The Impact of North American Free Trade Agreement on the Mexican Economy

Joana Chapa

Preliminary Version June 2004

Facultad de Economia
Universidad Autonoma de Nuevo Leon

Abstract

An applied general equilibrium model of the Mexican Economy is implemented to assess NAFTA´s impact on the main economic variables, allocation of resources and welfare. Focusing the attention on the most controversial sectors of the trade liberalization process: agriculture and livestock. The main finding is: NAFTA works in favor of the labor intensive manufacture which includes the most dynamic exporting activities. Additionally, the results suggest that the Mexican government should be concern about the effects of NAFTA on livestock, since this sector has strong production links in the Mexican economy.

Key words: Applied General Equilibrium Model, Social Accounting Matrix, Commercial Liberalization.

JEL Classification: C68 F13

Contact Author: Professor Joana Chapa, Facultad de Economia, Universidad Autonoma de Nuevo Leon, Loma Redonda 1515 Pte. Col. Loma Larga CP. 64710 Monterrey, N.L. MEXICO.
Phone Number: (0052) 818 3294150 Fax: (0052) 818 3422897
email: joachapa@ccr.dsi.uanl.mx

I. Introduction

The North American Free Trade Agreement (NAFTA) signed by Mexico, United States and Canada, taken into effect in 1994, has been a very interesting case of study. It is the first commercial agreement that involves economies that have a large difference of per capita income. Therefore, there were some considerations about its implementation. American labor unions argued that their national enterprises would localize in Mexico to take advantage from its low wages. In Mexico, even though there was social pressure of the most protected sectors, such as agriculture, the policy makers conceived NAFTA as a development strategy: the world would perceive Mexico as a trustworthy economy where to invest.

Therefore, the policy makers of the three countries gave an special attention to study NAFTA´s impact on their economies. The general equilibrium model was one of the most utilized tool to analysis this issue, because it makes possible to assess the public policies effects on the main economic variables. The models that were constructed to estimate NAFTA´s impact involve different structural characteristics, but most of them agree that Mexico would enjoy of the largest gains[1]. A common characteristic of these models is that they were calibrated from data of the endings of 80´s. In consequence, they capture the effects of the bilateral commercial agreement among United States and Canada, and the Mexican unilateral trade liberalization from 1985.

In this context, the task of this paper is to design an applied general equilibrium model (AGE model) that considers the tariff schedule and economic structure when NAFTA was implemented, in order to assess the impact of this agreement on the Mexican economy. Therefore, the model is calibrated based on a social accounting matrix (SAM) of Mexico

[1]Francois and Sheill (1994) presents the models that were considered by the policy makers in the discussion of NAFTA´s effects. While, Kehoe and Kehoe (1994a) comments the results of these models.

from 1993, a year before NAFTA was taken into effect. This model identifies nine production sectors, two production factors, a single representative consumer, a government level and two regions (Mexico and the rest of the world). Among them, there are the most controversial sectors in the trade liberalization process: Grains and Livestock. After 10 years of NAFTA´s implementation, the national producers of agriculture and livestock argue that they are not prepared to face the tariff reduction stipulated on this commercial agreement. In 2003, there was political pressure to renegotiate NAFTA in these sectors. As a result, the Mexican government implemented the "Acuerdo Nacional para el Campo", a program to support these sectors with low prices of electricity and oil.

The model is utilized to perform four simulations. The base simulation exemplifies the elimination of import taxes of all the production sectors. Then, because this exercise fails to replicate the foreign commercial behavior of livestock sector in the next years of NAFTA´s beginning, the second experiment supposes that the national livestock production is completely substituted by imports, at the same time that the tariffs are eliminated (to have the relative prices of the free trade situation). Therefore, the exercise allows to identify if the production resources allocated in livestock would be better utilized by other economic sectors. The next simulation implements a subsidy to the national grains producers, which is determined endogenously, in order to the tariff removal does not displace national grains production. Finally, the last exercise is similar to the second one, but with respect to the grains sector.

The base simulation predicts an increase of 0.56% in the aggregate consumption, that can be taken as a welfare improvement. The reallocation of resources goes in favor of the labor intensive manufacture (this sector includes the most dynamic exporting activities) and against the construction sector and capital intensive manufacture. Furthermore, the

simulations suggest that the Mexican government has reasons to be concerned about the trade liberalization effects on livestock, given its strong production links in the Mexican economy.

