A Structural and Trade Liberalization Analysis of the Mexican Economy*

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Abstract

An Accounting Multipliers Model and a Lineal Price Model with endogenous wage are formulated based on a Social Accounting Matrix of the Mexican economy from 1993, at a 73 sector level of aggregation. The models involve the production structure, the receipt-expenditure relationships and the tariff schedule when NAFTA was implemented. The accounting multipliers model identifies the key production and institutional sectors by their national income effects and the lineal price model calculates the price effects from a unilateral trade liberalization, that can be taken as an approximation of NAFTA´s impact. This paper demonstrates that the leading exporting sectors, distinguished by their assembly activity, show modest effects on national income. This is because maquila industry utilizes few domestic intermediate inputs, having scarce backward linkages in the Mexican economic system.

Key words: Social Accounting Matrix, Accounting Multipliers Model, Lineal Price Model, Commercial Liberalization.

JEL Classification: C67 C69 F13

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*I thank the comments of Josep Gonzalez Calvet of Universitat de Barcelona (UB) and Edgardo Ayala of Instituto Tecnologico y de Estudios Superiores de Monterrey (ITESM). Also, the translation assistance of Darren Bishop.

1. Introduction

Trade liberalization has been the most important structural reform of the last two decades for the Mexican economy. It was initiated in 1985, with a unilateral reduction of tariffs, import licenses, quotas and official prices. Then, Mexico became a member of the GATT in 1986 and implemented the North American Free Trade Agreement (NAFTA) in 1994. In addition, Mexico has signed agreements with other commercial regions and countries, such as the European Union and Chile. As a result, Mexico has become one of the most open economies in the world (its total foreign commerce was 51% of GNP in 2001[1]).

Specially, the analysis of the NAFTA´s impact caught the attention of policymakers and researchers, because it was the first agreement that involves economies that have a large difference of per capita income. To get an idea of the importance of this trade agreement for Mexico, on average, around 81%[2] of its foreign commerce is done with United States and Canada.

Even though it was implemented 10 years ago, the study of the NAFTA´s effects on activity levels (prices, employment and income), reallocation of resources and welfare is still relevant and attractive. On one hand, its impact has not been captured completely, since some products still carry high tariffs and quotas and safeguards are applied on their foreign trade. These products are contained into agriculture and livestock sectors, like beans, corn and chicken[3]. On the other hand, the multi-sector

[1] Total foreign commerce is defined as the sum of imports and exports. Data from Banco de Mexico and INEGI.
[2] Average of the period 1993-2001 (Data from Secretaria de Economia).
[3] The tariffs on 2004 for maize and beans are 72.6% and 46.9%, respectively. The chicken would have been imported freely in 2003. However, in January 2003 a safeguard was announced for its commerce, stipulating a quota on leg and thigh imports, a tariff of 98.8% applied to the imports that exceed the quota, and the other parts of this product were freely imported (Diario Oficial de la Federacion, January 25th, 2003). In 2004, the same tariff is applied, except the quota is larger (Diario Oficial de la Federacion, December 26th, 2003). In this sense, the liberalization of the agriculture and livestock has been controversial. Last year there was political pressure to renegotiate NAFTA on this issue, therefore the

models, particularly, the applied general equilibrium models, that played the most relevant role in the discussion of the NAFTA´s effects on the three economies (Francois y Shell, 1994), were calibrated with production structures and tariff schedules in the years before NAFTA. Therefore, these models captured the effects of the Mexican unilateral trade liberalization from 1985.

In this sense, the task of this paper is to realize a structural and trade liberalization analysis of the Mexican economy from 1993, in a multi-sector framework. Therefore, a Lineal SAM Model[4] of the Mexican economy from 1993 at a 73 sector level of aggregation is formulated. A model that involves the production structure, the receipt-expenditure relationships and the tariff schedule when NAFTA went into effect. Two specifications of the Lineal SAM Model are implemented: ***The Accounting Multipliers Model*** analyzes the Mexican economic structure, determining the national income effect per production sector, production factor (labor and capital) and institutional sector (families, foreign sector, aggregate capital account and government); and ***The Lineal Price Model*** calculates the price effect of a supposed unilateral trade liberalization in 1993 (tariffs removal), that can be taken as approximation of NAFTA´s impact on prices. These models allow us to study two aspect of the trade liberalization: income effect of the foreign trade and the price effect of the tariff elimination per economic activity. The aggregated price effect brings a welfare impact estimation.

The model is formulated through the intrinsic relationships contained in a social accounting matrix (SAM) of the Mexican economy from 1993 constructed by Chapa (2003). The SAM considers 73 production sectors, an aggregated private sector, an aggregated foreign sector, a government level and an aggregated capital account. Also,

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Mexican government implemented a program to support these economic sectors (Acuerdo Nacional para el Campo).

[4] It is also known as Expenditure and Production Fixed Coefficients Model.

this matrix separates the agriculture into grains (beans, corn and others) and other agricultural products (vegetables, fruits and others), because the foreign trade of each has different behaviors: grains are net importers and the rest are net exporters. In addition, it considers a tariff schedule that was derived thoroughly, computing a tariff per economic activity from data at 8 digits level of tariff fraction according to the International Harmonized System.

The main findings indicate that the free trade effects on the assembly sectors (the metallic products, machinery and equipment sector, other manufacturing industries and the textile industry) are the most interesting. The price model predicts that these sectors will show strong reduction in prices (since their production costs reduce); however, their scarce relationship with the other economic sectors, since assemblies uses few national inputs in their production, cause their expansion income effects to be low.

With respect to grains and livestock, the results are not conclusive because the lineal price model does not consider the non tariff barriers that are usually utilized to protect these economic activities. For these sectors, the price effect of the unilateral trade liberalization policy is lower than the average price effect. However, they have strong national income effects (strong backward and forward effects); therefore, if they are negatively affected by the trade liberalization, the effects on national income will be important.

This paper consists of six sections. In the next one, the SAM for Mexico is presented: how it was constructed, the statistics used to build it, and specially, the calculation of the tariff schedule per economic activity for 1993. Then, the accounting multipliers model is described and derived for 73 economic activities, identifying the leading sectors by their national income effect. Then, the accounting multipliers are separated into open loop, closed loop and circular effects and, the exogenous accounts

are made endogenous to determine their relative importance according to their impact on national income. In the section four, the price lineal model with endogenous wage is formulated to calculate the price impact when a unilateral trade liberalization is supposed. The paper finishes with a section of conclusions and a statistic appendix.

2. Social Accounting Matrix of the Mexican Economy

A social accounting matrix is a consistent database that consists of the national accounting identities. It includes the inter-industry relationships of an Input-Output Table (I-O table) and incorporates into it, information about the distribution and generation of income of an economy in a given year. Therefore, a SAM links industrial activities, production factors and institutional sectors, representing an initial equilibrium of the economy. In this sense, it can be utilized to formulate the Lineal SAM Model and to calibrate computable general equilibrium (CEG) models. These models allow one to do structural analysis and to study public policy´s impact on the main economic variables.

Sobarzo built a SAM from 1980, that contains the public-private dichotomy of the Mexican economy. In addition, he elaborated a SAM from 1985 to calibrate applied general equilibrium models, which studied the effects of NAFTA and fiscal policy (Sobarzo, 1992, 1994a and 1994b). The most recent official I-O table is from 1985, but it is not commonly used because in those years the economy went through periods of high inflation as consequence of the debt crisis of 1982. As a result of the lack of new official I-O tables, the SAMs have been constructed based on update I-O tables from 1980 or 1985[5]. Jaime (1992) elaborated a SAM from 1989 at a 93 sector level of aggregation. Specially, the primary sector was divided into 23 economic activities, and

[5] Consultoria Internacional Especializada, Mexico, D.F. has up dated the official I-O table from 1980, for the next years: 1990, 1993 and 1996. Its updates have taken as officials.

this SAM was utilized by Barceinas et al (1997) to calculate accounting and fixed price multipliers of the Mexican economy from 1989. Blancas (2003) constructed a SAM of one production sector from 1990 to analyze the financial unlikage of the Mexican economy. However, the most recent SAM was elaborated by Lee (2002) of the Globalization Research Center. This SAM is from 1996, combining the I-O table from 1985 and national accounts data from 1996[6]. This matrix contains the agriculture and livestock sectors in detail and separated by geographic region, also, the families are divided by three ranks of income.

