

We can expect that these measures hold for demand vectors of varying scale but with the same structures of equations 2 or 3. However neither the demand vector nor its changes will ever assume a structure of this type. This is why some authors come to the drastic conclusion that "multipliers should be never used" (Skolka, 1986).

On the other hand it is a common opinion that the structure of final demand produces the most different effects on the level of total output (Ciaschini, 1989). Given a set of nonzero final demand vectors, whose elements sum up to a predetermined level, but with varying structures, we will have to expect that the corresponding level of total output will also vary considerably.

For these reasons we cannot confine our knowledge of the system to the picture emerging from measures which can only show what would happen if final demand assumed a predetermined and unlikely structure.

3 Relationship between final demand and output: Macro Multiplier approach

The direct and indirect effects of final demand on total output are then quantified in our model from structural matrix $\mathbf{R}$.

The structural matrix $\mathbf{R}$ of our model can be easily decomposed in a sum of m different matrices through the Singular Values Decomposition (Ciaschini, 1993).

The decomposition proposed can be applied both to square and to non-square matrices. Here the general case of square matrix $\mathbf{R}$ will be shown[1]. For example given 2x2 model we will show a Singular Values Decomposition. Let us consider matrix $\mathbf{W}$ $[2,2]$, for example, the square of matrix $\mathbf{R}$:

$$\mathbf{W} = \mathbf{R}^T \cdot \mathbf{R}$$

Matrix $\mathbf{W}$ has a positive definite or semi definite square root. Given that $\mathbf{W} \geq 0$ by construction, its eigenvalues λ_i for $i = 1,2$ shall be all real non negative (Lancaster and Tiesmenetsky, 1985).

The nonzero eigenvalues of matrices $\mathbf{W}$ and $\mathbf{W}^T$ coincide. The system of eigenvectors $[\mathbf{u}_i \ i = 1,2]$ for $\mathbf{W}$ and $[\mathbf{v}_i \ i = 1,2]$ for $\mathbf{W}^T$ are orthonormal basis.

We get then

$$\mathbf{R}^T \cdot \mathbf{u}_i = \sqrt{\lambda_i} \cdot \mathbf{v}_i \qquad i = 1,2$$

We can construct the two matrices

$$\mathbf{U} = [\mathbf{u}_1, \mathbf{u}_2] \qquad \mathbf{V} = [\mathbf{v}_1, \mathbf{v}_2]$$

As defined above, the eigenvalues of $\mathbf{W}$ coincide with singular values of $\mathbf{R}$ hence $s_i = \sqrt{\lambda_i}$ and we get

$$\mathbf{R}^T \cdot \mathbf{U} = [s_1 \cdot \mathbf{v}_1, s_2 \cdot \mathbf{v}_2] = \mathbf{V} \cdot \mathbf{S}$$

Structural matrix $\mathbf{R}$ in equation 1 can be then decomposed as

$$\mathbf{x} = \mathbf{U} \cdot \mathbf{S} \cdot \mathbf{V}^T \cdot \mathbf{f} \tag{4}$$

$\mathbf{V}$ is an $[2,2]$ unitary matrix whose columns define the 2 reference structures for final demand:

$$\mathbf{v}_1 = \begin{bmatrix} v_{1,1} & v_{1,2} \end{bmatrix}$$

[1] The non-square matrix case is easily developed along the same lines.

$$\mathbf{v}_2 = \begin{bmatrix} v_{2,1} & v_{2,2} \end{bmatrix}$$

U is an [2, 2] unitary matrix whose columns define 2 reference structures for output:

$$\mathbf{u}_1 = \begin{bmatrix} u_{1,1} \\ u_{2,1} \end{bmatrix}, \mathbf{u}_2 = \begin{bmatrix} u_{1,2} \\ u_{2,2} \end{bmatrix}$$

and **S** is an [2, 2] diagonal matrix of the type:

$$\mathbf{S} = \begin{bmatrix} s_1 & 0 \\ 0 & s_2 \end{bmatrix}$$

Scalars s_i are all real and positive and can be ordered as $s_1 > s_2$. Now we have all the elements to show how this decomposition correctly represents the MM that quantify the aggregate scale effects and the associated structures of the impact of a shock in final demand on total output. In fact if we express the actual vector **f** in terms of the structures identified by matrix **V**, we obtain a new final demand vector, $\mathbf{f}^0$, expressed in terms of the structures suggested by the **R**:

$$\mathbf{f}^0 = \mathbf{V} \cdot \mathbf{f} \tag{5}$$

On the other hand we can also express total output according the output structures implied by matrix **R**:

$$\mathbf{x}^0 = \mathbf{U}^T \cdot \mathbf{x} \tag{6}$$

Equation 4 then becomes through equations 5 and 6:

$$\mathbf{x}^0 = \mathbf{S} \cdot \mathbf{f}^0 \tag{7}$$

which implies:

$$x_i^0 = s_i \cdot f_i^0 \tag{8}$$

where $i = 1, 2$. We note that matrix **R** hides 2 fundamental combination of the outputs. Each of them is obtain multiplying the corresponding combination of final demand by a predetermined scalar which has in fact the role of aggregated Macro Multiplier.

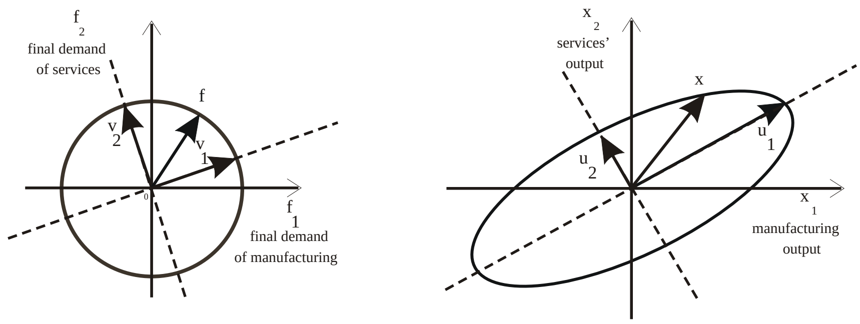
The complex effect on the output vector of final demand shocks can be reduced to a multiplication by a constant s_i.

The structures we have identified play a fundamental role in determining the potential behavior of the economic system, i.e. the behavior of the system under all possible shocks. We can in fact evaluate which will be the effect on output of all final demand possible structures. This is easily done imposing in equation 4 a vector whose modulus is constant, say equal to one, but whose structure can assume all possible configurations. If vector **f** in equation 4 is such that

$$\sqrt{\sum_j f_j^2} = 1 \tag{9}$$

then geometrically we mean that the final demand vector describes a sphere of unit radius (the unit circle).

Figure 1: Unit circle and corresponding ellipsoid for output industry



It rotates around the origin, as in figure 1(a), assuming all the possible structures, including those implied by the columns of matrix **V**. Correspondingly the vector of total output will describe an ellipsoid with semi-axes of length s_1, s_2, oriented according the directions designated by the columns of matrix **U**, as in figure 1(b). This ellipsoid represents the isocost of final demand control.

When final demand vector crosses a structure in **V**, the vector of total output crosses the corresponding structure in **U** and the ratio between the moduli of the two vectors is given by the corresponding scalar s. Singular values s_i, then, determine the aggregated effect of a final demand shock on output. For this reason we will call them Macro Multipliers. These MM are aggregated, in the sense that each of them applies on all components of each macroeconomic variables taken into consideration, and are consistent with the multi-industry specification of the model[2].

In our original $[m,m]$ model, we can than say that, given our matrix $\mathbf{R}$, we are able to isolate impacts of different (aggregate) magnitude, since that MM present in matrix $\mathbf{R}$, s_i can be activated through a shock along the demand structure $\mathbf{v}_i$ and its impact can be observed along the output structure $\mathbf{u}_i$.