The paper is structured as follow: section II describes the AGE model. In section III, the equilibrium of the model is described, as well as the solution mechanism. The parameters and are calibrated in section IV. The results of the simulations are discussed in section V and section VI concludes.

II. The Model

The Mexican economy is specified by a static AGE model, which is similar to the first model designed for Spain (Kehoe and et al, 1988). It identifies a single representative consumer, nine production sectors, two production factors, a government level and an aggregate foreign sector. It supposes constant returns to scale and perfect competition in production sectors. The primary inputs, labor and capital, are perfectly movable between sectors, but not internationally. Also, the model specifies that domestic and foreign productions are imperfect substitutes, assuming national production differentiation (Armington, 1969). Additionally, it is supposed that Mexico is "almost" a small economy since it cannot affect international prices but its exporters face a downward sloping foreign demand.

The foreign sector is aggregated, therefore, the imports and exports are not differentiated by their origin and destine countries. This fact is a limitation because it does not permit to identify processes of trade creation and trade diversion.

The government purchases goods and services and it destines them to the collective consumption. It demands primary inputs to produce a "public administration good". Also, it

owns public enterprises[2] and it is specified that their gains goes to the government. The equations of the model are in Appendix 1.

Production

Each sector produces a homogeneous good, that can be used as intermediate input or final product. All sectors combine domestic production and imports to obtain their total production according to a Cobb Douglas function, therefore, substitution between national and foreign production is allowed (Armington Aggregator). Then, the domestic production combines intermediate inputs and value added in fixed proportions (Leontief function). The labor and capital works together to produce value added by a Cobb Douglas function, therefore, there is some substitution degree between labor and capital.

It is assumed that the producers minimize costs subject to their technological constrains. Therefore, the producers optimization is a three stage decision process. As a result, domestic production, imports, intermediate products, value added, labor and capital demands are obtained.

Consumers

It is assumed that the representative consumer maximizes his utility function subjects to his budget constrain to get his consumption and saving demands. The consumer preferences are specified by a Cobb Douglas utility function. He owns the endowments of capital and labor, therefore, his principal income comes from capital rent and wages. Also, he receives net transfers from the foreign sector, governmental transfers, net interests paid by

[2] The public enterprises invest and produce in the market. But, the private and public enterprises activities are not separated.

foreign sector and government and wages of people those are working abroad. Finally, he pays income and value added taxes.

Production Factors Markets

Labor and capital demands has two components: production sectors demands (variable) and public demand (fixed). The supplies of labor and capital are assumed to be fixed, therefore the capital rent and wages adjust to equilibrate the primary inputs markets. This is a closure rule of the model.

Government

The government decides how much to consume and invest as a result of an optimization, that involves a utility maximization subject to its budget constrain. The utility function is Leontief type, this implies that the public consumption and investment keep a fixed relationship.

The governmental income comes from tax collection (taxes apply to imports, income, production and consumption), social security contributions and gains of public enterprises. Its income is utilized in current consumption, transfer to families, interest payment, capital rent and wages.

The government´s surplus or deficit is obtained by resting its expenditures and investment from its income. It is established as closure rule, that the public expenditure is constant and governmental surplus or deficit is variable.

Aggregate Capital Account

Since this model is static, the accounting closure rule is assured by the national accounting identity: aggregate saving is equal to aggregate investment. The investment supply is determined by adding up private, public and foreign savings. The investment demand is a Leontief function, implying that each production sector *i* invests a fixed proportion of the aggregate saving.

Foreign Sector

The optimization of the foreign demanders of the Mexican products (exports) is outside this model, because just the Mexican economy is specified. However, it is supposed that the Mexican enterprises have some market power and face a downward sloping foreign demand. The closure rule in the foreign sector is that imports are variable but the current account is constant.

III. Equilibrium and Solution Mechanism

The equilibrium is a vector of final prices, primary inputs prices, consumption and production plans, and tax collection that guarantees that the consumer maximizes his utility function subjects to his income, the production sectors minimize their production costs according to their technological restrictions, the products and factors markets are clear, the governmental collection equals the effective taxes paid by the economic agents and the current account maintains constant. In a model of this nature, the Walras Law implies that the sum of the demand excesses of the production sectors and the taxes paid by consumer

(income and value added taxes) equals the total tax collection[3].

