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A Multisectorial Model of Prices: The SAM Approach

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Abstract

Social Accounting Matrices (SAM) are normally used to analyse the income generation process. They are also useful, however, for analysing the cost transmission and price formation mechanisms. For price contributions, Roland-Holst and Sancho (1995) used the SAM structure to analyse the price and cost linkages through a representation of the interdependence between activities, households and factors. This paper is a further analysis of the cost transmission mechanisms, in which I add the capital account to the endogenous components of the Roland-Holst and Sancho approach. By doing this I reflect the responses of prices to the exogenous shocks in savings and investment. I also present an additive decomposition of the global price effects into categories of interdependence that isolates the impact on price levels of shocks in the capital account. I use a 1994 Social Accounting Matrix to make an empirical application of the Catalan economy.

Keywords: social accounting matrix, cost linkages, price transmission, capital account.

JEL Classification: C63, C69, D59.

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1. Introduction

In recent decades Social Accounting Matrices (SAM) have become a common instrument in economic analysis. Since the pioneering contributions of Stone (1978) and Pyatt and Round (1979), social accounting techniques have been used to analyse both developed and developing countries.

The usefulness of a SAM lies not only in the empirical information it provides, but also in its ability to define and implement models. The disaggregated nature of a social accounting matrix makes it suitable for providing details about the sources and destinations of transactions between economic institutions.

SAMs are usually used to analyse the income creation process through the relationships of circular flow. This kind of approach involves the quantity-oriented models and measures the changes in the income levels of the endogenous accounts caused by exogenous inflows received.[1] However, a social accounting matrix can also involve cost transmission models that capture the responses of the endogenous prices to the exogenous shocks received. In essence, the SAM price model is an extension of the traditional Leontief approach, endogenously defining the prices of production and the prices of other components such as factors of production or consumers. For price contributions, Roland-Holst and Sancho (1995) developed an intersectorial price model using the social accounting matrix framework and provided an empirical application for the Spanish economy.

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[1] See Stone (1978) or Pyatt and Round (1979) for an analysis of the SAM quantity models.

The traditional assumption of endogeneity used in SAM quantity models is based on the contributions by Stone (1978) and Pyatt and Round (1979). These authors considered that the accounts related to activities, factors of production and private agents were endogenous. Polo, Roland-Holst and Sancho (1991) and Ferri and Uriel (2000), on the other hand, followed a different approach. These authors presented a multiplier analysis for the Spanish economy by incorporating the capital account into the traditional endogenous components of the SAM quantity models.

As in the quantity approach, the explanatory ability of the SAM price analysis depends, to a greater extent, on the accounts endogenously considered in the model definition. The price model of Roland-Holst and Sancho (1995), which followed the criterion of endogeneity traditionally used in the quantity approaches, considers activities, factors and households as endogenous components. However, extending this model to include the links between production, distribution, consumption and saving-investment could be extremely interesting, particularly for analysing economies that are characterised by high rates of saving and investment. For such economies, omitting the capital account in the endogenous part of the model ignores the links between production costs, consumption expenditure and investment price, and may ignore a significant component within the price transmission mechanism.

In this paper I use the method proposed by Roland-Holst and Sancho (1995) to evaluate the price formation and cost linkages in the economy. The model considers production activities, households and capital account to be endogenous components. The endogeneization of capital account allows us to reflect how the exogenous shocks in investment prices affect price definition and cost transmission and how the exogenous changes in production costs or in cost-of-living indices affect investment price.

Using the technique of multiplier decomposition we can divide the global price effects into different categories of interdependence. Specifically, in this paper we separate the price interdependences between production, consumption and distribution from the linkages between these components and saving-investment. This way of dividing the multiplier matrix is useful for isolating the induced effects of capital account on the global prices defined in the model.

The empirical application is for the Catalan economy and uses the latest available social accounting matrix. The results reveal important asymmetries in the individual price effects. An important finding is that there are many differences in the intensity of the response of the accounts to the exogenous rises in costs received. On the other hand, the multiplier decomposition shows that the induced effects of capital account explain a non-negligible part within the global price transmission mechanism.

The rest of the paper is organised as follows. The next section presents the SAM structure and the underlying price model. The third section decomposes the global price multiplier matrix into different interdependence relationships. The fourth section contains an empirical application to a 1994 Social Accounting Matrix for the Catalan economy. In the last section, I point out some concluding remarks.