As we see from figure 1 it exist a "dominating" policy structure $\mathbf{v}_1$ which, when activated, produces the largest effect $s_1 \cdot \mathbf{u}_1$. For policy purposes, however, we could be interested in a sub-dominating policy which does not produce greatest effect but favors same pre-determined sectors. In this case the policy structure will be given by a combination of the two policies according a convenient coefficient α $(0 \leq \alpha \leq 1)$

$$\mathbf{f}^* = \alpha \cdot \mathbf{v}_1 + (1 - \alpha) \cdot \mathbf{v}_2$$

Its effect on total output will be by same combination

$$\mathbf{x}^* = \alpha \cdot [s_1 \cdot \mathbf{u}_1] + (1 - \alpha) \cdot [s_2 \cdot \mathbf{u}_2]$$

4 Empirical analysis

Policy objectives of demand control can be designed with reference either to the whole producing system or to specific outputs. However even when considering specific outputs we need to consider the entire producing structure given the interactions among branches. Our aim is to identify the demand control policies (instrument variable) that promote for example the wine sectors (4 and 5) within the realized total output (objective variable). The fundamental intersectoral relationship between the policy control on final demand $\Delta\mathbf{f}$ and the resulting change in the objective variable, total output, $\Delta\mathbf{x}$, is given by:

$$\Delta\mathbf{x} = [\mathbf{I} - \mathbf{A}]^{-1} \cdot \Delta\mathbf{f} \tag{10}$$

The problem will be that of quantifying, given the aggregate value of the policy control $\| \Delta\mathbf{f} \|$ that we need to activate, the resulting aggregate value of total output $\| \Delta\mathbf{x} \|$; and of identifying which structures will be most

[2]Given the problems connected with aggregation in multisectoral models, this feature of singular values s_i is not of minor relevance. They are aggregated multipliers consistently extracted from a multisectoral framework and their meaning holds both if we speak in aggregated or disaggregated terms.

suitable in order to activate structures most favorable to wine sectors within the objective variable.

In this application matrix $\mathbf{A}$ is the technical coefficient matrix for Italy (ISTAT, 2004) in the year 2000 in the 60 branches disaggregation[3]. Inverse matrix of Input-Output model is shown in appendix, tables 2, 3 and 4.

The policy variable (demand) has 60 demand sectors as well as the objective variable (total output). Applying Singular Values Decomposition we obtain a set of 60 Macro Multipliers, a set of 60 (linearly independent) structures of demand control each one activating the corresponding multiplier and a set of 60 (linearly independent) structures each one under the impact of the corresponding multiplier.

Matrix $[\mathbf{I} - \mathbf{A}]^{-1}$, then, hides a set of multipliers that can be stimulated by convenient structures (compositions) of the policy control and observed on the corresponding structures of the objective variable. The set of Macro Multipliers are shown in figure 2 where they have been arranged in decreasing order of magnitude.

Let us concentrate on what we will define as "policy 1", which is in fact the "dominating policy". Policy 1 will be characterized by structure 1, $\mathbf{v}_1$,of the policy control as shown in figure 4, whose aggregated value will be determined by its modulus $||\mathbf{v}_1||$, in our experiment $||\mathbf{v}_1|| = 1$. Its aggregated effect on the objective variable (total output) will be determined by $s_1 \cdot ||\mathbf{u}_1||$ $= 2.77$. Such effect will be observed on objective structure 1, $\mathbf{u}_1$ and will be equal to $s_1 \cdot \mathbf{u}_1$ as in figure 3.

Policy 1 has two relevant features. Firstly it is a demand policy that has the highest multiplier effect on output: a generic change in final demand vector will be characterised by the effect of this multiplier. Only when the demand change has precisely structure 1 we get the highest effect on output. Secondly it exists an expansion of all sectors of final demand that results in an expansion of all sectors of total output, consistently with what one should expect from a priori theory.

In particular the objective structure 1, which is the effect of policy 1 on output, tends to expand sectors 45 (Finance intermediation), 52 (Professional services), 19 (Manufacturing chemicals and chemical products), 22 (Manufacturing basic metals), 16 (Paper), 37 (Wholesale trade on contract basis), 46 (Insurance), 40 (Land transport) and 23 (Metal products) of an amount higher than 40. In this case we can see on an output change of 277

[3] See table 1 for the classification branches.

generated starting from and expansion of final demand of 100. The corresponding policy 1 is realized especially stimulating final demand sectors 45 (Finance intermediation), 22 (Manufacturing basic metals), 23 (Metal products), 8 (Metallic ores), and 52 (Professional Services) for an amount greater than 20 on a total policy control of 100.

If we have not the exclusive objective of activating the "dominating policy" and are interested in warranting a positive impact on specific sectors, as for example the wine sectors, we have to examine carefully the effects on these sectors' outputs of all the 60 policies. As shown in table 5 the structures of the objective variable (total output) of specific interest for the wine sectors which can be activated are structures nr. 7, 8, 28, 46, 51, 52 and 53. In these structures wine sectors are stimulated at an higher degree with respect to the remaining structures.

In figure 5 we show the effect on total output of wine policy control when we use policy control 53. In particular, in structure 53 wine sectors 4 (White wine) and 5 (Red wine) get a major share of the total effect.

Moreover positive impacts are to be detected on the output of sector 11 (Manufacturing Tobacco) and sector 39 (Hotels and restaurants). On the other hand structure 53 (Healthcare and social assistance) implies an output decrease for sectors 1 (Agriculture), 34 (Water collection and distribution), 37 (Wholesale on contract), 38 (Wholesale trade) and 40 (Land transport).

Policy control 7, as shown in figure 6, seems more suited when a policy in favor of wine and environment is designed.

In fact it expands sector outputs: 1 (Agriculture), 10 (Food and beverages), 14 (Leather and shoes), 39 (Hotels and restaurants), 52 (Professional services); while depressing the output of sectors: 7 (Extracting crude petroleum and natural gas), 12 (Textiles), 16 (Pulp and paper), 18 (Refining petroleum coke and nuclear fuels), 19 (Chemicals) and 33 (Electricity gas).

In aggregated terms the effects of the combination of the two policies can be evaluated considering the ratio between the modulus of the policy control (demand change) and the modulus of the corresponding change in the objective variable (total output change), as shown in figure 7.

We will choose combination 0.2 of policy 53 and 0.8 of policy 7 since we see from the previous picture that their combined aggregated effect amounts to 1.60. The representation is shown in figure 8.

The effects on the structure of total output of this combined policy follow mainly (80%) the effects of policy 7. However the impact of policy 53 can be detected, for example, for the two wholesale trade sectors and agriculture. The demand control that realizes the output structure shown in the previous figure will be then given by a combination of the two policies according the weights 0.2 and 0.8 as show in figure 9.

5 Conclusions

The analysis proposed in this paper focuses on the role played by the sectoral composition of macroeconomic variable. Each macroeconomic variable is decomposed into an aggregated scale component and a disaggregated structure component through a rigorously consistent procedure. This allows for the determination of all specific structures that rule the loop between the policy control and the policy objective.

The policy problem is then transformed into the choice of a "convenient" structure for the policy control. This structure is taken out from a set of structures which are predetermined by the data of the problem, or is given by a combination of two or more of them.

The suitability of the chosen policy structure will be evaluated both according the aggregated scale effect and according the structure of the policy objective. According the scale effect when we choose a policy structure different from the "dominating" one we get a loss in the overall policy effectiveness which is quantified by the difference between the "dominating" multiplier and that associated with the policy chosen. The overall effectiveness loss has to be then justified vis-à-vis with the attainment of a new structure of the objective variable. Such new structure should appear more suitable than the dominating one if it generates balancing adjustments in the composition of the objective.

The application shows the two cases. Firstly, policy 1 has been determined. This is a "pure" policy in the sense that is not a combination of two or more pure policies (linearly independent). It is also the "dominating" policy since it makes the highest multiplier emerge through the sectors of the objective variable. Secondly, a specific wine-promoting policy is determined as combination of two "pure" policies whose impact on wine sector is as large as possible while the overall multiplier is lower then the dominating 1.

More complex combinations of policies can be designed starting from a careful scrutiny of the set of "pure" policies that completely determine the behavior of our Leontief inverse.

They would possibly give a deeper and more creative insight of the inter-industry interaction then that provided by the assumption of equi-distributed (or impulsive) demand-shocks which are pervasive in the traditional analysis.

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Appendix: Tables and graphics

Table 1: Input-Output classification

1	Agriculture and related services (incl. Fish farming)	**31**	Manufacturing furniture and related products
2	Forestry and logging	**32**	Recovering and recycling and waste management
3	Fishing	**33**	Electricity, gas, steam and cooling industries
4	White wine	**34**	Water collection and distribution; sewage
5	Red wine	**35**	Construction
6	Mining and extracting coal, lignite and peat	**36**	Trade and repairs of motor vehicles
7	Extracting crude petroleum and natural gas	**37**	Wholesale on a fee or contract basis
8	Mining and quarrying metallic ores	**38**	Wholesale trade
9	Mining and Quarrying other materials	**39**	Accommodation services and Restaurants
10	Manufacturing food (incl. crop preparation) and beverages	**40**	Lend transport
11	Manufacturing tobacco	**41**	Sea transport
12	Manufacturing textile	**42**	Air transport
13	Manufacturing wearing apparels and fur	**43**	Travel arrangement and reservation service
14	Manufacturing leather and related products	**44**	Postal, Contents and ICT services
15	Manufacture of products of wood; manufacture of articles of cork, straw and plaiting materials	**45**	Finance intermediation
16	Manufacture of pulp, paper and paperboard	**46**	Insurance
17	Printing, reproduction of recording media, photo laboratories	**47**	Finance intermediaries
18	Refining petroleum; manufacturing coke and nuclear fuels	**48**	Real estate services
19	Manufacturing chemicals and chemical products	**49**	Renting of machinery and equipment
20	Manufacturing plastic and rubber products	**50**	Computer services (consels, data processing, customised software)
21	Manufacturing other non-metallic mineral products	**51**	Research and development
22	Manufacturing basic metals	**52**	Professional services
23	Manufacturing metal products	**53**	Social security
24	Manufacturing machinery and equipment	**54**	Education
25	Manufacture of office and of computers machinery	**55**	Healthcare and social assistance
26	Manufacturing electrical appliances and components	**56**	Cleaning services
27	Manufacture of television and radio transmitters and apparatus for line telephony and line telegraphy	**57**	Other service activities
28	Manufacture of medical and surgical equipment and orthopedic appliances	**58**	Arts, entertainment and recreation services
29	Manufacture of motor vehicles, of bodies for motor vehicles; manufacture of trailers and semi-trailers	**59**	Other service activities n.e.c.
30	Manufacture of other transport equipment	**60**	Domestic services