In this paper, a SAM from 1993 is constructed to capture the economic structure of Mexico when NAFTA was implemented[7]. The matrix is based on an I-O table from 1993 at a 73 sector level of aggregation (*Consultoria Internacional Especializada*). This I-O table contains the economic activities indicated by the National Accounting Codifier at a 73 sector level of the Mexican official statistics (Instituto Nacional de Estadisticas, Geografia e Informatica, INEGI). However, the agriculture is separated into grains and other agricultural products (1a and 1b), and the economic activity "73 public administration" is eliminated.

An I-O table of total coefficients is utilized, since it contains imports per sector of origin. Therefore, the supply of resources (domestic production + imports) of every account is obtained, adding up the elements of the SAM by column, and the total use of resources (aggregate demand), adding up the elements of the matrix by row.

The SAM´s structure is based on Polo, Roland-Holst and Sancho (1991) and Kehoe (1996). It considers 73 production sectors, two production factors (capital and labor) and four institutional sectors (families, a level of government, an aggregate

[6] This matrix can be requested at International Food Policy Research Center http://www.ifpri.org/data/mexico02.htm

[7] For more details about the construction of this matrix, consult Chapa (2003), chapter five.

foreign sector and an aggregate capital account). This matrix assumes an aggregate private sector since the families receive the labor and capital income, even though part of the capital income goes to government via its public enterprises such as PEMEX (The SAM structure is contained in Table 1). Also, the next governmental income is separated per production activity: social security contributions and tariffs (Appendix 2).

The following national accounting identities are added to the I-O table: national income and its assignment; accumulation and financing of capital; current transactions with the foreign sector; as well as pertinent data of public finance. On one hand, the aggregate national accounts correspond to 1993 and they come from the national accounting system (INEGI´s methodology of 1980). On the other hand, direct and indirect taxes, social security contributions, transfers to the families and other information of public finance are taken from the database of Secretaria de Hacienda y Credito Publico (SHCP). Finally, the private and public savings are derived from national accounting identities, guaranteeing that the SAM be squared.

This SAM is consistent with the official national accounting data. The imports and exports are affected equally by update error; therefore, this matrix replicates the official data of GNP (INEGI´s methodology of 1980) and it can be derived in two ways:

Resources, factorial income after taxes

(1) GNP = WE+WG+RE+RG+TPE+SSCE+TPG+SSCG+TA

Uses, aggregate demand

(2) GNP = C+I+G+WG+RG+SSCG+TPG+X-M

Table 1 A SAM from 1993 of the Mexican Economy.

Units: Millons of pesos

	Enterprises	Families	Labor	Capital	Government	Aggregate Capital Account	Foreign Sector
Enterprises	**A** 633,108	**C** 801,161	0	0	**G** 88,820	**I** 247,829	**X** 131,693
Families	0	0	**WT** 290,990	**RT-BEP** 690,494	**TGP** 14,629	0	**TSEPN** 3,959
Labor	**WE** 259,330	0	0	0	**WG** 29,619	0	**WSEPN** 2,041
Capital	**RE** 698,657	0	0	0	**RG+INTGP** 28,923	0	**RSEPN** -32,697
Government	**TPE+SSCE** 123,777	**TR** 69,221	0	**BEP** 4,390	**TPG+SSCG** 3,462	**-SG** -48,084	**TA** 12,687
Aggregate Capital Account	0	**SH** 129,690	0	0	0	0	**-CC** 70,056
Foreign Sector	**M+TA** 187,739	0	0	0	0	0	0
Resources	**1,902,611**	**1,000,072**	**290,990**	**694,884**	**165,453**	**199,746**	**187,739**

Source: Calculated from Appendix 2 and Chapa (2003) pages 348-355.
Note: Enterprises = Production Activities GNP_{1993}=1,127,584 RG=52 TPG=191 INTGP=28871
The Net Border Transactions (4,575) were rested from net transfer from foreign sector (TSEPN).

A = Inter industry purchases matrix (73 x 73)	RT = total capital rent = RE + RG + RSEPN + INTGP	SSCE = Social Security Contributions paid by Enterprises vector (1 x 73)
C = Private Consumption vector (73 x 1)	RE = Capital Rent paid by enterprises	TR = Income Tax
G= Government Consumption vector (73 x 1)	RG = Capital rent paid by government	TPG = Net Production and Consumption Taxes - Tariffs paid by government
I = Gross Capital Accumulation + Inventories Change vector (73 x 1)	RSEPN = Net Capital Rents paid by foreign sector	SSCG = Social Security Contributions paid by government
X = Exports vector (73 x 1)	BEP = Public enterprises benefits (PEMEX)	SG = Governmental saving
WT = Total wages = WE + WG + WSEPN	TGP = Governmental Transfers to families	TA= Tariffs
WE = Wages paid by enterprises vector (73 x 1)	TSEPN = Foreign sector Net Transfers to families	SH = Families saving
WG= Wages paid by government	INTGP = Interests paid by government	CC = Current Account
WSEPN = Net Wages paid by foreign sector	TPE = Net Production and Consumption Taxes - Tariffs paid by enterprises vector (1 x 73)	M = Imports vector (1 x 73)

In "uses" section, the wages (WG), capital rent (RG) and taxes (SSCG, TPG) that government pays are added, since they are part of their current consumption and, therefore, of the GNP (Appendix 2, Aggregate Accounts).

An weighted average tariff per economic activity for 1993 is estimated. The

tariffs are published per tariff fraction and they are required per economic activity to be compatible with the structure of the SAM. Therefore, it is necessary to identify which tariff fractions are contained into each economic activity, in order to make the classifications parallel[8].

Moreover, each economic activity contains fractions with different tariff levels; therefore, it is convenient to ponder the tariffs according to the fraction imports. In order to make the calculations more precise, I work with a level of 8 digits tariff fraction according to the International Harmonized System. It is important to mention that these calculations do not consider quotas and non tariff barriers (like the case of the sugar cane)

In general, the Mexican tariff system of 1993 is characterized as having 4 levels of protection: 5%, 10%, 15% and 20% , as well as exempt articles. The exceptions are activities that contain some articles whose imports are relevant and are taxed at special rates. For example, the activity 11, Meat and Diary Products, the major part of its imports are burdened at 260% (tariff fraction 0207 Edible Meat and Leavings of Birds).

The tariffs went calculated per economic activity of origin. For example, if a producer or consumer imported a medical product in 1993, on average, he paid a tariff of 10%[9]. The tariff schedule is contained in Appendix 1 and the SAM per economic activity (73), production factors (labor and capital), institutional sectors (families, government, foreign sector and aggregate capital account) and taxes can be requested to the author or consulted in http://www.tdx.cesca.es/TDX-1010103-105603/ (pages 348-355).

[8] The tariff fractions contained into every economic activity were provided by Banco de Mexico.

[9] Although the tariffs were calculated thoroughly, they are different than the effective taxes paid by the average consumer. Therefore, a discrepancy was found between the estimated average tax and the one that is derived from the official Mexican data, which climbs to 7.1% (collection between total imports). This discrepancy was solved, reducing in the same proportion the collected amount per economic activity, so the general tariff respects the published data (intrinsically, neutral tax evasion is being supposed).

3 Accounting Multipliers Model

The Accounting Multipliers Model estimates amplified multipliers with respect to the classic Input-Output multipliers, computing the effect on national income induced by an injection into public expenditure, exports or investment. The papers that fomented this area of study were provided by Stone (1978) and Pyatt and Round (1979). These latter, also derived fixed price multipliers based on marginal propensities. Polo, Sancho and Roland-Holst (1991) compute accounting multipliers considering the aggregate capital account as endogenous, creating an interesting performance of these and their application to the Spanish case.