The model is identified so the relative price of labor and capital adjusts to reach the equilibrium. Therefore, it starts with a supposed value of this relative price, and the internal prices are determined simultaneously. Then, the exports (since the international prices are assumed to be fixed) and private consumption are obtained. Since the public expenditure is fixed, fewer variables have to be solved in order to determine the production by the side of final demand. Therefore, the total production, primary inputs demands, imports and domestic production are solved simultaneously. This process repeats itself by iterations, till the demand excesses of goods, capital and labor markets satisfy the desirable prediction error.

The model is a non lineal equation system and can be solved by the Newton method of first derivative, and under some conditions, by the Gauss Seidel method. The econometric program Eviews Version 4.1 allows utilizing any of these methods. This program performs a structural analysis of the model by itself, and it collects the equations by blocks. The blocks are solved, sequentially, depending of the order that the variables dictates. Therefore, it eliminates the problem that the Gauss Seidel method faces: the order of the equations is a condition for the model convergence.

[3]Kehoe and Serra Puche (1983) prove the existence of equilibrium for this type of models and Kehoe and Walley (1985) prove the uniqueness of the equilibrium.

IV. Calibration

The model is calibrated based on a SAM of the Mexican economy from 1993 (Chapa 2003 and 2004). The SAM was constructed at a 73 sector level of aggregation, therefore, to calibrate this model, it is aggregated at nine production sectors: Grains, Other Agricultural Products, Livestock, Forestry-Fishing, Mining, Labor Intensive Manufacture, Capital Intensive Manufacture, Construction and Services.

Although, the labor is abundant in Mexico, the payment to capital represents the larger portion of the value added for almost all the production sectors (the construction sector is the exception). This is because Mexico is a low-wage country. Therefore, the manufacturing activities were classified as labor intensive or capital intensive, according to their employment multipliers (the multipliers were taken from Chapa 2003, chapter 3). In consequence, the production activities that show the largest employment multipliers were taken as labor intensive, and the rest of production activities as capital intensive.

The parameters and exogenous variables are calibrated based on the optimal conditions of the model and the social accounting matrix. Therefore, they satisfy the structural and statistics conditions, representing a benchmark equilibrium. Since the SAM is in value terms, the exogenous variables, such as taxes, are calibrated in order to all the prices are equal to unity in the initial equilibrium.

The export demand elasticities were assigned taking into account the value used by other researchers and doing simulations to determine the elasticities that better adjust the demand excesses of the production factors. This parameter equals 2 for: Grains, Livestock, Finishing-Forestry and Mining sectors. The elasticity is 3 for: Other Agricultural Products, Capital Intensive Manufacture and Services. Finally, the labor intensive manufacture demand elasticity is fixed to 6.

V. Results

Simulation 1: Unilateral Trade Liberalization in 1993

The base simulation consists to eliminate all import taxes applied in the Mexican economy. This exercise is a unilateral trade liberalization policy, but, it can be taken as an approximation of NAFTA´s policy, since 78% of the Mexican total commerce was done with their North American partners in 1993.

The aggregate consumption increases 0.56% (Appendix 3). At sector level, the consumption from the labor intensive sector increase 2.32%, follows by the capital intensive manufacture (0.71%) and grains (0.23%), the rest do not change. The final consumer prices of these sectors are the most reduced, since their imports represent a large portion of their total production (29%, 17% 14%, respectively).

There is an expulsion effect on aggregate investment (4.28%), in part as result of the closure rules: the foreign saving is constant, but the public saving reduction overcomes the private saving increment. Indeed, the public saving reduces because the government looses import tax collection.

The relative price of labor and capital reduces since the real capital rent decreases in lower degree than the real wage. The construction sector is impacted by the expulsion effect, and since construction is labor intensive (labor payment is 60% of its value added), its labor usage reduces 4.16%. This fact pressures real wage to diminish.