Table 2: Input-Output inverse: 1-20 columns

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
1	1.16	0.00	0.01	0.15	0.15	0.00	0.00	0.00	0.00	0.37	0.10	0.05	0.02	0.06	0.00	0.01	0.00	0.00	0.02	0.01
2	0.00	1.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.01
3	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
7	0.01	0.02	0.03	0.02	0.02	0.02	1.00	0.01	0.04	0.02	0.01	0.03	0.02	0.02	0.02	0.04	0.02	0.77	0.04	0.03
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	1.08	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.02	0.01
10	0.08	0.00	0.02	0.11	0.08	0.00	0.00	0.00	0.00	1.24	0.01	0.01	0.01	0.15	0.01	0.01	0.01	0.00	0.04	0.02
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.46	0.46	0.04	0.00	0.03	0.01	0.00	0.00	0.02
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	1.16	0.00	0.00	0.00	0.00	0.00	0.00
15	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.01	1.54	0.01	0.01	0.00	0.01	0.01
16	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.02	0.04	0.08	0.02	0.02	0.04	0.02	1.50	0.29	0.00	0.05	0.05
17	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.02	0.01	0.05	1.13	0.00	0.03	0.02
18	0.02	0.03	0.03	0.02	0.02	0.01	0.00	0.01	0.04	0.02	0.01	0.02	0.02	0.02	0.02	0.03	0.02	1.12	0.05	0.03
19	0.06	0.02	0.02	0.07	0.05	0.01	0.01	0.01	0.07	0.05	0.02	0.16	0.09	0.11	0.07	0.22	0.09	0.02	1.41	0.46
20	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.02	0.02	0.01	0.01	0.03	0.09	0.02	0.03	0.02	0.00	0.03	1.11
21	0.01	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.10	0.03	0.00	0.01	0.01	0.01	0.02	0.01	0.01	0.00	0.05	0.03
22	0.00	0.03	0.02	0.00	0.00	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.02	0.03	0.04	0.02	0.02	0.01	0.02	0.04
23	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.01	0.02	0.02	0.00	0.01	0.02	0.06	0.05	0.01	0.01	0.01	0.02	0.04
24	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.03	0.01	0.00	0.01	0.01	0.02	0.01	0.02	0.02	0.00	0.02	0.02
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01
27	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
30	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00
33	0.02	0.01	0.04	0.04	0.04	0.06	0.01	0.01	0.08	0.04	0.03	0.08	0.05	0.04	0.05	0.11	0.04	0.02	0.07	0.09
34	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01
36	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.02	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
37	0.04	0.01	0.03	0.06	0.04	0.01	0.00	0.01	0.06	0.11	0.03	0.08	0.07	0.12	0.07	0.12	0.09	0.02	0.08	0.07
38	0.02	0.00	0.01	0.03	0.02	0.01	0.00	0.01	0.01	0.04	0.01	0.03	0.03	0.06	0.01	0.02	0.01	0.00	0.02	0.02
39	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01
40	0.02	0.01	0.02	0.03	0.03	0.02	0.01	0.01	0.06	0.06	0.04	0.04	0.04	0.06	0.05	0.07	0.05	0.02	0.07	0.07
41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01
42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01
43	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.03	0.02
44	0.01	0.01	0.01	0.01	0.01	0.03	0.01	0.04	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.02	0.02
45	0.08	0.08	0.06	0.06	0.05	0.62	0.16	0.91	0.09	0.11	0.07	0.11	0.11	0.12	0.13	0.13	0.10	0.16	0.11	0.11
46	0.00	0.03	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
47	0.01	0.03	0.01	0.00	0.00	0.03	0.01	0.04	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
48	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.01	0.02	0.02	0.01	0.02	0.02
49	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.02	0.01	0.00	0.02	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.01
50	0.01	0.01	0.01	0.01	0.01	0.05	0.01	0.07	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.01
52	0.04	0.02	0.03	0.04	0.03	0.11	0.03	0.14	0.13	0.11	0.03	0.13	0.15	0.16	0.13	0.14	0.17	0.04	0.14	0.13
53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
56	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.02	0.00	0.01	0.01	0.00	0.01	0.01
57	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
58	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.01	0.02	0.00	0.02	0.02	0.02	0.01	0.01	0.02	0.00	0.02	0.01
59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 3: Input-Output inverse: 21-40 columns

	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.11	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.04	0.06	0.03	0.02	0.02	0.03	0.02	0.02	0.03	0.02	0.03	0.03	0.25	0.06	0.02	0.02	0.02	0.03	0.02	0.06
8	0.00	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.08	0.01	0.01	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.02	0.00	0.00	0.00	0.00	0.00
10	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.29	0.01
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.32	0.00	0.00	0.01	0.03	0.00	0.00	0.00	0.01	0.00
16	0.04	0.02	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.02	0.03	0.02	0.00	0.01	0.02	0.02	0.02	0.02	0.02	0.01
17	0.01	0.02	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.01	0.01	0.01	0.00	0.01	0.01	0.02	0.02	0.02	0.01	0.01
18	0.03	0.06	0.03	0.02	0.02	0.02	0.02	0.02	0.03	0.02	0.02	0.02	0.07	0.03	0.02	0.02	0.02	0.03	0.02	0.08
19	0.08	0.10	0.06	0.07	0.05	0.10	0.08	0.05	0.10	0.06	0.09	0.18	0.01	0.13	0.05	0.04	0.01	0.01	0.03	0.03
20	0.02	0.02	0.02	0.05	0.05	0.06	0.06	0.03	0.09	0.04	0.03	0.02	0.00	0.02	0.02	0.02	0.01	0.01	0.01	0.04
21	1.19	0.06	0.03	0.02	0.02	0.03	0.04	0.02	0.04	0.02	0.03	0.01	0.00	0.06	0.18	0.01	0.00	0.00	0.01	0.01
22	0.04	1.34	0.34	0.21	0.05	0.24	0.09	0.11	0.21	0.14	0.19	0.05	0.02	0.04	0.08	0.04	0.01	0.01	0.01	0.02
23	0.03	0.05	1.13	0.21	0.03	0.09	0.06	0.12	0.22	0.09	0.06	0.07	0.02	0.03	0.09	0.03	0.01	0.01	0.01	0.01
24	0.02	0.03	0.02	1.15	0.02	0.03	0.03	0.02	0.06	0.06	0.02	0.02	0.01	0.03	0.02	0.01	0.01	0.01	0.01	0.01
25	0.00	0.00	0.00	0.00	1.51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.01	0.02	0.02	0.05	0.05	1.19	0.09	0.02	0.07	0.03	0.01	0.02	0.02	0.03	0.03	0.01	0.01	0.01	0.01	0.01
27	0.00	0.01	0.00	0.03	0.45	0.03	1.24	0.04	0.01	0.04	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.00	0.00
28	0.00	0.00	0.00	0.00	0.01	0.00	0.01	1.12	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
29	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	1.21	0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.02
30	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.14	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01
31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	1.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	0.00	0.07	0.02	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33	0.10	0.11	0.06	0.05	0.03	0.05	0.04	0.03	0.06	0.03	0.06	0.09	1.19	0.22	0.03	0.03	0.01	0.03	0.04	0.02
34	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	1.00	0.00	0.00	0.00	0.00	0.00	0.00
35	0.02	0.03	0.02	0.01	0.02	0.01	0.02	0.01	0.02	0.02	0.01	0.01	0.01	0.26	1.12	0.01	0.01	0.01	0.01	0.02
36	0.01	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.04	0.02	0.01	0.01	0.01	0.01	0.01	1.02	0.01	0.01	0.00	0.03
37	0.08	0.11	0.08	0.08	0.08	0.09	0.06	0.06	0.07	0.07	0.09	0.04	0.02	0.03	0.05	0.05	1.05	0.02	0.06	0.02
38	0.01	0.01	0.01	0.01	0.06	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.00	0.01	0.01	0.00	0.00	1.00	0.02	0.00
39	0.01	0.02	0.01	0.01	0.02	0.01	0.02	0.01	0.02	0.01	0.01	0.02	0.00	0.02	0.01	0.01	0.01	0.01	1.01	0.02
40	0.07	0.09	0.06	0.07	0.08	0.06	0.06	0.05	0.08	0.05	0.07	0.04	0.01	0.04	0.06	0.03	0.04	0.02	0.03	1.06
41	0.01	0.01	0.00	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
42	0.01	0.01	0.01	0.01	0.02	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01
43	0.02	0.04	0.02	0.03	0.03	0.02	0.03	0.02	0.03	0.02	0.02	0.02	0.01	0.01	0.02	0.02	0.03	0.01	0.01	0.11
44	0.02	0.03	0.02	0.02	0.03	0.02	0.03	0.02	0.03	0.02	0.02	0.04	0.01	0.02	0.02	0.03	0.03	0.02	0.01	0.02
45	0.10	0.19	0.14	0.13	0.19	0.13	0.14	0.11	0.14	0.10	0.13	0.41	0.09	0.09	0.09	0.10	0.12	0.08	0.07	0.10
46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01
47	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.00	0.01	0.01	0.01	0.01	0.01	0.00	0.01
48	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.01	0.02	0.01	0.05	0.04	0.05	0.02	0.02
49	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
50	0.02	0.02	0.02	0.02	0.03	0.02	0.04	0.02	0.03	0.02	0.02	0.04	0.01	0.02	0.01	0.02	0.02	0.03	0.01	0.02
51	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
52	0.13	0.17	0.15	0.16	0.19	0.15	0.18	0.15	0.18	0.13	0.14	0.17	0.05	0.10	0.12	0.18	0.18	0.15	0.09	0.10
53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
55	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
56	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.03	0.00	0.01	0.00	0.01	0.00	0.00
57	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
58	0.01	0.01	0.01	0.02	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.02	0.02	0.02	0.01	0.01
59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 4: Input-Output inverse: 41-60 columns