In Spain, the analysis of these multipliers has been very fruitful, not only on a national level but also a regional one (autonomous communities). Some examples can be cited: Llop and Manresa (1999) for Catalunya, Cardenette (2000) for Andalucia and, Miguel, Manresa and Ramajo (1998) for Extremadura.

In Mexico, these kind of studies are scarce, possibly, as consequence of the lack of new official I-O tables. The last multi-sector study was elaborated by Yunez -Naude and Crowe (1997), whose computed accounting and fixed price multipliers from 1989, were used to analyze the Mexican economic structure, putting special emphasis on the agriculture-livestock sector and redistribution effects .

3.1 Absorption and diffusion effects

The accounting multipliers model is static. It is formulated supposing: fixed average expenditure propensities, fixed prices or an economy with idle capacity and, lineal production. This last assumption means that intermediate products, imports and production factors (or primary inputs) are complementary.

Once the assumptions are established, it is necessary to define which variables are endogenous and which are exogenous. In this way, the inherent relationships of the SAM are converted into a model. The production sectors, families, labor and capital are the accounts that are taken as endogenous. Therefore, their national income effect is determined when an exogenous injection into an institutional sector is supposed. In this sense, the exogenous variables are public expenditure, exports and aggregate capital account, since they can be used as economic policy instruments.

Table 2 contains the relationships between the endogenous and exogenous variables. The matrix Tnn encloses the transactions between the endogenous accounts; Tnx includes the exogenous injections into endogenous variables; Txn is a matrix of exits since it contains the payments from endogenous accounts to exogenous and; Txx is the matrix of residuals that is to say, interchanges between the exogenous institutional sectors.

Based on this table, the amplified multipliers formula is derived. Tnn can be expressed in the function of a matrix of fixed average expenditure propensities (A_n), that is obtained by dividing the endogenous accounts transactions by the total of the corresponding column:

(3) $\mathbf{Tnn = AnYn}$

where Yn is a diagonal matrix that contains the total income of each endogenous account y_n. Therefore, the accounting multipliers are very alike at input-output, but in this case, we are talking about an inverse matrix of average expenditure propensities:

(4) $\mathbf{y_n = n + x = A_n y_n + x = (I-A_n)^{-1}x = M_c x}$

where M_C is the accounting multipliers and the element m_{ij} of this matrix represents the national income increase for the account *i* when the account *j* receives an unitary injection.

Table 2 Schematic representation of the endogenous and exogenous accounts.

		EXPENDITURES				Total
		Endogenous	Sum	Exogenous	Sum	
RECEIPTSESE	Endogenous	Tnn	n	Tnx	X	y_n
	Exogenous	Txn	l	Txx	T	y_x
Total		y_n'		y_x'		

Source: Defourny and Thorbecke (1984)

The ***absorption effect*** (forward effect) is obtained by adding up the elements of the matrix M_C by row and it dictates the income expansion of the account *i* when the whole economic system receives an income injection. The sum of the elements of the matrix M_C by column results in the ***diffusion effect*** (backward), which computes the increase in the economy´s income when the account *j* receives an unitary injection.

The production factors (labor and capital) and the families have a stronger absorption effect than diffusion effect, because the primary inputs are used by all the economic sectors and the families are their owners. In addition, note that the families multiplier is very close to the sum of the absorption effect of the production factors, although they do not coincide completely because part of the capital income goes to government via its public enterprises (Table 3).

Services is the only production sector whose absorption effect is greater than its diffusion effect, suggesting that it is a relevant supplier of intermediate and final products to the economy.

The absorption effect of agriculture and livestock, is markedly greater than the effects of the remaining sectors, only surpassed by the services effect. The nature of these activities explains this fact. They present an important impact when the economy

receives an exogenous injection, because they are relevant in final consumption that now is endogenous.

Table 3 Economic Sectors according to their Diffusion and Absorption Effects, 1993

Sectors	Diffusion	Absorption
Agriculture	8.53	7.23
Livestock	9.17	6.53
Forestry and fishing	8.75	1.75
Mining	8.51	1.72
Foods, drinks and tobacco	8.27	3.02
Textile industry	6.26	2.24
Wood Industry	7.91	1.77
Paper Industry	7.15	3.18
Chemical industry	6.80	2.76
Products of not metallic minerals	8.44	1.85
Basic Metallurgic Industry	6.89	2.28
Metallic products, machinery and equipment	5.38	1.78
Other manufacturing industries	4.75	2.33
Construction	9.08	1.00
Services	8.64	10.74
Labor	8.62	33.63
Capital	8.57	109.98
Family	7.62	143.91

Source: Calculated from Appendix 5.

With respect to the diffusion effect, the most interesting result is that assembly sectors are characterized for having modest income impact when an exogenous injection on them is applied. These activities are: other manufacturing industries, metallic products, machinery and equipment sector (48-58) and textile industry (24-28). (Appendix 3)

Services (61-72) and livestock are characterized by their strong income effects, when their products demands receive an injection and when the whole system expands (backward and forward effects). Note that Construction (60), Cement (44) and Mining

activities (7 and 9) are associated with high diffusion effects but low absorption effects. This means that they are relevant demanders of intermediate products and primary factors, but they do not provide intermediate or final consumption products to the economy, notably.

With respect to activities that are part of Foods, Drinks and Tobacco sector, they have strong diffusion effects, because they are activities related to agricultural products: Grinding of wheat (13), Grinding of corn (14), Processing of coffee (15) and Sugar and its Products (16).

3.2 Accounting and Input-Output Multipliers

Let´s think about an increase in the exports of all the sectors. This will generate an increase in intermediate production and primary factors, since they are complementary in the implicit production function. The families will have more income and therefore, an increase in consumption will be induced. The increase in consumption will incite an expansion effect on intermediate production, capital and labor demand, starting the process again. This process will repeat itself until the convergence is reached. This is the mechanism that is behind the accounting multipliers. Therefore, they are also known as amplified, since they include a major endogenous degree and they are bigger than the classic input-output multipliers. In our case, on average, the accounting multipliers are 139.75% greater than their input-output counterpart (Table 4).

The inclusion of the circular flow of income increases in greater degrees the forward and backward multipliers of services, agriculture and livestock. Note that the absorption effect of other manufacturing industries sector and foods, drinks and tobacco sector is augmented since the large endogenous degree. The same behavior is observed

in the case of mining, products of non metallic minerals and construction, but with respect to the diffusion effect.

Table 4 Accounting Multipliers Versus Input-Output Multipliers from 1993.

	Diffusion			Absorption		
Sector	**SAM**	**TIO**	**DIF %**	**SAM**	**TIO**	**DIF %**
Agriculture	3.99	1.32	202.28	6.98	2.68	160.32
Livestock	4.54	1.81	150.48	6.25	1.64	281.90
Forestry and fishing	4.15	1.44	187.78	1.73	1.33	30.20
Mining	4.09	1.49	175.13	1.71	1.54	11.17
Foods, Drinks and tobacco	4.21	1.81	132.44	2.92	1.17	148.68
Textile industry	3.31	1.57	110.73	2.18	1.17	85.56
Wood Industry	3.92	1.57	149.39	1.74	1.18	47.70
Paper Industry	3.67	1.61	127.20	3.10	1.76	76.46
Chemical industry	3.59	1.71	110.69	2.70	1.67	61.70
Products of non metallic minerals	4.09	1.53	166.70	1.82	1.29	40.47
Basic metallurgies industries	3.71	1.84	101.60	2.27	1.96	15.56
Metallic products, machinery and equip	2.93	1.48	97.29	1.75	1.23	42.43
Other manufacture industries	2.58	1.30	98.20	2.26	1.13	100.13
Construction	4.52	1.83	146.96	1.00	1.00	0.00
Services	4.04	1.33	203.36	10.27	2.39	328.80
Average	**3.77**	**1.57**	**139.75**	**3.77**	**1.57**	**139.75**

Source: It was elaborate on base to the Appendix 4.