The commercial sectors which are labor intensive expand. The reallocation of resources (labor and capital) goes in favor of the labor intensive manufacture and, in lower degree, of agriculture, livestock and forestry-fishing sectors. Therefore, their domestic production increase. In contrast, the reallocation of resources works against the capital intensive manufacture, mining, construction and services (they present a close production

relationship). They are negatively impacted by the expulsion effect, since the construction sector purchases an huge amount of intermediate inputs to them.

The imports and exports increase for all economic sectors, specially, the labor intensive manufacture does the best. The grains and capital intensive manufacture show larger trade deficits.

The predictions of the model are corrected, qualitatively (Appendixes 4-8). The model predicts that the labor intensive manufacture is the winner sector of the commercial liberalization process. In the period, 1993-99, its exports to the total exported increases 15 percentage points, their exports augments 198.08% and its GNP increases 40.77%[4]. In addition, this sector shows the largest increase in imports, they augment 79.49%. Also, the model predicts that the capital intensive manufacture, other agricultural products and services would show strong increase in their exports.

On the contrary, the model fails to predict the commercial situation of grains, mining and livestock. The failure in grains and mining is not very important, since the commercial flows of these sectors are a small part of the total commerce. But, the case of livestock looks relevant. The model predicts a small increase in livestock exports and imports, while the statistics shows a reduction of 31.86% in its foreign sells and an increase of 51.28% in its imports. This fact suggests that the national livestock production has been displaced by imports. This could be consequence of the non inclusion of non tariffs barriers, those are important in this sector. However, the next simulation pays special attention to this fact, using the model to determine if the observed behavior of this sector is a warning alarm to the

[4]The price elasticity of the foreign demand of this sector was supposed very large. However, another simulation was realized, assuming the same price elasticity to all production sectors, and the labor intensive manufacture still being the leader (even though in a lower degree).

Mexican livestock producers.

Simulation 2: National Livestock production substituted by imports

A substitution of the national livestock products by imports is introduced exogenously. This policy is implemented at the same time that the trade liberalization policy, in order to have the relative prices of the free trade situation. The simulation generates a reallocation of resources from livestock to the other economic activities. The production factors of livestock are free so, in order to the other sectors absorb them, the real wage and capital rent have to decrease. The capital rent reduces more than the real wage, since 75% of the livestock value added goes to the capital payment.

The aggregate consumption reduces 0.51% because the national income reduces (Appendix 9). The negative income effect caused by the primary inputs payments reduction overcome the positive income effect caused by the tariff elimination.

This policy impacts, negatively, the domestic production and primary inputs usage of the economic sectors that have close production relationship with livestock: grains (-9.95%) and other agricultural products (-4.46%). On the contrary, the reallocation of resources goes in favor of labor intensive manufacture (8.63%), services (1.39%), capital intensive manufacture (2.99%), mining (5.68%) and forestry-fishing sector (4.54%).

The investment reduces 3.45% as a result of the reduction of public and private saving (-36.25% and -0.55%, respectively). Also, the national construction production declines.

The aggregate imports increase 23.44%, because the livestock products are getting completely from abroad. Also, the labor intensive manufacture shows an increase in its imports (8.67%). As a result of the closure rule applies to the foreign sector, current account

constant, the exports augment substantially (44.63%). At sector level, the labor intensive manufacture (67.19%), services (33.72%) and other agricultural products (33.37%) show an increase in their exports.

Simulation 3: Subsidy to National Grains Producers

This is a very opportune exercise since the last year were social and political pressures to renegotiate NAFTA in the agriculture and livestock sectors. The government is worry about NAFTA´s effects on these sectors because they are a significant portion of the national consumption and their national producers are low income.

The subsidy is introduced at the same time that the tariffs are eliminated. The rate of the subsidy is determined endogenously, in order that the commercial liberalization does not displace grains domestic production. The main results are as follow. A subsidy of 5.9% maintains the grains imports constant even though the tariffs are eliminated (Appendix 10). In comparison with the base simulation, this policy generates a larger increase in national income and consumption (0.74%). The governmental income shows a larger reduction than in the first simulation, as a result, there is a larger expulsion effect on investment and construction.

The domestic production rise 3.71%. The allocation of resources goes in favor of the labor intensive manufacture and, in lower degree, of agriculture and livestock sectors, but, in this case, grains sector shows larger effects. Specially, livestock and labor intensive manufacture are impacted positively.