2. The SAM Price Model

The SAM price model is based on the accounting identities reflected in a social accounting matrix. A SAM is a square matrix whose rows and columns add up to the same quantity. This database contains the flows of income and expenditure related to all the economic agents by a temporal reference.[2] By convention, receipts of agents are entered in the rows, and expenditures are entered in the columns. Table 1 shows schematically the transactions that appear in a social accounting matrix.

[PLACE TABLE 1 HERE]

In the first row of this table, X_{11} is a square matrix containing the intermediate transactions; matrix X_{12} shows private consumption and has the same number of columns as the number of consumers in the SAM; matrix X_{13} shows sectorial investment; finally, matrix X_{14} contains the other destinations of production (exports and public expenditure).

Matrix X_{21} shows the factorial income of consumers and matrix X_{24} shows private income from abroad and the public transferences to consumers. Matrix X_{32} shows private saving and matrix X_{34} shows the balance with the foreign agents (we take for granted that this is positive). Finally, the last row in table 1 shows the transactions corresponding to the rest of the accounts (the government and the foreign agent).

[2] See, for example, Pyatt (1988) for a detailed presentation of social accounting matrices.

To transform the structure of the accounts in table 1 into a model, we assume that the structure of income and payments is constant. On the other hand, we must also divide the accounts of the SAM into two categories: endogenous accounts and exogenous accounts. Roland-Holst and Sancho (1995) applied to their SAM price model the traditional criterion used in the SAM quantity models, i. e. they considered activities, factors of production and consumers endogenously. In this paper, I extend the endogenous accounts to reflect the price transmission of saving and investment. I therefore assume that the accounting relations corresponding to the first three accounts in table 1 are endogenous. Using this criterion I can reflect the effects on price levels of shocks in capital account and the effects on capital price of shocks in production activities and households.

Let A_{ij} denote the column coefficients obtained by dividing the transactions in the SAM (X_{ij}) by the corresponding column sum (Y_i), and let P_i be a price index for account i. Reading down the columns of the social accounting matrix, we can define the following model of prices:

$$P_1 = P_1 A_{11} + P_2 A_{21} + \overline{P_4} A_{41};$$

$$P_2 = P_1 A_{12} + P_3 A_{32} + \overline{P_4} A_{42};$$

(1) $$P_3 = P_1 A_{13} + \overline{P_4} A_{43}.$$

Let A now be the matrix of normalized coefficients:

$$A = \begin{bmatrix} A_{11} & A_{12} & A_{13} \\ A_{21} & 0 & 0 \\ 0 & A_{32} & 0 \end{bmatrix},$$

and let $P = (P_1, P_2, P_3)$ be the row vector of prices for the endogenous accounts. We can also define the vector of exogenous costs as $v = \overline{P_4}\,\overline{A_4}$, where $\overline{A_4}$ is the submatrix of coefficients A_{41}, A_{42}, and A_{43}, with the form:

$$\overline{A_4} = \begin{bmatrix} A_{41} & A_{42} & A_{43} \end{bmatrix}.$$

We can transform expression (1) in matrix notation, and vector P is calculated as follows:

$$\begin{aligned} P &= P\,A + v = \\ &= v\,[I - A]^{-1} = \\ &= v\,M. \end{aligned} \tag{2}$$

In expression (2), I is the identity matrix and $M = [I - A]^{-1}$ is the matrix of price multipliers.[3] Notice that, for an identical classification of the endogenous and exogenous components, matrix M is also the multiplier matrix in the SAM quantity models. However, the two approaches interpret M differently: in the SAM price models, the matrix M is read down the columns, while in the SAM

[3] Pyatt and Round (1979) showed the properties that guarantee the existence of matrix M.

quantity models matrix M is read across the rows.[4] To reflect these different interpretations, I will refer to M as the standard income (or quantity) multipliers matrix and M' as the price multipliers matrix.

3. Decomposition of the Price Multipliers Matrix

To provide a deeper insight into the analysis of the preceding multipliers, this section deals with the decomposition of the matrix M into different circuits of interdependence.