3.3 Accounting multipliers decomposition

An interesting extension to the previous analysis consists in the decomposition of the accounting multipliers into three types of effects: ***close loop effects*** (MC1) capture the effects of transfers within the economy, representing the increase in income caused by the effect of the accounts into themselves; ***open loop effects*** (MC2) capture the cross effects of the multiplying process when an injection into a part of the system has repercussions on other parts and; ***circular effects*** (MC3) show the full effects of an

income injection that goes through the system and returns to its point of origin (Pyatt and Round, 1979). The equations of these multiplying effects are:

(5) $y_n = (I - A^{*3})^{-1} (I + A^{*} + A^{*2}) (I - A_n^t)^{-1} x$

where $A^{*} = (I - A_n^t)^{-1} (A_n - A_n^t)$

(6) $y_n = M_{c3} M_{c2} M_{c1} x$

in turn, we obtain the net multipliers by subtracting from the previous multipliers the injection that generates them:

(7) $y_n - x = M_c x - x = (M_c - I)x$

However, the pure close loop (M_{C1n}), open loop (M_{C2n}) and circular effects (M_{C3n}) are calculated ease using the additive division of Stone (1978):

(8) $M_c = I + (M_{c1} - I) + (M_{c2} - I)M_{c1} + (M_{c3} - I)M_{c2}M_{c1}$

$M_{c1} = M_{c1} - I$

$M_{c2} = (M_{c2} - I)M_{c1}$

$M_{c3} = (M_{c3} - I)M_{c2}M_{c1}$

The study of these multiplying effects contributes to the structural analysis of the economy, since it can determine the nature of the economic activities according to the distribution of their net effects. The net circular effect is the largest component of the net absorption and diffusion multipliers. On average, it contributes 70.1%, followed by the open loop effect contributing 21.5% and the close loop contributing 8.4% (Appendix 3).

However, the production sectors that are not relevant in the final consumption show strong net close loop forward effect. Therefore, they are important suppliers of intermediate products but not suppliers of final products: forestry (3), mining products (5-10), threads and fabrics of hard fibers (25), sawmills (29), chemical industry (34, 35 and 37), products of non metallic minerals (45), basic metallurgy industries (46 and 47) and metallic products, machinery and equipment (49, 51 and 52). (Appendix 3).

3.4 Institutional sectors

In this section, the accounting multipliers are recalculated with different endogenous assumptions. Therefore, the government, aggregate capital account and foreign sector are formulated endogenous into the model, one by one, to identify their relative income effect. The results indicate that the government is the institutional account that has the greatest impact on national income. On average, it generates an increase of 84.3% in the accounting multipliers, while the aggregate capital account causes an increase of 47.3% and the foreign sector only 31.4% (Appendices 5 and 6).

However, the multipliers behave in different way than the average in some activities. In the case of the diffusion effect of seven activities, the foreign sector is the account that augments their multipliers the most: an economic activity of the textile industry (25), five activities of the metallic products, machinery and equipment sector (51, 54, 55, 57 and 58) and other manufacturing industries sector (59).

A large number of exceptions in the analysis of the absorption effect are found. On one hand, in the case of 16 activities, the most considerable increase on their accounting multipliers is associated with the aggregate capital account: forestry (3), mining (5, 7 and 9), wood industry (29), products of non metallic minerals (44 and 45), basic metallurgy industries (46 and 47), metallic products, machinery and equipment (48-52 and 58), other manufacturing industries (59) and construction (60). On the other hand, for 10 economic activities, the foreign sector is the key generator of income: Mining (6, 8 and 10), processing of coffee (15) and metallic products, machinery and equipment sector (48, 53-57).

When the government is endogenous, the diffusion effect of the services increases considerably. Also, this happens to activities that are taxed intensively like tobacco and its products (23) and alcoholic beverages (22) and to an activity that is

subsidized and is an important part of the Mexican diet: Grinding of corn (14). In addition, this behavior is shown by activities that have an important relationship with public infrastructure: Construction (60) and Cement (44). The families, labor, capital and government are the accounts with the largest absorption effects, followed by services, livestock, agriculture and meat and diary products.

When the foreign sector is endogenous, the diffusion effect of services loses relevance, and the activities of the foods, drinks and tobacco sector (11,13-16,18 and 22), agriculture (1b Other agricultural products) and livestock have the largest effects. On the other hand, the highest absorption effects are associated to the labor, capital, families and services. However, note that two activities of auto industry are in the top places: Automotive vehicles (56) and Body and auto parts (57).

4. Unilateral Trade Liberalization Effects

A lineal price model with endogenous wage is implemented. Its specification is identical to the Dual Price System of Leontief (Pulido and Fontela, 1993), but in this case, the wage is endogenous, equaling the consumer price index. This model allows to determine the price effects of this commercial policy:

(9) $$p = [(I-A^t)^{-1}](sW + kP_k + t + mP_m^*)$$

(10) $$P_m^* = P_m(1+t_m)$$

(11) $$W = IPC$$

p= unitary initial sector prices, vector (1 x n).

s= proportion of salaries to total resources per sector j, diagonal matrix (n x n).

k= proportion of exploitation surplus to total resources per sector j, diagonal matrix (n x n).

m= proportion of imports to total resources per sector j, diagonal matrix (n x n).

t= proportion of production and consumption net taxes less tariffs to total resources per sector j, vector (1 x n).

A^t = transpose of inverse matrix of average expenditure propensities, matrix (nxn).

W = The salary is equal to a Laspeyres consumer price index calculated from production sectors prices

(p).

P_k = vector of capital price per sector j, vector (1 x n)

P_m^* = vector of import price after tariffs per sector j, vector (1 x n)

t_m = tariffs per sector j, vector (1 x n)

All the prices are unitary in the initial equilibrium (except the import price before tariffs). Therefore, the price effect of the trade liberalization is assessed, comparing the new prices from the applied policy (removal tariffs) with the initial prices. This price effect takes into account the direct and indirect effects of commercial policy. The direct effect of the economic activity *j* is the immediate impact on its price when the tariffs are eliminated:

(12) $\Delta p = m\Delta t_m$

However, the sector *j* trades with other economic activities and these latter activities experience a reduction in their prices too, as consequence of the unilateral trade liberalization. Therefore, the economic activity *j* shows an additional decrease in its price. This impact is called "indirect effect", explaining the existence of a multiplier.

The elimination of the import taxes of all the economic sectors generates a drop of 1% on the nominal wages and consumer price index, which can be seen as an increase in welfare. The activity Threads and fabrics of hard fibers (25) experiences the highest drop in prices, 5.78%, followed by activities of metallic products, machinery and equipment sector (50-58), articles of clothing (27), two activities of the foods, drinks and tobacco sector (11 and 12), articles of plastic (42) and other manufacturing industries sector (59). Among them, assembly activities are found, which are characterized by their low income effect (Appendix 7).

Another exercise was performed. It supposed that the initial wage was equal to one. This way, the model is converted into an I-O model but with the SAM structure. In this case, a decrease of 0.8% in consumer price index is realized. Therefore, since the

labor is a production factor, an additional 0.2% decrease in prices results when the wage is indexed according to the consumer price index. However, the activities with intensive impact do not change qualitatively.

With respect to the economic activities that are still being taxed, the model predicts that there will less pressure on their prices than on the average sector: grains (0.78%) and livestock (0.61%).

5. Conclusions

The economic structure of Mexico from 1993 is characterized by the following facts. The services are the activities with a stronger impact on the national income in the presence of an exogenous injection in themselves (***diffusion effect***) and in the whole economic system (***absorption effect***). Also, the agriculture and livestock have important income effects, but, contrary to services, their backward effects are stronger than their forward effects. Therefore, these sectors are more relevant demanders than suppliers of intermediate and final products. This last fact was identified by Barceinas et al (1993), too.

The net circular effects represent the feedback effect of an income injection and are the main component of the accounting multipliers. In this sense, the Mexican economy from 1993 shows modest cross and close effects. However, when the net distribution of the absorption effects is analyzed, the close loop effects place greater weight on activities that are important suppliers of intermediate products (mining, products of non metallic minerals and others).

The analysis reveals that government has a considerable impact in the Mexican economy. This institutional account increases greatly the accounting multipliers when it is endogenous. It raises the income effect of activities that contribute considerably to

government collection (22 drunk alcoholic and 23 tobacco), that are important in the public expenditure (69 educational services) or that are related to public investment (60 construction and 44 cement).