	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
1	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01	0.01	0.00
2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
3	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
7	0.02	0.04	0.02	0.02	0.01	0.01	0.01	0.00	0.03	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.00
8	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
9	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.02	0.01	0.00	0.01	0.01	0.00
11	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00
14	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
15	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
16	0.02	0.02	0.04	0.02	0.02	0.02	0.01	0.00	0.01	0.01	0.02	0.02	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.00
17	0.03	0.03	0.04	0.02	0.02	0.02	0.01	0.00	0.02	0.02	0.06	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.00
18	0.03	0.06	0.02	0.02	0.01	0.01	0.02	0.00	0.03	0.01	0.01	0.02	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.00
19	0.03	0.03	0.03	0.01	0.01	0.01	0.00	0.00	0.01	0.02	0.02	0.02	0.02	0.01	0.19	0.07	0.01	0.01	0.06	0.00
20	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.03	0.00	0.01	0.01	0.00
21	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.03	0.00	0.00	0.00	0.00
22	0.03	0.03	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.00	0.01	0.03	0.00	0.01	0.01	0.00
23	0.02	0.02	0.01	0.01	0.00	0.00	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.02	0.00	0.01	0.00	0.00
24	0.02	0.02	0.01	0.01	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.03	0.00	0.00	0.01	0.00
25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
26	0.01	0.01	0.02	0.03	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.01	0.00	0.00
27	0.01	0.01	0.01	0.02	0.01	0.00	0.00	0.00	0.00	0.03	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.00
28	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00
30	0.07	0.20	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00
31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
33	0.02	0.02	0.02	0.03	0.01	0.01	0.01	0.01	0.03	0.02	0.01	0.02	0.03	0.02	0.03	0.02	0.01	0.03	0.03	0.00
34	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
35	0.02	0.02	0.04	0.04	0.01	0.01	0.01	0.05	0.01	0.01	0.01	0.02	0.03	0.01	0.02	0.02	0.01	0.01	0.01	0.00
36	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.02	0.00	0.00	0.01	0.01	0.00	0.01	0.03	0.00	0.00	0.00	0.00
37	0.03	0.03	0.02	0.01	0.01	0.01	0.00	0.00	0.03	0.02	0.01	0.01	0.01	0.01	0.04	0.02	0.01	0.01	0.01	0.00
38	0.01	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.00
39	0.03	0.03	0.03	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.02	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.00
40	0.04	0.04	0.08	0.04	0.01	0.02	0.01	0.01	0.04	0.02	0.02	0.02	0.02	0.01	0.02	0.05	0.01	0.02	0.01	0.00
41	1.04	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
42	0.02	1.01	0.04	0.02	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.00	0.00	0.00	0.01	0.02	0.02	0.00	0.00
43	0.29	0.26	1.09	0.02	0.01	0.01	0.00	0.00	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.00
44	0.03	0.04	0.05	1.01	0.05	0.03	0.03	0.01	0.03	0.02	0.03	0.04	0.03	0.01	0.02	0.03	0.02	0.02	0.01	0.00
45	0.11	0.09	0.09	0.07	1.17	0.09	0.11	0.05	0.09	0.08	0.05	0.09	0.06	0.03	0.07	0.09	0.04	0.08	0.05	0.02
46	0.01	0.01	0.01	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.01	0.00	0.00
47	0.01	0.01	0.01	0.00	0.05	0.42	1.11	0.00	0.01	0.01	0.00	0.01	0.01	0.00	0.00	0.01	0.00	0.01	0.00	0.00
48	0.02	0.03	0.04	0.02	0.03	0.04	0.02	1.01	0.04	0.03	0.03	0.05	0.01	0.01	0.02	0.06	0.03	0.03	0.03	0.00
49	0.01	0.03	0.02	0.02	0.01	0.02	0.00	0.00	1.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.00
50	0.02	0.03	0.03	0.04	0.09	0.05	0.04	0.01	0.02	1.09	0.10	0.03	0.02	0.01	0.01	0.02	0.02	0.02	0.01	0.00
51	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	1.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
52	0.16	0.22	0.23	0.07	0.17	0.13	0.08	0.07	0.15	0.15	0.10	1.20	0.10	0.04	0.12	0.31	0.19	0.14	0.08	0.00
53	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
54	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00	0.00	0.00
55	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.21	0.01	0.00	0.00	0.00	0.00
56	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.01	1.21	0.00	0.00	0.00	0.00
57	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.00	0.00	0.01	1.00	0.00	0.00	0.00
58	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.06	0.02	0.02	0.01	0.02	0.01	1.27	0.01	0.00
59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03	0.00	0.00	0.00	1.01	0.00
60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.00