Simulation 4: National Grains Production substituted by Imports

The private consumption does not change (-0.09%) under this simulation. The positive income effect caused by the elimination of tariffs is compensated by the negative income effect generated by the reduction in capital rent and wages (Appendix 11).

The capital rent decreases in more degree than wage, in order that the resources allocated into grains sectors are absorbed by the rest of economic activities (81% of grains value added is capital payment). The production factors of grains are absorbed by all economic sectors, specially, by the labor intensive manufacture, increasing its domestic production 7.06%. The exception is the construction sector, since its domestic production decrease 3.41%, as a result of the expulsion effect.

The aggregate imports increase 18.38% and the aggregate exports increase 33.88%. The exporting leader is the labor intensive manufacture sector (52.11%), followed by other agricultural products (22.49%).

VI. Conclusions

An AGE model was designed and calibrated in order to evaluate the NAFTA´s impact on the Mexican economy. The model determines that this commercial agreement increases consumption and welfare (0.56%). All the economic sectors expand their foreign commerce, and the reallocation of resources goes in favor of the labor intensive manufacture (its exports increase 21.54% and its domestic production augments 8.73%).

Even tough, the model does not predict NAFTA´s effects, quantitatively, the model does well, qualitatively[5]. The labor intensive manufacture is the most benefited of NAFTA: its exports to the total exported increases 15 percentage points, their exports augments 198.08% and its GNP increases 40.77%, in the period 1993-99.

In exception, the relative prices of the free trade situation do not explain the commercial behavior of livestock sector, possibly, because non tariff barriers are not consider. Therefore, the second simulation supposes that the national livestock production is substituted by imports. The reallocation of resources of this policy goes against the grains and other agricultural products sectors, because their have a close production relation with livestock.

With respect to the grains sector, a subsidy of 5.9% to their national producers would maintain imports constant (even though the tariffs are eliminated) and generates a larger increase in consumption than the base simulation. The subsidy works in favor of grains, livestock and labor intensive manufacture sectors. In this sense, this policy is an option for the Mexican government to help agriculture and livestock, since, works in favor of both sectors.

If the national grains production were substituted by imports, the aggregate consumption would be constant and the resources allocated into it would be absorbed by all the economic activities, except construction (because it is affected by the expulsion effect). The labor intensive manufacture would expand the most.

Note that the negative impacts on consumption and domestic production of the substitution of livestock production are larger than the effects of the substitution of grains

[5] Kehoe (2002) argues that in trade protection situation, some products were not commerce between the North American economies, and the AGE models are unable to replicate how they start to be trade. Additionally, these

production. This is consequence of the next facts. Firstable, livestock is more important in the Mexican economic structure than grains sector and; secondly, it is an important demander of intermediate inputs[6]. The simulations suggest that there must be more concern about the NAFTA´s effects on livestock sector.

The paper has some future research potential. The income distribution effect of the NAFTA has not been explored with this kind of models, because the lack of adequate information. Therefore, it would be interesting to introduce several consumers according to their income. Also, the analysis of programs to support agriculture and livestock sector are opportune and attractive. It could include: the comparison of the Acuerdo Nacional para el Campo with direct subsidies; and the evaluation of implementing the "farm bill" program in Mexico[7].

In addition, the model design could be improved in some aspects: the estimation of parameters to calibrate more flexible functions of production and consumption; the differentiation of imports and exports by origin and destine country and, the inclusion of non tariff barriers.

Since the model is static and the current account is constant (closure rule), there is an expulsion effect on investment and construction sector when tariffs are removed[8]. This is a limitation to analysis trade liberalization effects on the Mexican economy, since it is a country that needs foreign saving. Even tough the best option would be to construct a

---

models cannot explain the explosive growth of the assembly exports.

[6] Intermediate inputs are more relevant than primary inputs in livestock production. In addition, in 1993, its intermediate purchases were very diversified, livestock need inputs from 5 sectors in the same importance: services, labor intensive manufacture, capital intensive manufacture, grains and other agricultural products.

[7] The farm bill is the program used by United States to support its agriculture and livestock sector.

[8] There are some simulations that are not reported in this paper. They are identical that describe above, but, the policies are neutral with respect to the public income. They suppose that the value added tax increase in order to overcome the import tax collection loss. As a result, the expulsion effect on investment reduces, but the increase in consumption declines.

dynamic model to study this agreement, an alternative is to do additional simulations which other closure rules. In this context, it would be opportune to allow capital inflows and variable current account.