The SAM model allows one to study the effects of commercial policy in two ways: the income effect of the exports (assuming unitary income elasticity) and the price impact of the elimination of tariffs. The results of the accounting multipliers model indicate that the main assembly sector, metallic products, machinery and equipment sector, among other activities, shows modest income impact. This is because the assembly industry utilizes few intermediate domestic inputs, having few backward linkages in the Mexican economic system (Chapa, 2003 chapter 2 and Guajardo, 1998). Therefore, even though assembly exports (to total exports) increased 29.5 percentage points from 1985 to 2001, this industry represents only 3% of the Mexican GNP[10].

The activity Body and Auto parts (57) of auto industry, it is the only leading maquila activity that show strong absorption effect on national income when the foreign sector is taken as endogenous. From a merely production point of view, this activity has foundations in the Mexican economy and is considered strategic, for their generating capacity of growth in the Mexican economy (Chapa, 2003 chapter 2).

The grains are net importers; therefore, an increase in their exports is not expected, but at less governmental programs like "Acuerdo Nacional para el Campo" that were implemented in 2003 help substantially to raise their productivity. However, other agricultural products, such as fruits and vegetables, are highly competitive and net exporters, specially the tomatoes, and according to our multipliers calculated, an increase in their exports would have a substantial impact on national income.

[10] Data from Banco de Mexico.

The price model predicts a reduction on the order of 1% in consumer price index when tariffs are removed, which can be taken as an welfare improvement. On one hand, the activities of the metallic products, machinery and equipment sector experiences the biggest decrease in prices. On the other hand, grains and livestock show smaller price effects than the average activity. Their low price effect can possibly be explained by the non tariff barriers (such as sanitary requirements) and import quotas. These protection measures are a common practice in the agriculture and livestock sector, and they are not considered in the present calculations.

This lineal price model shows a smaller welfare and price impact than an AGE model does. The best known AGE model of the Mexican economy that studies NAFTA´s impact, predicts an increase of 4.4% in welfare, but this model considers imperfect competition and non trade barriers removal (Sobarzo in Francois and Shiells, 1994). However, the lineal price model predicts qualitatively the correct effects at sector level. In the last decade, the metallic products, machinery and equipment and textile sectors have been dynamic exporters. Therefore, this model can be implemented to devise an approximation of a public policy´s impact at sector level.

This paper has some future research potential. The accounting multipliers model could be update to a year after NAFTA went into effect (1994), to do an structural change analysis, identifying the production sectors whose income effects (when foreign sector is endogenous) were affected by NAFTA´s implementation. It would be interesting to separate the foreign sector by country of origin, the labor by types and, the families by income levels. This would allow one to study trade diversion and creation as well as redistribution effects. Also, the lineal price model could be refined, including non trade barriers, to improve the calculation of NAFTA´s impact on agriculture and livestock sectors.

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Statistic Appendices

Appendix 1 Average Tariff per Economic Activity, 1993.

Economic Activity	Tariff	Economic Activity	Tariff
1a Grains	6	37 Synthetic Resins y Artificial Fibers	7
1b Other Agricultural Products	12	38 Medical Products	10
2 Livestock	7	39 Soaps, Detergents, Perfumes y Cosmetics	16
3 Forestry	3	40 Other Chemical Industries	12
4 Hunting and Fishing	19	41 Rubber Products	16
5 Coal	2	42 Articles of Plastic	15
6 Petroleum and Gas	10	43 Glass and its products	16
7 Mineral of Iron	10	44 Cement	8
8 Non Ferrous Metallic Minerals	8	45 Other Products of non metallic minerals	17
9 Quarry, Sand, Gravel and Clay	3	46 Basic industries of iron and steel	8
10 Other No Metallic Minerals	6	47 Basic Industries of non ferrous metals	8
11 Meat and Diary Products	77	48 Metallic Accessories	18
12 Packing of Fruits and Vegetables	20	49 Structural and Metallic Products	16
13 Grinding of Wheat and Products	10	50 Other Metallic Products	15
14 Grinding of Maize	10	51 Non Electric Machinery and Equipment	13
15 Processing of Coffee	20	52 Electric Machinery and Devices	14
16 Sugar and Products	14	53 Electro-Domestic Devices	19
17 Vegetable Edible Oils and Grasses	13	54 Electronic Equipment and Accessories	14
18 Food for Animals	13	55 Other Electric Equipments and Devices	15
19 Other Nutritional Products	18	56 Automobiles	11
20 Alcoholic Beverages	19	57 Body and Auto parts	13
21 Beer	102	58 Other equipments and materials of transport	9
22 Soft Drinks	20	59 Other Manufacturing Industries	14
23 Tobacco and its Products	50	60 Construction and Installation	15
24 Threads and Fabrics of Bland Fibers	11	61 Electricity, Gas and Water	10
25 Threads and Fabrics of Hard Fibers	13	62 Commerce	0
26 Other Textile Industries	17	63 Restaurants and Hotels	0
27 Articles of Clothing	20	64 Transport	20
28 Leather and its Products	13	65 Communications	0
29 Sawmills	14	66 Financial Services	0
30 Other wood industries	16	67 Renting of Real estate	0
31 Paper and cardboard	7	68 Professional Services	0
32 Printing and Publishing	5	69 Educational Services	0
33 Refinement of Petroleum	1	70 Medical Services	0
34 Basic Petrochemistry	2	71 Entertainment Services	0
35 Basic Chemistry	8	72 Other Services	0
36 Fertilizers	10		

Source: The imports come from Secretaria de Economia data base and the tariffs come from SECOFI (1994).

Appendix 2 Aggregate Accounts of SAM, including residuals (Relationships between institutional sectors)

	Enterprises	Labor	Capital	SSC	Families	GOV	ACA	Foreign Sector	Tariff	Uses
Enterprises	633108	0	0	0	801161	88820	247829	131693	0	**1902611**
Labor	259330	0	0	0	0	29619	0	2041	0	**290990**
Capital	698657	0	0	0	0	28923	0	-32697	0	**694884**
SSC	28635	0	0	0	0	3271	0	0	0	**31905**
Families	0	290990	690494	0	0	14629	0	3959	0	**1000072**
GOV	95142	0	4390	31905	69221	191	-48084	0	12687	**165453**
ACA	0	0	0	0	129690	0	0	70056	0	**199745**
Foreign Sector	175052	0	0	0	0	0	0	0	0	**175052**
Tariff	12687	0	0	0	0	0	0	0	0	**12687**
Resources	**1902611**	**290990**	**694884**	**31905**	**1000072**	**165453**	**199745**	**175052**	**12687**	**4473399**

Source: Input-Output Table 1993, Consultoría Internacional Especializada and Appendix 1.
Note: The sum of partials does not coincide with the total since the numbers were round, this is the case of social security contributions (SSC), but the SAM is squared at the decimal level. GOV=Government, ACA=Aggregate capital account.

Appendix 3 Accounting Multipliers: Diffusion and Absorption Effects and their net distribution, 1993.