Matrix A of share coefficients can be divided into two submatrices containing different kinds of economic relationships. In this analysis we separate the linkages related to production, distribution and consumption (A_1) from the linkages related to the capital account (A_2). Hence we can write:[5]

$$A = A_1 + A_2 = \begin{bmatrix} A_{11} & A_{12} & 0 \\ A_{21} & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix} + \begin{bmatrix} 0 & 0 & A_{13} \\ 0 & 0 & 0 \\ 0 & A_{32} & 0 \end{bmatrix}.$$

To decompose the matrix of global price multipliers into different blocks, it can be checked that:

$$P = v\,[I - A]^{-1} =$$

$$= v\,[I - A_1 - A_2]^{-1} =$$

[4] See Roland-Holst and Sancho (1995).

[5] The interpretation of the multipliers' decomposition depends basically on the division of the matrix of expenditure share coefficients. In this paper, I apply a division of matrix A in order to detach the effects of the shocks in saving-investment.

$$= v\,[(I - A_2\,(I - A_1)^{-1})\,(I - A_1)]^{-1} =$$

$$= v\,(I - A_1)^{-1}\,[I - A_2\,(I - A_1)^{-1}]^{-1} =$$

$$= v\,(I - A_1)^{-1}\,(I - B)^{-1} =$$

$$= v\,(I - A_1)^{-1}\,(I + B)\,(I + B)^{-1}\,(I - B)^{-1} =$$

$$= v\,(I - A_1)^{-1}\,(I + B)\,(I - B^2)^{-1} =$$

$$= v\,M_1\,M_2\,M_3, \tag{3}$$

where $B = A_2\,(I - A_1)^{-1}$, $M_1 = (I - A_1)^{-1}$, $M_2 = (I + B)$ and $M_3 = (I - B^2)^{-1}$. In expression (3), matrix M (or, alternatively M') has been defined by three multiplicative components that convey different economic meanings.

After the corresponding matrix algebra is applied, the component M_1' contains the following elements:

$$M'_1 = \begin{bmatrix} A_{11}^{*} & A_{21}A_{11}^{*} & 0 \\ A_{11}^{*}A_{12} & A_{22}^{*} & 0 \\ 0 & 0 & I \end{bmatrix},$$

where $A^{*}_{11} = [I - (A_{11} + A_{12}A_{21})]^{-1}$ and $A^{*}_{22} = [I - A_{21}(I - A_{11})^{-1}A_{12}]^{-1}$. The elements A^{*}_{11} and A^{*}_{22} reflect the cost and price transmissions between production activities, factors and consumption.

Matrix M'_1 contains the *own effects* explained by the connections between sectorial costs, consumption prices and factor costs. For example, the first column of this matrix indicates how an exogenous cost increase affecting the production sectors modifies the production prices once the interdependences with consumption and factors have been concluded (A^{*}_{11}). Also in the first column, the component $A^{*}_{11}A_{12}$ shows how the exogenous cost increase in production affects households' cost-of-living indices. The perspective of cost transmission reflected in M'_1 therefore responds to the effects of intersectorial linkages, factor prices and consumption expenditure. In fact, it can be proved that if we subtract the third row and the third column from M'_1, the resulting elements are equivalent to the price multipliers obtained by Roland-Holst and Sancho (1995).

Matrix M'_2 presents the following structure:

$$M'_2 = \begin{bmatrix} I & 0 & A_{32}A_{21}A^{*}_{11} \\ 0 & I & A_{32}A^{*}_{22} \\ A_{13} & 0 & I \end{bmatrix}.$$

This matrix represents the *open effects* taking place between production, consumption and the capital account. Specifically, M'_2 contains the effects on investment prices of an exogenous cost increase affecting the production activities (A_{13}), the effects on production prices of an exogenous shock in the capital account ($A_{32}A_{21}A^{*}_{11}$) and the effect on households' prices of an exogenous shock in the capital account ($A_{32}A^{*}_{22}$). Matrix M'_2 constitutes an extension of the cost transmission process as it captures the direct connection between capital price and production costs and consumption price indices.