Figure 2: Macro Multipliers

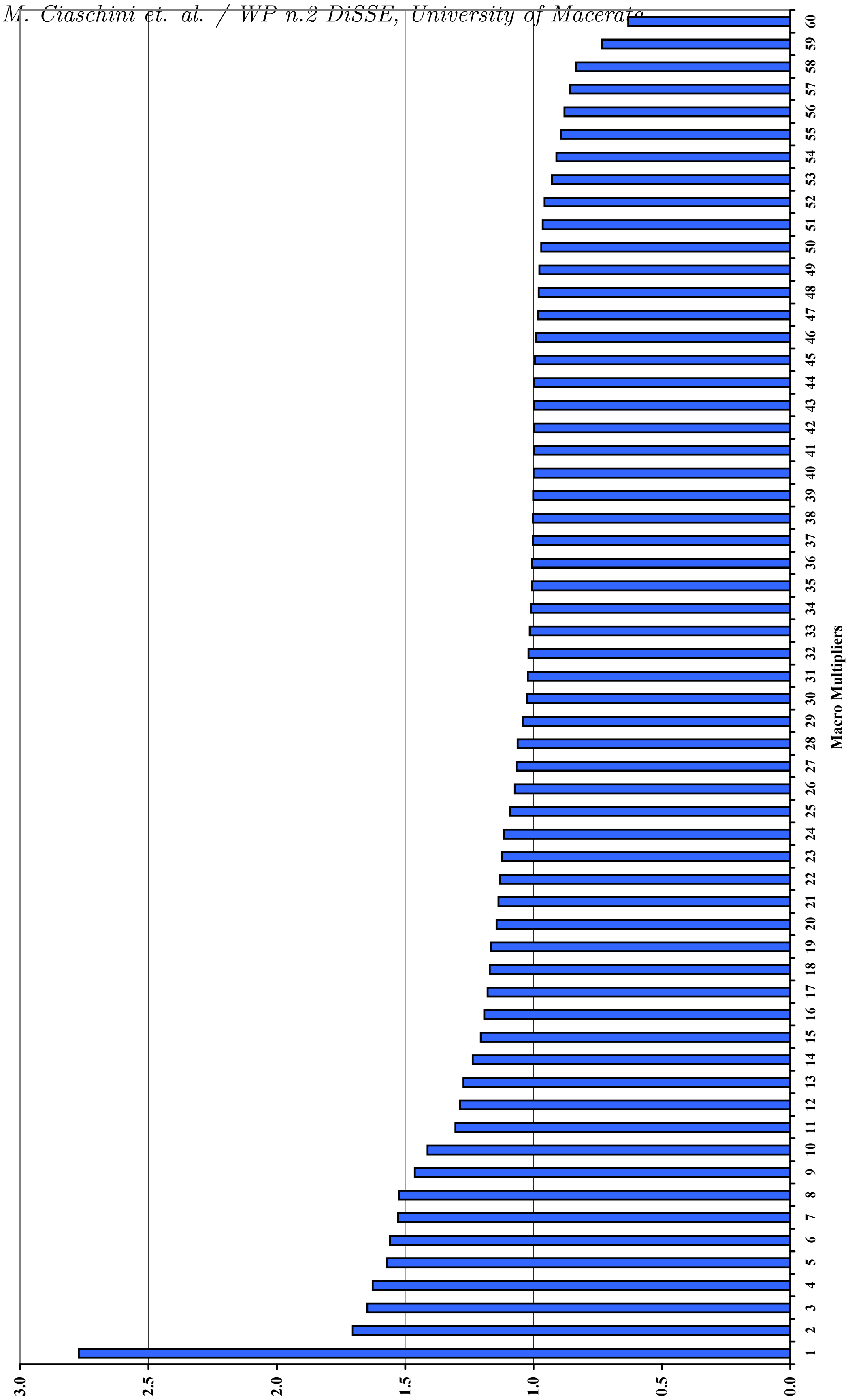


Table 5: Effect on total output of policy 7, 8, 28, 46, 51, 52 e 53

Commodities	s7u7	s8u8	s28u28	s41u41	s46u46	s51u51	s52u52	s53u53
1	0.76	-0.31	-0.49	-0.01	-0.06	0.19	-0.16	-0.18
2	-0.03	-0.01	0.01	-0.06	0.01	0.08	0.08	0.00
3	0.00	-0.03	0.04	-0.25	0.02	0.10	0.01	0.08
4	**0.15**	**-0.09**	**-0.20**	**-0.63**	**0.22**	**-0.19**	**0.07**	**0.42**
5	**0.13**	**-0.08**	**-0.31**	**0.55**	**0.27**	**-0.26**	**0.13**	**0.37**
6	-0.04	0.08	0.00	0.16	-0.20	-0.03	0.07	-0.01
7	-0.39	-0.91	0.03	0.01	-0.01	0.02	-0.01	0.02
8	-0.04	0.17	0.02	-0.15	0.08	-0.07	0.11	-0.06
9	-0.02	-0.03	-0.06	-0.04	-0.06	-0.02	-0.06	0.06
10	0.90	-0.33	0.45	0.01	-0.03	0.02	0.03	-0.01
11	0.02	-0.01	-0.38	0.03	-0.30	-0.14	0.17	0.22
12	-0.22	0.08	0.03	-0.03	-0.15	-0.09	-0.07	0.04
13	-0.07	0.05	0.02	0.11	0.39	0.25	0.17	0.02
14	0.19	-0.03	-0.16	0.01	-0.07	0.07	0.06	0.13
15	-0.04	-0.31	0.02	0.01	-0.02	-0.10	-0.02	-0.01
16	-0.52	0.27	0.07	0.00	0.02	0.02	-0.04	0.03
17	-0.14	0.14	-0.13	0.01	-0.08	0.07	0.02	0.07
18	-0.28	-0.70	0.01	0.01	-0.01	0.00	0.00	0.00
19	-0.17	-0.05	0.02	0.00	-0.09	0.02	0.27	-0.06
20	-0.03	-0.02	0.04	-0.01	0.07	-0.09	-0.49	0.12
21	0.02	-0.05	0.06	0.01	-0.02	0.06	0.04	0.00
22	0.05	0.17	-0.02	-0.01	-0.11	-0.16	-0.08	0.02
23	0.08	0.14	0.03	-0.03	0.19	0.00	0.26	-0.09
24	0.05	0.11	0.00	0.01	-0.15	0.11	-0.05	0.07
25	-0.14	-0.37	0.05	0.00	-0.02	0.03	0.01	0.03
26	0.01	0.06	0.04	0.01	-0.01	0.12	0.05	0.05
27	-0.07	-0.19	-0.08	-0.01	0.01	0.00	0.02	-0.02
28	0.02	0.05	0.04	0.01	-0.10	0.09	-0.02	0.05
29	0.05	0.13	0.03	-0.04	-0.04	0.09	-0.04	0.05
30	0.06	0.08	0.02	0.04	0.09	0.09	0.01	0.03
31	-0.01	-0.04	-0.05	-0.04	-0.03	0.59	0.10	0.15
32	-0.03	0.07	0.05	0.15	0.17	0.15	-0.46	0.09
33	-0.17	-0.31	-0.01	-0.02	0.04	0.00	0.01	-0.03
34	-0.03	-0.07	-0.01	-0.02	-0.04	0.03	0.11	-0.16
35	0.02	-0.01	-0.02	0.00	-0.01	0.00	-0.16	0.14
36	0.03	0.04	-0.09	0.18	-0.22	-0.02	0.07	-0.02
37	0.12	-0.01	-0.06	-0.01	0.19	-0.24	-0.03	-0.32
38	0.07	-0.04	-0.07	-0.04	-0.17	-0.21	-0.02	-0.24
39	0.27	-0.09	0.52	0.11	-0.08	-0.17	0.16	0.31
40	0.06	-0.06	-0.12	0.06	0.32	-0.02	0.06	-0.16
41	0.07	0.04	0.04	0.04	0.10	0.06	-0.01	0.07
42	0.06	0.04	-0.01	-0.07	-0.23	-0.02	0.01	0.01
43	0.13	0.08	-0.03	-0.03	-0.05	-0.03	0.03	-0.07
44	0.01	0.04	-0.03	-0.12	-0.17	-0.01	0.03	0.01
45	-0.09	0.20	0.00	0.00	0.00	0.00	0.00	0.00
46	0.01	0.06	0.00	0.00	0.01	-0.01	0.01	0.00
47	0.01	0.10	0.00	0.00	0.00	-0.02	0.00	-0.02
48	0.04	0.06	-0.04	0.04	-0.07	0.23	0.14	0.04
49	0.00	0.02	-0.06	-0.09	0.04	-0.02	0.03	-0.01
50	0.01	0.07	0.08	0.03	0.00	0.02	0.02	-0.01
51	0.00	0.03	0.03	-0.02	0.06	-0.04	-0.01	-0.03
52	0.19	0.24	-0.01	0.02	0.01	0.00	-0.12	0.07
53	0.01	0.02	0.00	-0.01	0.01	-0.02	0.06	-0.04
54	0.01	0.00	0.00	0.20	-0.01	-0.02	0.01	0.01
55	0.00	0.00	-0.02	0.00	0.01	0.01	-0.08	0.03
56	0.07	0.10	0.02	-0.03	0.01	-0.03	0.03	-0.03
57	0.03	0.04	-0.02	-0.09	0.22	-0.07	0.16	-0.09
58	0.09	0.09	0.00	-0.01	0.01	-0.01	0.02	-0.02
59	0.00	0.00	0.01	-0.10	0.12	-0.04	-0.10	0.00
60	0.00	0.00	0.00	-0.02	0.00	0.00	0.00	0.00