Activity	Diffusion				Absorption			
	Total	CLLE	OLE	CLE	Total	CLLE	OLE	CLE
1a	7.17	0.38	1.58	5.21	5.54	1.67	0.08	3.79
1b	7.89	0.26	1.77	5.85	6.93	1.69	0.11	5.13
2	8.17	0.81	1.71	5.65	5.53	0.64	0.10	4.79
3	7.61	0.18	1.73	5.70	0.88	0.57	0.01	0.30
4	7.90	0.71	1.67	5.52	0.63	0.08	0.01	0.53
5	6.84	0.38	1.50	4.96	0.40	0.37	0.00	0.03
6	7.87	0.38	1.74	5.75	1.70	1.01	0.01	0.67
7	8.21	0.50	1.79	5.92	0.23	0.21	0.00	0.01
8	7.61	1.25	1.48	4.89	1.42	1.22	0.00	0.20
9	8.15	0.15	1.86	6.14	0.35	0.25	0.00	0.10
10	6.38	0.27	1.42	4.69	0.21	0.15	0.00	0.05
11	7.80	1.29	1.51	5.00	8.05	0.30	0.16	7.58
12	6.40	0.76	1.31	4.33	0.88	0.05	0.02	0.81
13	8.18	0.85	1.71	5.63	1.88	0.12	0.04	1.72
14	8.92	1.00	1.84	6.07	3.59	0.55	0.06	2.98
15	8.38	0.71	1.78	5.89	0.40	0.09	0.01	0.30
16	8.20	0.80	1.72	5.68	1.72	0.36	0.03	1.33
17	6.83	0.92	1.38	4.54	1.27	0.27	0.02	0.97
18	7.60	1.20	1.49	4.91	0.43	0.11	0.01	0.31
19	7.52	0.75	1.58	5.20	2.74	0.26	0.05	2.42
20	5.30	0.55	1.11	3.65	0.79	0.04	0.02	0.74
21	6.46	0.73	1.33	4.40	1.49	0.06	0.03	1.40
22	8.16	0.64	1.75	5.78	2.13	0.00	0.04	2.09
23	4.80	0.33	1.04	3.44	0.94	0.05	0.02	0.87
24	5.86	0.72	1.19	3.94	1.69	0.45	0.03	1.22
25	0.96	0.04	0.21	0.71	0.21	0.12	0.00	0.09
26	6.20	0.63	1.30	4.28	0.69	0.10	0.01	0.57
27	6.25	0.67	1.30	4.28	2.28	0.05	0.05	2.18
28	7.02	0.80	1.45	4.78	1.32	0.15	0.02	1.15
29	6.43	0.54	1.37	4.52	0.54	0.31	0.00	0.22
30	7.39	0.60	1.58	5.21	1.01	0.05	0.02	0.94
31	5.43	0.69	1.10	3.64	2.37	1.04	0.03	1.30
32	6.86	0.54	1.47	4.85	1.99	0.47	0.03	1.49
33	5.69	0.76	1.15	3.79	2.01	0.54	0.03	1.44
34	5.31	0.69	1.07	3.55	2.17	1.40	0.02	0.76
35	4.60	0.50	0.95	3.15	2.06	1.16	0.02	0.88
36	5.60	0.94	1.08	3.57	0.41	0.17	0.01	0.24
37	5.47	0.85	1.07	3.55	1.92	1.02	0.02	0.87
38	6.55	0.45	1.42	4.68	1.77	0.31	0.03	1.42
39	7.07	0.84	1.45	4.78	2.03	0.07	0.04	1.93
40	6.16	0.73	1.26	4.16	2.62	1.22	0.03	1.37
41	6.09	0.63	1.27	4.19	0.95	0.24	0.01	0.69
42	5.43	0.65	1.11	3.66	1.67	0.56	0.02	1.09
43	6.85	0.52	1.47	4.86	0.69	0.30	0.01	0.39
44	7.97	0.59	1.71	5.66	0.14	0.09	0.00	0.05
45	7.50	0.49	1.63	5.38	1.70	0.49	0.03	1.19
46	6.43	0.89	1.29	4.25	1.69	1.32	0.01	0.36
47	5.36	0.79	1.06	3.50	0.88	0.60	0.01	0.28
48	7.01	0.73	1.46	4.82	0.09	0.00	0.00	0.09
49	6.50	0.66	1.36	4.48	0.04	0.03	0.00	0.01
50	4.78	0.49	1.00	3.29	1.87	0.62	0.03	1.22
51	2.30	0.21	0.48	1.60	0.46	0.28	0.00	0.18
52	4.80	0.44	1.01	3.35	0.27	0.14	0.00	0.13
53	5.37	0.62	1.10	3.65	0.24	0.02	0.00	0.22
54	2.93	0.26	0.62	2.05	0.79	0.23	0.01	0.55
55	3.94	0.37	0.83	2.74	0.66	0.32	0.01	0.33
56	5.45	0.96	1.04	3.44	1.68	0.02	0.03	1.63
57	2.55	0.33	0.52	1.70	2.36	0.83	0.03	1.50
58	2.51	0.25	0.53	1.74	0.15	0.04	0.00	0.11
59	3.75	0.30	0.80	2.64	1.33	0.13	0.02	1.17
60	8.08	0.83	1.69	5.56	0.00	0.00	0.00	0.00
61	7.15	0.58	1.53	5.04	4.99	2.42	0.05	2.52
62	5.92	0.35	1.29	4.27	28.60	4.01	0.51	24.08
63	7.88	0.25	1.77	5.85	11.38	0.71	0.22	10.45
64	7.73	0.42	1.70	5.61	16.09	2.03	0.29	13.77
65	6.36	0.32	1.40	4.63	4.24	0.55	0.08	3.62
66	7.95	0.33	1.77	5.84	9.18	2.17	0.15	6.87
67	8.34	0.13	1.91	6.30	16.79	1.10	0.33	15.36
68	8.31	0.22	1.88	6.21	6.08	1.62	0.09	4.37
69	7.90	0.17	1.80	5.93	2.82	0.00	0.06	2.76
70	8.09	0.37	1.80	5.93	4.54	0.19	0.09	4.25
71	8.01	0.38	1.77	5.85	2.42	0.41	0.04	1.97
72	8.03	0.45	1.76	5.81	9.70	1.51	0.17	8.02
Labor	7.62	0.00	2.18	5.43	32.63	0.00	13.21	19.42
Capital	7.57	0.00	2.17	5.40	108.98	0.00	37.86	71.12
Families	6.62	0.00	1.81	4.80	142.91	0.00	52.19	90.72

Source: It was elaborate with base on Chapa (2003) pages 348-355.
Note: CLLE= net close loop effect. OLE= net open loop effect. CLE= net circular loop effect

Appendix 4 Close loop Effects of Production Sectors: Input-Output and Accounting Multipliers, 1993.

Activity	Diffusion		Absorption	
	I-O	AM	I-O	AM
1a	1.38	3.89	2.67	6.32
1b	1.26	4.09	2.69	7.63
2	1.81	4.54	1.64	6.25
3	1.18	3.93	1.57	1.86
4	1.71	4.37	1.08	1.59
5	1.38	3.78	1.37	1.40
6	1.38	4.16	2.01	2.66
7	1.50	4.35	1.21	1.23
8	2.25	4.61	2.22	2.41
9	1.15	4.12	1.25	1.34
10	1.27	3.53	1.15	1.20
11	2.29	4.70	1.30	8.61
12	1.76	3.85	1.05	1.84
13	1.85	4.57	1.12	2.78
14	2.00	4.94	1.55	4.42
15	1.71	4.55	1.09	1.38
16	1.80	4.54	1.36	2.65
17	1.92	4.11	1.27	2.21
18	2.20	4.57	1.11	1.41
19	1.75	4.26	1.26	3.60
20	1.55	3.31	1.04	1.75
21	1.73	3.86	1.06	2.41
22	1.64	4.43	1.00	3.01
23	1.33	2.99	1.05	1.89
24	1.72	3.62	1.45	2.62
25	1.04	1.38	1.12	1.20
26	1.63	3.69	1.10	1.66
27	1.67	3.74	1.05	3.16
28	1.80	4.10	1.15	2.26
29	1.54	3.73	1.31	1.53
30	1.60	4.12	1.05	1.95
31	1.69	3.45	2.04	3.29
32	1.54	3.89	1.47	2.90
33	1.76	3.58	1.54	2.93
34	1.69	3.40	2.40	3.13
35	1.50	3.02	2.16	3.01
36	1.94	3.67	1.17	1.40
37	1.85	3.56	2.02	2.87
38	1.45	3.71	1.31	2.69
39	1.84	4.15	1.07	2.92
40	1.73	3.75	2.22	3.55
41	1.63	3.66	1.24	1.91
42	1.65	3.42	1.56	2.61
43	1.52	3.87	1.30	1.67
44	1.59	4.33	1.09	1.14
45	1.49	4.08	1.49	2.64
46	1.89	3.94	2.32	2.67
47	1.79	3.48	1.60	1.87
48	1.73	4.06	1.00	1.09
49	1.66	3.83	1.03	1.04
50	1.49	3.08	1.62	2.80
51	1.21	1.98	1.28	1.45
52	1.44	3.06	1.14	1.27
53	1.62	3.38	1.02	1.23
54	1.26	2.25	1.23	1.76
55	1.37	2.69	1.32	1.64
56	1.96	3.62	1.02	2.59
57	1.33	2.15	1.83	3.28
58	1.25	2.09	1.04	1.14
59	1.30	2.58	1.13	2.26
60	1.83	4.52	1.00	1.00
61	1.58	4.01	3.42	5.84
62	1.35	3.42	5.01	28.22
63	1.25	4.08	1.71	11.78
64	1.42	4.13	3.03	16.30
65	1.32	3.56	1.55	5.03
66	1.33	4.15	3.17	9.78
67	1.13	4.17	2.10	16.91
68	1.22	4.22	2.62	6.83
69	1.17	4.04	1.00	3.66
70	1.37	4.23	1.19	5.29
71	1.38	4.21	1.41	3.31
72	1.45	4.26	2.51	10.24

Source: It was elaborate with base on Chapa (2003) pages 348-355.
Note: I-O= Input-Output multiplier. AM= Accounting Multiplier

Appendix 5 Diffusion Effect with Endogenous Government, Aggregate Capital Account and Foreign Sector, 1993.