Finally, matrix M'_3 presents the following structure:

$$M'_3 = \begin{bmatrix} \tilde{A}_{11} & 0 & 0 \\ \tilde{A}_{11}A_{13}A_{32}A^*_{22} & I & 0 \\ 0 & 0 & \tilde{A}_{33} \end{bmatrix},$$

where $\tilde{A}_{11} = [I - A_{13}\, A_{32}\, A_{21}\, A^*_{11}\,]^{-1}$ and $\tilde{A}_{33} = [I - A_{32}\; A_{21}\; A^*_{11}\; A_{13}]^{-1}$. The element $\tilde{A}_{11}$ shows the following interaction. For every increase in investment costs there is a corresponding effect on production prices and factorial costs. At the same time, a new round of effects is also produced on both saving and investment. On the other hand, $\tilde{A}_{33}$ indicates that an exogenous shock in saving brings about an effect on investment prices. This causes an impact on production and factorial costs and, therefore, a new impact on saving.

The block M'_3 contains the *circular effects* that are activated because of the interaction between the accounts and saving and investment. Specifically, it shows how an exogenous cost rise in production affects production prices ($\tilde{A}_{11}$) once the interaction with capital account has concluded, how the same exogenous cost rise affects households' prices ($\tilde{A}_{11}A_{13}A_{32}A^*_{22}$), and how an exogenous cost shock in capital account affects capital prices ($\tilde{A}_{33}$). Notice that the impacts captured in M'_3 incorporate the feedback between production, consumption, saving and investment through the elements $\tilde{A}_{11}$ and $\tilde{A}_{33}$.

This decomposition of global multipliers is useful when we wish to detach the contribution from saving and investment prices within the price formation mechanism. As we have shown, blocks M'_2 and M'_3 jointly measure the effect of capital account on the global prices defined in our analysis. Therefore, these two blocks together enable us to capture the induced effects of saving-investment as a result of extending the price model.

Additionally, we can transform the multiplicative decomposition of expression (3) into the following additive formula:

$$M - I = (M_1 - I) + M_1\,(M_2 - I) + M_1\,M_2\,(M_3 - I) =$$

$$= N_1 + N_2 + N_3, \tag{4}$$

where $N_1 = (M_1 - I)$, $N_2 = M_1\,(M_2 - I)$ and $N_3 = M_1\,M_2\,(M_3 - I)$. In the additive decomposition, the *net multiplier* ($M - I$) is obtained by adding the *net own effects* (N_1), the *net open effects* (N_2) and the *net circular effects* (N_3).

Expression (4) makes it easier to interpret the results because it defines the effects on endogenous variables in net terms, once we have subtracted the initial and exogenous shock that activates the changes in prices. This additive decomposition is also useful for quantifying how the capital account contributes to the global multipliers. This can be calculated by adding the net open multipliers (N_2) and the net circular multipliers (N_3).

4. Empirical Application for the Catalan Economy

This section illustrates the empirical results of the price multipliers presented above. The database we use is the latest available social accounting matrix for the Catalan economy.[6] In the price model we incorporate 31 endogenous accounts. These correspond to 17 activities of production, the capital

[6] Llop and Manresa (1999) include a description of this social accounting matrix.

account and 13 categories of consumers.[7] The complete list of the endogenous components appears in the appendix.

The multiplier analysis presented in the preceding section allows us to capture the effects on regional prices when there are exogenous costs shocks in production and consumers. Additionally, we incorporate the effects on regional prices of the exogenous costs shocks in saving-investment.

The values in matrix *M* reflect both the absolute variation and the percentage variation in prices, because the calibration procedure takes all benchmark prices equal to unity. The reading of the element m_{ji} of *M'* then illustrates how one monetary unit increase in the exogenous costs of account *i* affects the price index of account *j*. These elements capture the changes in the endogenous prices when there is a unitary increase in imports or taxation, i. e. in the exogenous components of the model. The results will therefore constitute a measure of the producers' prices indices, the individual cost-of-living prices and the capital price index, which are the elements we consider endogenous in the model definition.

4.1. Effects on production prices

The amount of information reported by the model can be divided into different perspectives of cost transmission. This section illustrates how the production prices are affected by the exogenous cost increases in the endogenous

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[7] In the SAM for the Catalan economy, the households were divided into socio-economic groups according to the activity of the head of the family (active or inactive) and the levels of income in each group. The active groups were divided into ten categories of income and the inactive groups were divided into three.

accounts. Specifically, we focus on the impact on the prices of activities when production, consumers and investment receive new and unitary costs injections. Using this perspective of price effects we can identify the changes in the relative prices of production after an increase in the exogenous costs is produced (increased taxation or higher prices of imported goods, for instance). Logically this provides highly valuable information for industrial policy.