Figure 3: Multisectoral effect of demand policy control 1

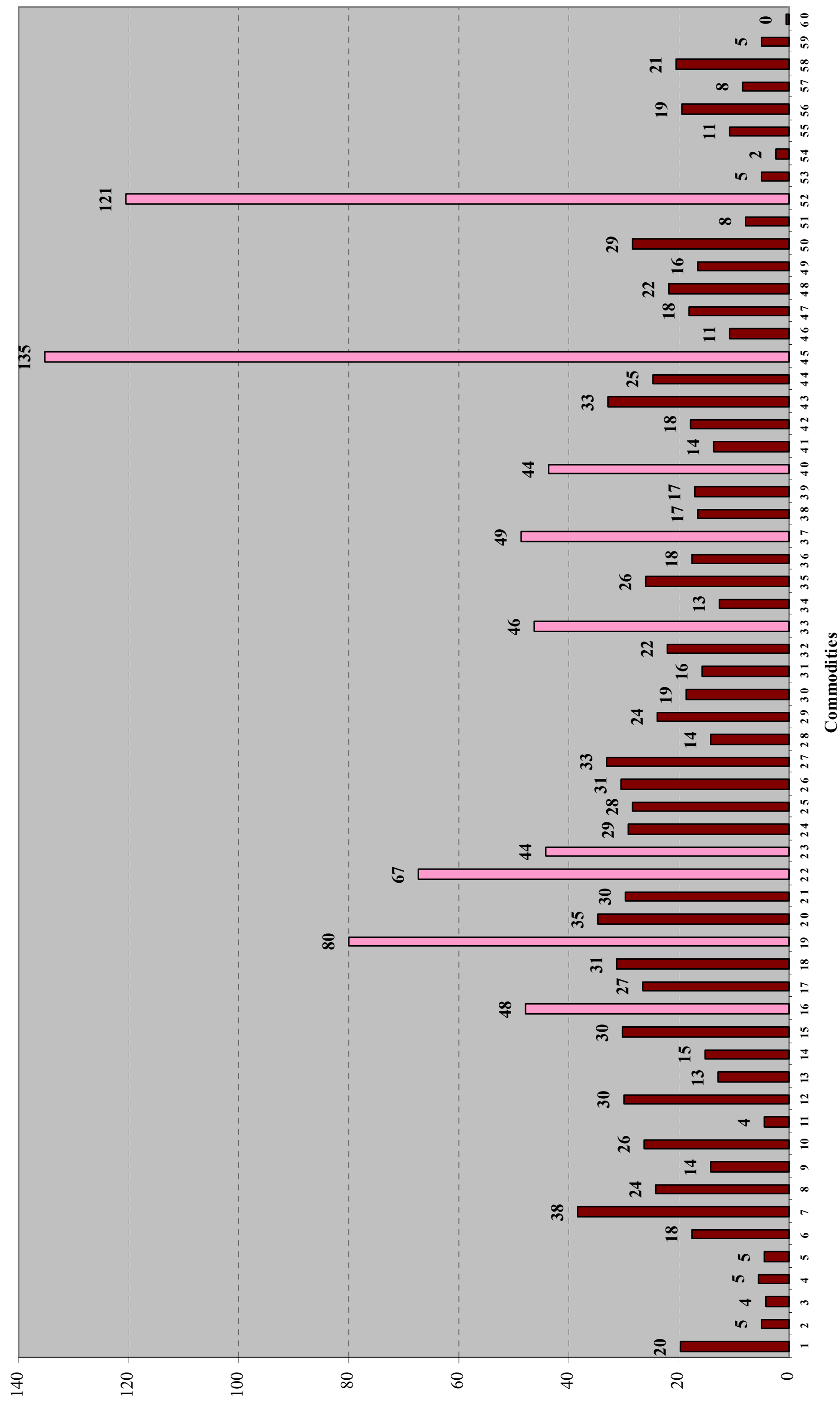
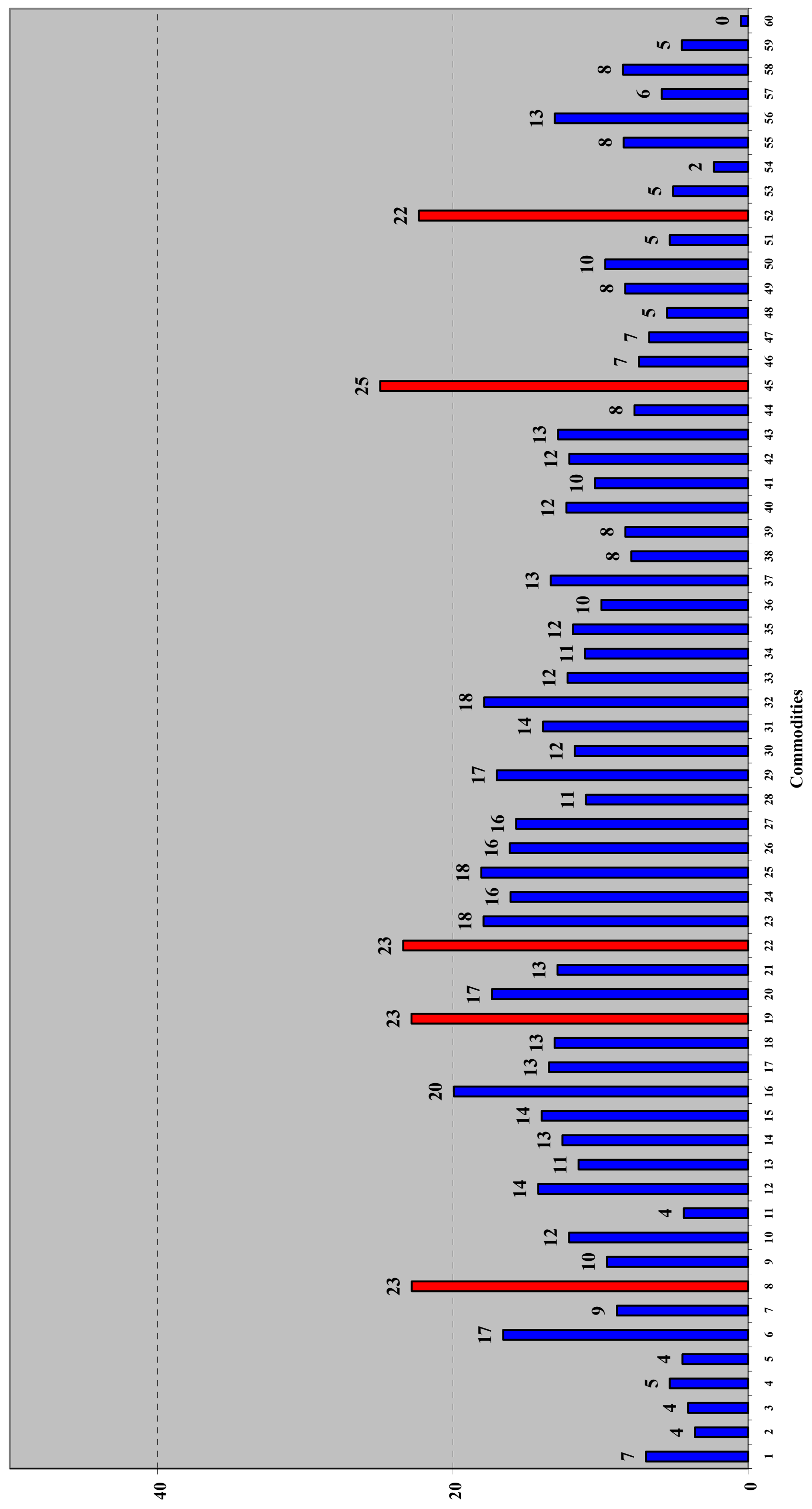