Activity	Multiplier				Percentual Increment		
	AM	AMGOV	AMACA	AMFS	AMGOV	AMACA	AMFS
1a	8.17	14.38	12.13	10.42	76.11	48.50	27.61
1b	8.89	15.83	13.33	10.67	78.16	50.05	20.06
2	9.17	16.37	13.47	10.93	78.46	46.81	19.17
3	8.61	15.62	12.94	10.42	81.43	50.36	21.00
4	8.90	16.49	13.09	10.56	85.33	47.15	18.65
5	7.84	13.99	11.61	10.20	78.39	48.06	30.13
6	8.87	16.28	13.24	10.52	83.53	49.24	18.59
7	9.21	16.40	13.71	10.88	78.11	48.87	18.14
8	8.61	15.30	12.33	10.81	77.57	43.14	25.46
9	9.15	16.54	13.83	10.68	80.64	51.03	16.70
10	7.38	13.04	10.94	10.00	76.72	48.32	35.57
11	8.80	14.83	12.60	11.19	68.55	43.18	27.18
12	7.40	12.98	10.69	10.18	75.32	44.44	37.48
13	9.18	16.41	13.46	10.94	78.67	46.61	19.11
14	9.92	17.18	14.53	11.51	73.21	46.55	16.10
15	9.38	16.52	13.86	11.08	76.04	47.70	18.14
16	9.20	16.33	13.52	10.97	77.45	46.95	19.26
17	7.83	13.70	11.28	10.43	74.91	44.04	33.21
18	8.60	14.87	12.33	10.93	72.95	43.40	27.14
19	8.52	15.31	12.48	10.58	79.55	46.38	24.10
20	6.30	15.14	9.07	8.12	140.47	44.03	28.99
21	7.46	16.76	10.81	8.88	124.52	44.79	18.99
22	9.16	16.80	13.55	10.72	83.40	47.92	17.00
23	5.80	17.40	8.42	6.71	199.87	45.00	15.61
24	6.86	12.59	9.85	9.70	83.71	43.74	41.45
25	1.96	1.89	2.50	7.96	-3.93	27.41	305.12
26	7.20	12.84	10.46	9.97	78.25	45.18	38.44
27	7.25	13.66	10.50	9.73	88.53	44.92	34.35
28	8.02	14.69	11.65	10.25	83.15	45.28	27.86
29	7.43	12.98	10.87	10.15	74.66	46.23	36.60
30	8.39	15.55	12.35	10.30	85.41	47.20	22.84
31	6.43	11.47	9.20	9.62	78.36	43.06	49.59
32	7.86	14.56	11.55	10.06	85.17	46.91	27.96
33	6.69	12.17	9.57	9.68	81.86	43.04	44.65
34	6.31	11.87	9.00	9.34	88.19	42.75	48.13
35	5.60	9.54	8.00	9.35	70.27	42.70	66.90
36	6.60	11.52	9.32	9.86	74.57	41.17	49.31
37	6.47	11.28	9.16	9.78	74.32	41.66	51.11
38	7.55	13.52	11.11	10.07	79.05	47.15	33.33
39	8.07	14.89	11.70	10.25	84.54	45.01	27.02
40	7.16	12.68	10.32	10.01	77.12	44.21	39.77
41	7.09	13.00	10.28	9.79	83.32	44.93	38.05
42	6.43	11.96	9.21	9.44	86.06	43.34	46.80
43	7.85	14.30	11.55	10.14	82.04	47.03	29.13
44	8.97	16.86	13.27	10.47	88.09	47.97	16.78
45	8.50	15.50	12.58	10.41	82.43	48.13	22.56
46	7.43	12.92	10.65	10.26	73.95	43.47	38.12
47	6.36	11.05	9.02	9.72	73.85	41.90	52.84
48	8.01	15.30	11.68	10.01	90.98	45.77	24.94
49	7.50	14.43	10.91	9.74	92.37	45.43	29.83
50	5.78	10.46	8.28	9.21	81.13	43.26	59.45
51	3.30	4.63	4.51	8.49	40.60	36.92	157.54
52	5.80	9.90	8.35	9.43	70.68	43.86	62.49
53	6.37	11.29	9.15	9.61	77.14	43.50	50.75
54	3.93	6.00	5.49	8.71	52.75	39.70	121.68
55	4.94	7.94	7.02	9.16	60.66	42.18	85.44
56	6.45	11.21	9.07	9.80	73.94	40.60	52.03
57	3.55	5.11	4.84	8.62	44.22	36.52	143.09
58	3.51	5.45	4.83	8.44	55.14	37.63	140.51
59	4.75	7.71	6.76	9.01	62.43	42.36	89.84
60	9.08	16.58	13.31	10.75	82.67	46.60	18.45
61	8.15	16.59	11.98	9.66	103.64	47.07	18.53
62	6.92	17.47	10.16	7.92	152.61	46.92	14.56
63	8.88	16.41	13.33	10.45	84.81	50.10	17.71
64	8.73	15.54	13.00	10.64	77.97	48.85	21.87
65	7.36	16.86	10.88	8.63	129.06	47.85	17.22
66	8.95	16.72	13.39	10.43	86.93	49.66	16.62
67	9.34	17.04	14.13	10.71	82.37	51.27	14.62
68	9.31	17.08	14.03	10.68	83.50	50.70	14.69
69	8.90	17.04	13.41	10.22	91.52	50.70	14.88
70	9.09	16.82	13.60	10.57	84.97	49.58	16.24
71	9.01	16.49	13.46	10.60	83.07	49.39	17.64
72	9.03	16.47	13.45	10.64	82.44	48.96	17.90
Labor	8.62	15.97	13.64	10.00	85.34	58.38	16.07
Capital	8.57	15.98	13.56	9.94	86.56	58.34	16.06
Families	7.62	14.97	12.64	9.00	96.55	66.04	18.18
Avergae	**7.53**	**13.88**	**11.09**	**9.89**	**84.29**	**47.31**	**31.41**

Source: It was elaborate with base on Chapa (2003) pages 348-355.

Note: AMGOV= Accounting multiplier with endogenous government. AMACA= Accounting multplier with endogenous aggregate capital accounting. AMFS= accounting multplier with endogenous foreign sector.