Table 2 contains some illustrative examples. It shows the greatest price effect received by each activity and the additive decomposition.[8] For instance, the first row in table 2 indicates that the greatest impact on the price of Agriculture was due to a rise in the costs of Commerce. This effect is quantified as 0.256, which means that 1 monetary unit increase in the exogenous costs of Commerce would raise the price of Agriculture by 0.256 monetary units.

In general, we can observe important asymmetries in the sectorial effects because the values of price multipliers are very different. The prices of services (Finance, Commerce, Private Services, Public Services), Energy and Construction show large quantitative adjustments after an exogenous cost shock is produced. In the opposite situation, Metals and Other Industries suffer the smallest impacts (0.067 and 0.143 respectively), which means that their prices are the least sensitive to changes in the cost elements.

The second column in table 2 provides information about the accounts that are responsible for the largest price increases. Commerce generates the major impacts on the others in most cases, which means that there are large adjustments

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[8] The complete results of the model are available from the author.

in production prices when there is an exogenous cost increase affecting this activity. On the other hand, table 2 also shows that the greatest impacts in Energy, Textile, Finance and Private Services are due to their own exogenous costs.

[PLACE TABLE 2 HERE]

The net own effects (N_1) dominate in the additive decomposition of all the accounts. This shows that the interdependence between production, consumption and distribution generates the largest price adjustments in activities. In fact, own effects correspond to those we would have obtained with the traditional assumption of endogeneity used by Roland-Holst and Sancho (1995). Net open effects (N_2) capture the direct impacts due to the connection of production and consumption with the capital account. As all the examples in table 2 correspond to an exogenous cost shock in production activities (second column), there are no direct links with capital account and this explains why all the N_2 multipliers are null. Circular net multipliers (N_3) capture the feedback between capital account and production prices. From table 2, Private Services and Public Services reflect the highest circular effects (15.1% and 13.8%, respectively, of the overall price increase).

4.2. Effects on Cost-of-Living Indices

This perspective of price effects involves the private institutions in the economy and describes the changes in consumers' cost-of-living indices as a result of an exogenous cost increase received by the endogenous components of the model. How shocks in production activities and investment affect the relative prices of households provides information about the redistribution mechanism underlying the price formation. Logically, this provides helpful information for welfare policy.

Table 3 shows the greatest price effect received by each category of consumers. In this table, the active and the inactive groups are both ordered by increasing levels of income.

As we can see, Private Services cause the greatest impact on the cost-of-living indices in all groups except the richest actives (A10) and the richest inactives (I3). As the rate of saving in these two categories is very high, the capital account is responsible for the greatest price impacts.

[PLACE TABLE 3 HERE]

If we compare the multipliers' values in tables 2 and 3, we can conclude that the impacts on cost-of-living indices are significantly higher than the impacts on production prices. It is interesting, therefore, that households' indices are more sensitive than production prices when an exogenous cost rise originates in production activities. Also from table 3, the values of price multipliers move in the opposite direction to income distribution, which shows that adjustments in cost-of-living indices decrease as the levels of income increase. This suggests that the exogenous costs shocks in production have non-neutral consequences for the relative prices of consumers because the overall effects tend to be higher in categories with lower levels of income.

The additive decomposition illustrates that the largest adjustments in cost-of-living indices are explained by the interdependence between production, distribution and consumption (net own effects N_1). Again, the net open effects (N_2) are zero when the cost rises accrue from production activities because in these cases there is no direct connection with the capital account. Exceptions to this are the richest active and inactive households. For these two categories, the capital account causes the major price impacts and the N_2 multipliers explain the greatest part of the overall effects. As the last column in table 3 shows, the values of circular effects (N_3) move in the same direction as income distribution. This shows that the feedback with saving-investment is more important in the price adjustments of the richer consumers. This is because saving is an important destination for income in these groups.

4.3. Capital Account Effects

In the empirical application we have included the capital account as an endogenous component of the model. Using this approach we can capture the responses of capital prices when there are exogenous shocks in production costs and households' prices. Alternatively, this approach reflects the responses of production prices and cost-of-living indices accruing from an exogenous shock in capital price.