Figure 4: Structure of the policy control 1



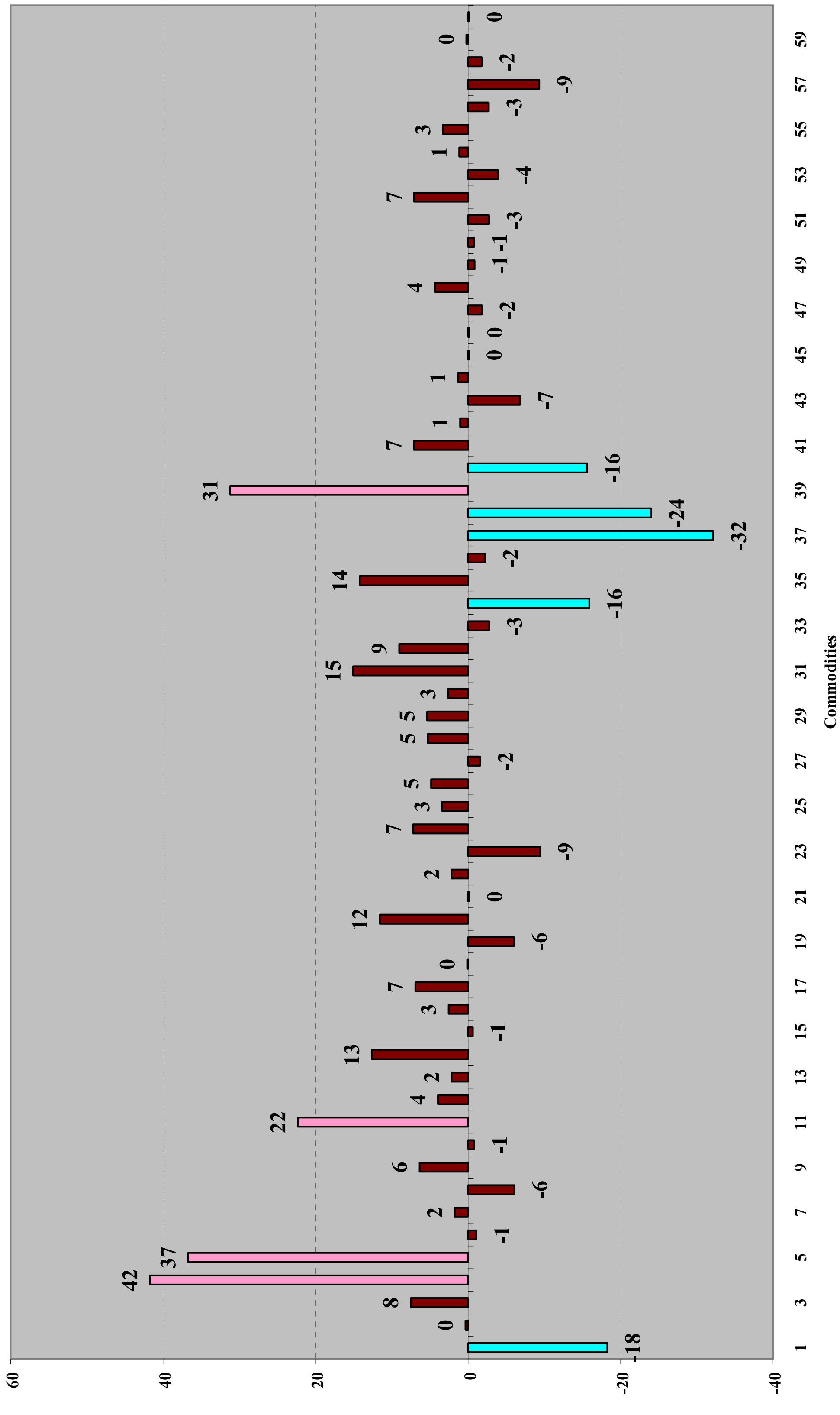


Figure 5: Multisectoral effect of wine policy control 53

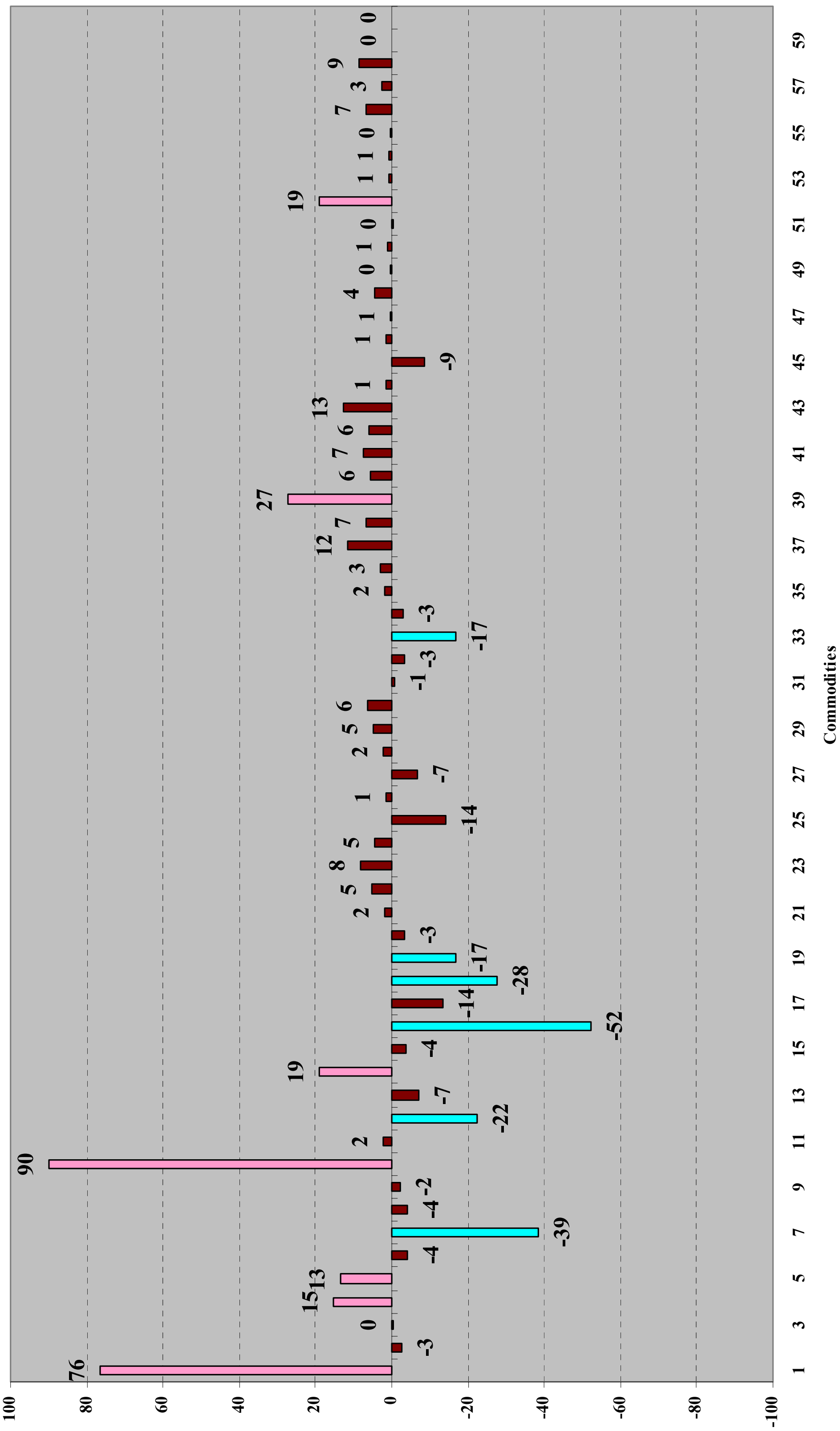


Figure 6: Multisectoral effect of wine policy control 7

Figure 7: Percentage share of policy and moduli combination 7 − 53

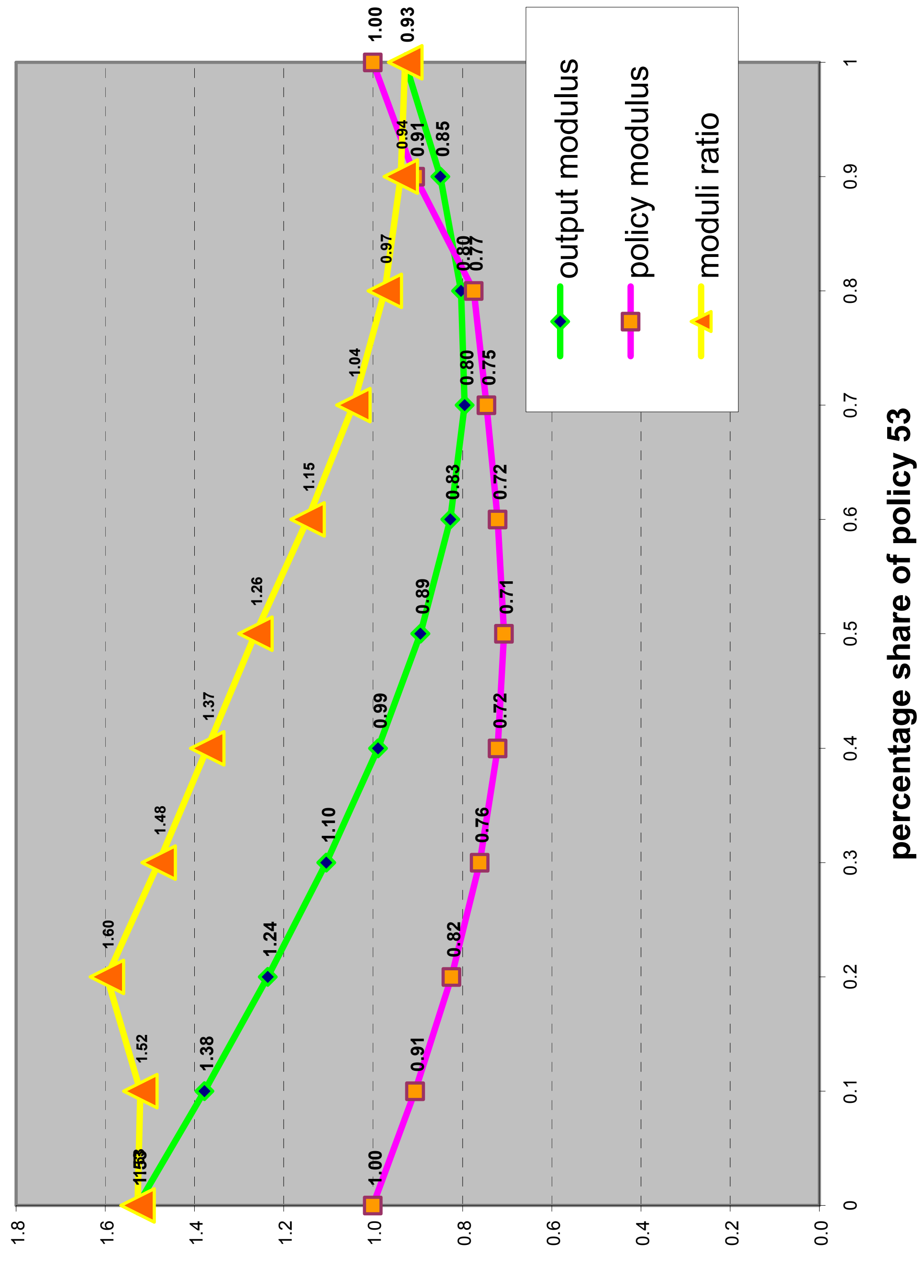


Figure 8: Multisectoral effect of the combination of demand policy control 53 and 7 (weights 0.2, 0.8)