Appendix 6 Absorption Effect with Endogenous Government, Aggregate Capital Account and Foreign Sector, 1993

Activity	Multiplier				Percentual Increment		
	AM	AMGOV	AMACA	AMFS	AMGOV	AMACA	AMFS
1a	6.54	10.07	8.28	7.53	54.15	26.73	15.21
1b	7.93	12.75	10.48	10.34	60.76	32.17	30.42
2	6.53	10.98	8.82	8.03	68.19	35.13	23.00
3	1.88	2.18	2.18	2.03	15.94	15.97	7.98
4	1.63	2.12	1.86	1.81	30.45	14.75	11.27
5	1.40	1.44	1.58	1.52	2.65	12.65	8.10
6	2.70	3.45	3.18	4.09	27.61	17.72	51.31
7	1.23	1.24	1.34	1.28	1.30	9.34	4.08
8	2.42	2.63	2.77	3.24	8.59	14.29	33.70
9	1.35	1.48	2.25	1.43	9.72	66.55	6.01
10	1.21	1.27	1.27	1.33	4.73	5.37	10.11
11	9.05	16.07	12.59	10.90	77.59	39.12	20.47
12	1.88	2.64	2.27	2.34	40.22	20.34	24.09
13	2.88	4.48	3.68	3.31	55.52	27.98	15.14
14	4.59	7.35	6.02	5.28	60.04	30.98	15.03
15	1.40	1.68	1.55	1.69	20.07	10.65	20.71
16	2.72	3.98	3.37	3.08	46.08	23.73	13.15
17	2.27	3.17	2.74	2.52	40.05	20.84	11.37
18	1.43	1.73	1.59	1.53	21.14	11.10	7.16
19	3.74	6.00	4.89	4.67	60.51	30.75	25.06
20	1.79	2.47	2.13	2.08	37.94	19.25	15.97
21	2.49	3.77	3.13	2.95	51.60	26.08	18.60
22	3.13	5.06	4.10	3.64	61.31	30.82	16.09
23	1.94	2.74	2.35	2.18	41.26	21.07	12.08
24	2.69	3.83	3.31	3.33	42.24	22.83	23.46
25	1.21	1.29	1.26	1.27	6.82	3.98	5.62
26	1.69	2.27	1.99	2.07	34.13	17.88	22.41
27	3.28	5.34	4.34	4.19	62.70	32.15	27.58
28	2.32	3.39	2.87	2.84	45.98	23.53	22.16
29	1.54	1.76	2.05	1.68	14.66	33.00	9.24
30	2.01	2.88	2.62	2.51	43.53	30.45	24.77
31	3.37	5.30	4.33	3.99	57.22	28.53	18.41
32	2.99	4.80	3.88	3.65	60.69	29.66	22.10
33	3.01	4.56	4.01	4.17	51.22	33.01	38.50
34	3.17	3.97	3.72	3.88	25.07	17.19	22.24
35	3.06	4.03	3.69	3.89	31.72	20.60	27.20
36	1.41	1.66	1.54	1.54	17.10	8.81	8.97
37	2.92	3.78	3.52	3.82	29.68	20.57	31.08
38	2.77	4.58	3.47	3.26	65.56	25.54	17.72
39	3.03	4.89	3.96	3.58	61.19	30.64	18.07
40	3.62	5.34	4.75	4.64	47.29	31.14	28.07
41	1.95	2.65	2.48	2.39	36.40	27.63	22.91
42	2.67	3.77	3.42	3.23	40.90	27.91	20.70
43	1.69	2.12	2.00	2.24	24.97	17.78	31.91
44	1.14	1.52	2.10	1.20	33.30	84.03	5.29
45	2.70	3.99	4.41	3.35	47.53	62.98	23.85
46	2.69	3.08	5.48	4.08	14.56	103.93	51.67
47	1.88	2.17	2.45	2.39	15.20	30.27	27.22
48	1.09	1.19	1.19	1.32	8.51	8.95	20.89
49	1.04	1.05	1.54	1.06	0.90	48.58	2.22
50	2.87	4.13	4.43	3.70	44.08	54.38	29.18
51	1.46	1.68	5.37	2.81	15.33	268.05	92.49
52	1.27	1.41	2.24	1.88	10.63	76.16	47.27
53	1.24	1.44	1.40	1.56	16.14	12.66	26.01
54	1.79	2.40	2.76	2.95	33.88	54.03	64.72
55	1.66	2.01	2.08	2.65	21.54	25.50	60.09
56	2.68	4.19	6.18	6.80	56.09	130.14	153.41
57	3.36	4.83	6.14	7.75	43.64	82.67	130.39
58	1.15	1.27	1.75	1.31	10.78	52.68	14.45
59	2.33	3.56	3.90	3.49	53.25	67.45	49.99
60	1.00	1.00	17.70	1.00	0.00	1670.41	0.00
61	5.99	8.93	7.83	7.33	49.16	30.67	22.45
62	29.60	52.58	45.78	41.35	77.61	54.66	39.69
63	12.38	22.25	17.30	16.90	79.73	39.74	36.54
64	17.09	30.47	25.18	22.25	78.27	47.29	30.18
65	5.24	9.36	7.16	7.11	78.50	36.65	35.63
66	10.18	17.97	15.30	12.73	76.55	50.32	25.10
67	17.79	32.69	25.11	21.86	83.72	41.09	22.84
68	7.08	12.06	10.32	9.08	70.31	45.70	28.18
69	3.82	21.26	5.03	4.45	457.02	31.79	16.72
70	5.54	17.80	7.49	6.61	221.48	35.18	19.40
71	3.42	5.41	4.40	4.39	58.04	28.65	28.45
72	10.70	18.96	14.95	13.60	77.18	39.73	27.10
Labor	33.63	74.99	50.17	42.93	122.99	49.20	27.65
Capital	109.98	193.95	155.73	132.54	76.35	41.59	20.51
Families	143.91	273.36	205.91	176.51	89.95	43.08	22.65
Avergae	**7.53**	**13.88**	**11.09**	**9.89**	**84.29**	**47.31**	**31.41**

Source: It was elaborate with base on Chapa (2003) pages 348-355.

Note: AMGOV= Accounting multiplier with endogenous government. AMACA= Accounting multplier with endogenous aggregate capital accounting. AMFS= accounting multplier with endogenous foreign sector.

Appendix 7 Price Level with unilateral trade liberalization policy, Exogenous and Endogenous Wage, 1993.

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Activity	Exogenous W	Endogenous W	Activity	Exogenous W	Endogenous W
1a	0.9937	0.9922	37	0.9865	0.9844
1b	0.9950	0.9941	38	0.9880	0.9857
2	0.9958	0.9939	39	0.9896	0.9877
3	0.9979	0.9961	40	0.9839	0.9823
4	0.9960	0.9937	41	0.9802	0.9781
5	0.9966	0.9944	42	0.9773	0.9753
6	0.9957	0.9937	43	0.9863	0.9841
7	0.9957	0.9940	44	0.9977	0.9958
8	0.9913	0.9885	45	0.9907	0.9891
9	0.9992	0.9974	46	0.9866	0.9849
10	0.9907	0.9895	47	0.9821	0.9804
11	0.9553	0.9537	48	0.9889	0.9867
12	0.9748	0.9733	49	0.9859	0.9839
13	0.9957	0.9932	50	0.9694	0.9678
14	0.9980	0.9969	51	0.9520	0.9513
15	0.9949	0.9938	52	0.9696	0.9679
16	0.9947	0.9928	53	0.9672	0.9651
17	0.9848	0.9833	54	0.9529	0.9517
18	0.9897	0.9874	55	0.9608	0.9594
19	0.9889	0.9872	56	0.9738	0.9723
20	0.9816	0.9802	57	0.9535	0.9526
21	0.9876	0.9853	58	0.9681	0.9668
22	0.9967	0.9946	59	0.9619	0.9609
23	0.9971	0.9955	60	0.9955	0.9920
24	0.9836	0.9814	61	0.9955	0.9929
25	0.9421	0.9420	62	0.9989	0.9966
26	0.9794	0.9775	63	0.9996	0.9986
27	0.9791	0.9770	64	0.9917	0.9901
28	0.9844	0.9816	65	0.9971	0.9952
29	0.9830	0.9812	66	0.9995	0.9965
30	0.9911	0.9896	67	0.9996	0.9993
31	0.9850	0.9836	68	0.9997	0.9985
32	0.9935	0.9918	69	0.9994	0.9925
33	0.9949	0.9932	70	0.9979	0.9943
34	0.9940	0.9919	71	0.9994	0.9981
35	0.9799	0.9786	72	0.9969	0.9947
36	0.9834	0.9812			

Source: It was elaborate with base on Chapa (2003) pages 348-355. The exercise with endogenous wage was solved using Eviews 4.0.