Table 4 shows some results. The examples at the top of this table correspond to an exogenous and unitary shock in Construction and Commerce, which generate the highest adjustments in capital price (0.375 and 0.213, respectively). Alternatively, when the exogenous shock comes from capital account, the prices of Private Services rise by 0.310 monetary units and the prices of Finance rise by 0.283 monetary units. Also from table 4, we can see that the bilateral effects between capital account and the richest active consumers (A10) are very asymmetric depending on the origin of the cost increase: when the cost shock is in capital account the effect on consumers is quantified as 0.577 units, whereas the opposite effect is quantified as 0.132.

[PLACE TABLE 4 HERE]

The additive decomposition of multipliers shows null own effects in all the examples. This is because we are now reflecting the links between the accounts and savings and investment. The open effects between production, consumption and capital account (N_2) explain the greatest price adjustments, whereas the circular effects (N_3) amount to approximately 10% of the overall price multipliers.

5. Concluding Remarks

This paper has presented a multisectorial model of prices based on the social accounting matrix framework. The aim was to focus on establishing the role of the price of capital in the cost transmission process and the price formation mechanism. We have also presented an additive decomposition of the global price multipliers in order to isolate the effects of the capital account on the overall price multipliers. With this decomposition we can analyse how investment contributes to the price formation process of an economy. We have empirically applied this analytical context to the Catalan economy using a 1994 social accounting matrix.

Our results show that there are important asymmetries in the individual price effects. In this sense, there are significant differences in the intensities of the responses of the accounts to the exogenous shocks received. On the other hand, the induced effects on prices due to capital account are non-negligible within the global price transmission mechanism.

As in the Leontief approach, the SAM-based price model assumes a completely rigid price formulation, so there is no possibility of substitution between the elements that define the price levels in the economy. This method therefore provides up-biased estimations when the model is used to compute price effects. The usual argument against this criticism is that the absence of cost substitution is an acceptable assumption in the short run analysis. This absence also seems an appropriate simplification for economies that are characterised by institutional rigidities, where prices are indexed according to the prices of production or the cost-of-living indices.

Despite these limitations, this kind of method provides information about the mechanism of cost' transmission and the underlying effects that help to define prices in an economy. This type of information is extremely valuable for policy decisions and welfare measures.

Appendix: Endogenous Accounts

Label Definitions

Activities

1. Agriculture
2. Energy
3. Metals
4. Minerals
5. Chemistry
6. Machinery
7. Automobiles
8. Food
9. Textile
10. Paper
11. Other Industry
12. Construction
13. Commerce
14. Transportation
15. Finance
16. Private Services
17. Public Services

Households

18. A1: Active, first group
19. A2: Active, second group
20. A3: Active, third group
21. A4: Active, fourth group
22. A5: Active, fifth group
23. A6: Active, sixth group
24. A7: Active, seventh group
25. A8: Active, eighth group
26. A9: Active, ninth group
27. A10: Active, tenth group
28. I1: Inactive, first group
29. I2: Inactive, second group
30. I3: Inactive, third group

Saving-Investment

31. Capital Account

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Table 1
An Aggregate Social Accounting Matrix

	1. Firms	**2. Households**	**3. Capital**	**4. Rest**	**Total**
1. Firms	X_{11}	X_{12}	X_{13}	X_{14}	Y_1
2. Households	X_{21}	0	0	X_{24}	Y_2
3. Capital	0	X_{32}	0	X_{34}	Y_3
4. Rest	X_{41}	X_{42}	X_{43}	X_{44}	Y_4
Total	Y_1	Y_2	Y_3	Y_4	