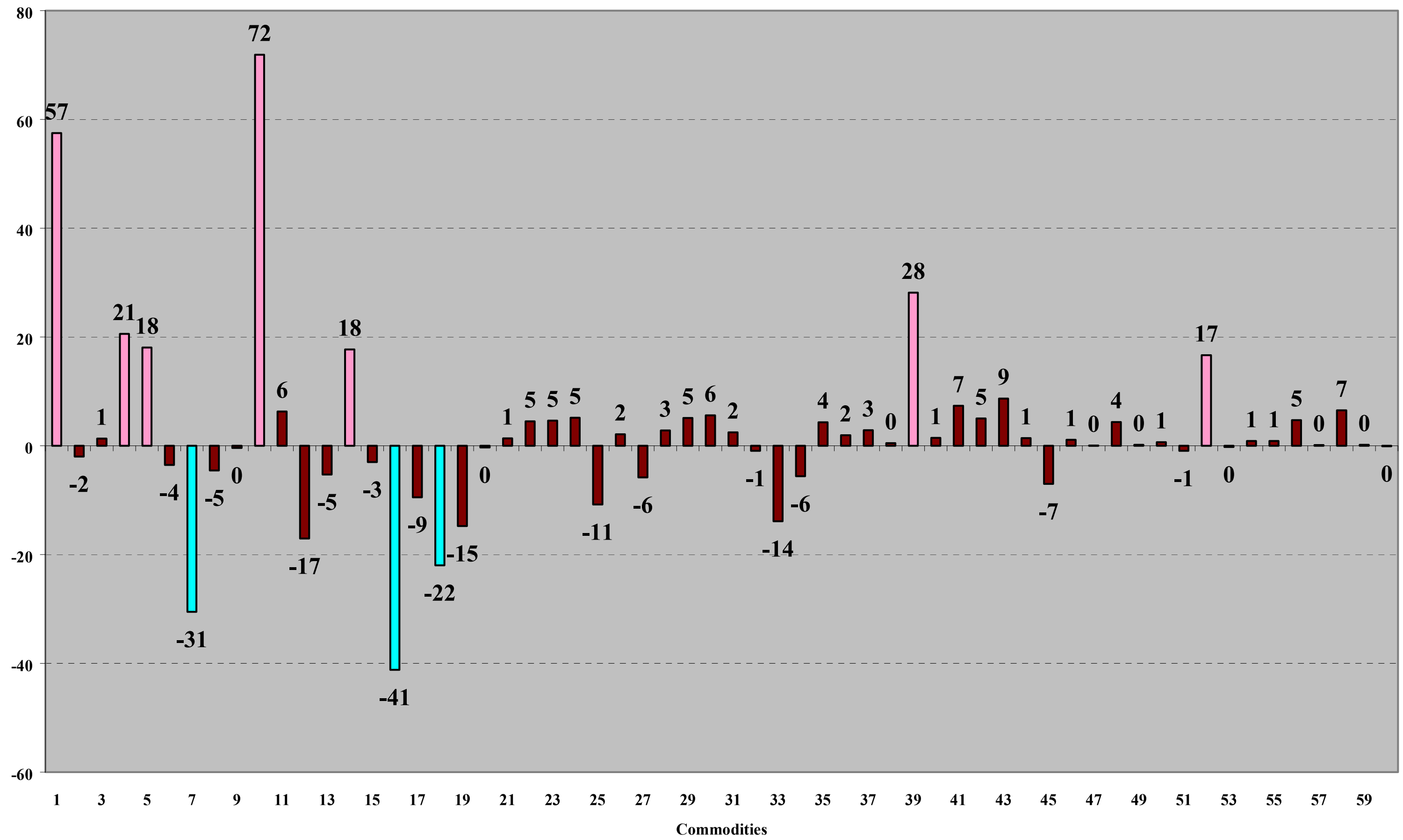
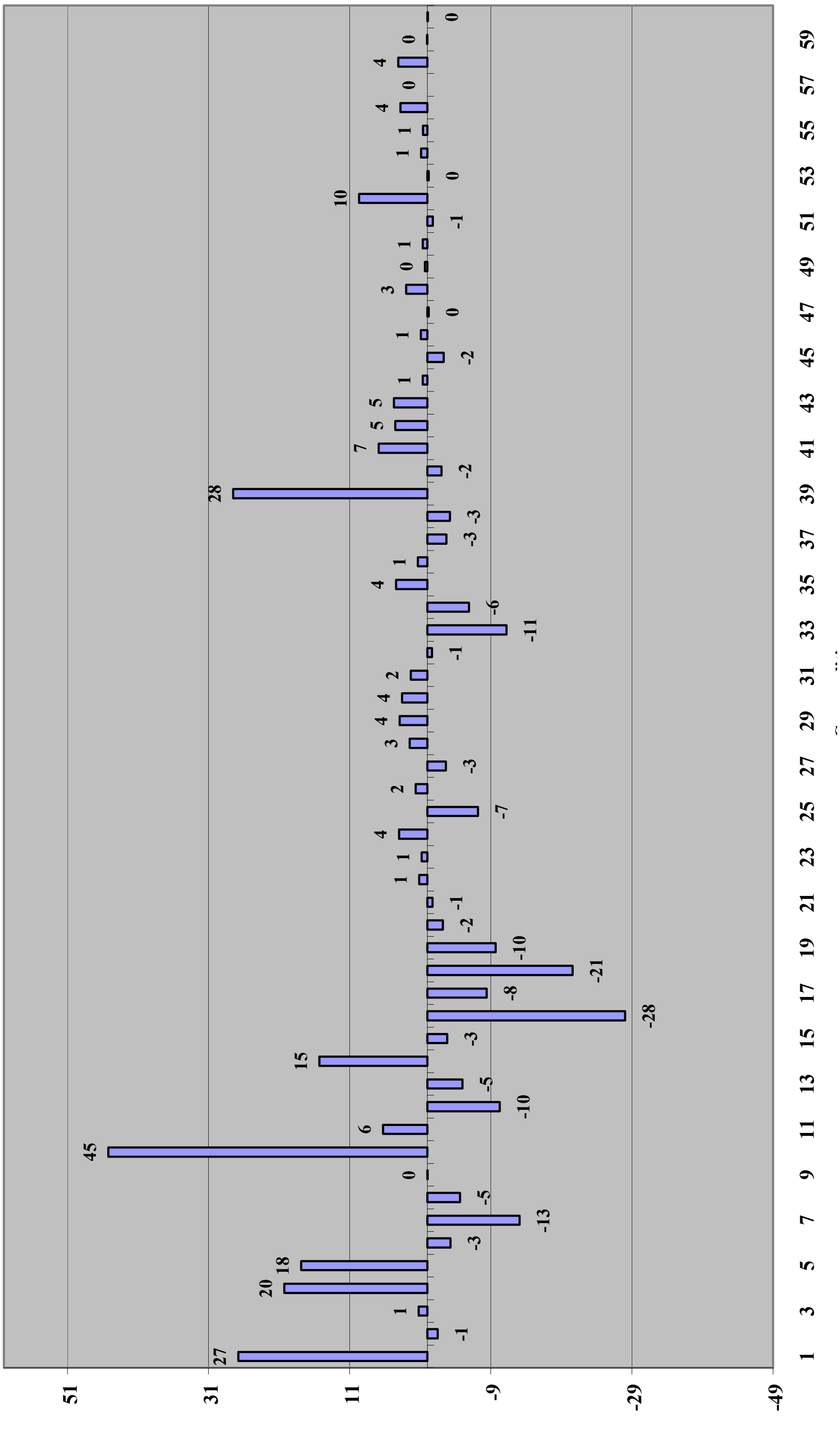


Figure 9: Structure of the wine policy control 53 and 7 (weights 0.2 for policy 53 and 0.8 for policy 7)



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