Table 2
Effects on Production Prices and Decomposition

Price Effect (j)	Cost increase (i)	$M\text{-}I$	N_1	N_2	N_3
1. Agriculture	13. Commerce	0.256	0.232	0.000	0.024
			(90.6%)	(0%)	(9.4%)
2. Energy	2. Energy	0.418	0.408	0.000	0.010
			(97.6%)	(0%)	(2.4%)
3. Metals	13. Commerce	0.067	0.062	0.000	0.005
			(92.5%)	(0%)	(7.5%)
4. Minerals	13. Commerce	0.206	0.181	0.000	0.025
			(87.9%)	(0%)	(12.1%)
5. Chemistry	13. Commerce	0.250	0.223	0.000	0.027
			(89.2%)	(0%)	(10.8%)
6. Machinery	13. Commerce	0.236	0.212	0.000	0.024
			(89.8%)	(0%)	(10.2%)
7. Automobiles	13. Commerce	0.205	0.187	0.000	0.018
			(91.2%)	(0%)	(8.8%)
8. Food	13. Commerce	0.331	0.302	0.000	0.029
			(91.2%)	(0%)	(8.8%)
9. Textile	9. Textile	0.276	0.264	0.000	0.012
			(95.6%)	(0%)	(4.4%)
10. Paper	13. Commerce	0.234	0.208	0.000	0.026
			(88.9%)	(0%)	(11.1%)
11. Other Industries	13. Commerce	0.143	0.126	0.000	0.017
			(88.1%)	(0%)	(11.9%)
12. Construction	13. Commerce	0.423	0.377	0.000	0.046
			(89.1%)	(0%)	(10.9%)
13. Commerce	13. Commerce	0.405	0.352	0.000	0.053
			(86.9%)	(0%)	(13.1%)
14. Transportation	13. Commerce	0.358	0.309	0.000	0.049
			(86.3%)	(0%)	(13.7%)
15. Finance	15. Finance	0.683	0.651	0.000	0.032
			(95.3%)	(0%)	(4.7%)
16. Private Services	16. Private Services	0.392	0.333	0.000	0.059
			(84.9%)	(0%)	(15.1%)
17. Public Services	13. Commerce	0.393	0.339	0.000	0.054
			(86.2%)	(0%)	(13.8%)

Table 3
Effects on Cost-of-Living Prices and Decomposition

Price Effect (j)	Cost increase (i)	$M - I$	N_1	N_2	N_3
Active					
18. A1	16. Private Services	0.663	0.619	0.000	0.044
			(93.4%)	(0%)	(6.6%)
19. A2	16. Private Services	0.640	0.598	0.000	0.042
			(93.4%)	(0%)	(6.6%)
20. A3	16. Private Services	0.599	0.543	0.000	0.056
			(90.6%)	(0%)	(9.4%)
21. A4	16. Private Services	0.585	0.531	0.000	0.054
			(90.8%)	(0%)	(9.2%)
22. A5	16. Private Services	0.563	0.499	0.000	0.064
			(88.6%)	(0%)	(11.4%)
23. A6	16. Private Services	0.547	0.478	0.000	0.069
			(87.4%)	(0%)	(12.6%)
24. A7	16. Private Services	0.533	0.467	0.000	0.066
			(87.6%)	(0%)	(12.4%)
25. A8	16. Private Services	0.523	0.453	0.000	0.070
			(86.6%)	(0%)	(13.4%)
26. A9	16. Private Services	0.471	0.383	0.000	0.088
			(81.3%)	(0%)	(18.7%)
27. A10	31. Capital Account	0.577	0.000	0.516	0.061
			(0%)	(89.4%)	(10.6%)
Inactive					
28. I1	16. Private Services	0.607	0.541	0.000	0.066
			(89.1%)	(0%)	(10.9%)
29. I2	16. Private Services	0.461	0.345	0.000	0.116
			(74.8%)	(0%)	(25.2%)
30. I3	31. Capital Account	0.542	0.000	0.485	0.057
			(0%)	(89.5%)	(10.5%)

Table 4
Capital Account Effects and Decomposition

Price Effect (*j*)	Cost increase (*i*)	$M - I$	N_1	N_2	N_3
31. Capital Account	12. Construction	0.375	0.000 (0%)	0.336 (89.6%)	0.039 (10.4%)
31. Capital Account	13. Commerce	0.213	0.000 (0%)	0.191 (89.7%)	0.022 (10.3%)
31. Capital Account	27. A10	0.132	0.000 (0%)	0.118 (89.4%)	0.014 (10.6%)
16. Private Services	31. Capital Account	0.310	0.000 (0%)	0.278 (89.7%)	0.032 (10.3%)
15. Finance	31. Capital Account	0.283	0.000 (0%)	0.254 (89.8%)	0.029 (10.2%)
27. A10	31. Capital Account	0.577	0.000 (0%)	0.516 (89.4%)	0.061 (10.6%)