Except in the above considerations, these models are a useful tool to study the public policy effects, in a framework where the economic agents are interconnected. Therefore, their principal quality is that permit to study the trajectory of trade liberalization impact, across the economic sectors and agents. In this paper, the implemented AGE model explains the reallocation of resources in favor of the most dynamic exporters and it was utilized to determine the effects of the displaced of national livestock and grains production.

Bibliography

Armington, P. (1969): "A Theory of Demand for Products Distinguished by Place of Production". International Monetary Fund Staff Papers, March, pp. 159-176.

Brown, D. (1994): "Properties of Applied General Equilibrium Trade Models with Monopolistic Competition and Foreign Direct Investment" in Modeling Trade Policy: Applied General Equilibrium Assessments of NAFTA edited by Joseph F. Francois, Clinton R. Shiells. Cambridge University Press. PP. 124-148.

Brown, D.; Deardorff, A. and Stern, R. (1992): "A North American Free Trade Agreement: Analytical Issues and A Computational Assessment". The World Economy 15, pp. 11-29.

Cardenete M. (2000): "Modelos de Equilibrio General Aplicados a la Economía Andaluza". Tesis Doctoral. Universidad de Huelva, España.

Chapa, J. (2004): A Structural and Trade Liberalization Analysis of the Mexican Economy. Working Paper. Universidad Autonoma de Nuevo Leon, Mexico, June.

Chapa, J. (2003): "Análisis de la Apertura Comercial en México mediante Modelos Multisectoriales, 1970-93". Tesis Doctoral. Universidad de Barcelona, España, Junio. http://www.tdx.cesca.es/TDX-1010103-105603/

Cox, D. (1994): "Some Applied General Equilibrium Estimates of the Impact of a North American Free Trade Agreement on Canada" in Modeling Trade Policy: Applied General Equilibrium Assessments of NAFTA edited by Joseph F. Francois, Clinton R. Shiells. Cambridge University Press. PP. 100-123.

Cox, D. and Harris , R. (1992): "North American Free Trade and Its Implications for Canada, Results from a CGE Model of North American Trade". The World Economy 15, pp. 31-44.

Fernández, M. and Polo, C. (2001): "Un Análisis de Equilibrio General de las Consecuencias del Ajuste Fiscal en España". Versión presentada en el encuentro: Evaluación

de las Políticas Económicas con Modelos de Equilibrio General Aplicado. UIMP, Sevilla, España.
Francois, F. and Shiells, C. (1994): "AGE Models of North American Free Trade" in Modeling Trade Policy: Applied General Equilibrium Assessments of NAFTA edited by Joseph F. Francois, Clinton R. Shiells. Cambridge University Press. PP. 3-43.
Ginsburgh, V. and Keyzer, M. (1997): "The Structure of Applied General Equilibrium Models". Massachusetts Institute of Technology.
Guajardo, R. (1998): "Assessing the Impact of the Maquiladora Industry in Mexico: An Interindustry Analysis. Review of Urban and Regional Development Studies. Vol. 10, No. 2 Autumn 1998.
Harris, R. (1984): "Applied General Equilibrium Analysis of Small Open Economies with Scale Economies and Imperfect Competition" American Economic Review 74, pp 1016-1032.
Harrison, Rutherford and Tarr (2001): "Acuerdos Regionales de Chile y el Acuerdo de Libre Comercio de las Américas: La Importancia del Acceso de Mercado". Abril.
_____(1997): "Opciones de Política Económica para Chile, Una Evaluación Cuantitativa". World Bank, Working Paper, Abril.
_____ (1997): "Passing the Laugh Test: Version 0 of the MobiDK Core Model".
Kehoe, T. (2002): "An Evaluation of the Performance of Applied General Equilibrium Models of the Impact of NAFTA". Federal Reserve Bank of Minneapolis. Research Department Staff Report.
_____ (1994): "Towards a Dynamic General Equilibrium Model of North American Trade" in Modeling Trade Policy: Applied General Equilibrium Assessments of NAFTA edited by Joseph F. Francois, Clinton R. Shiells. Cambridge University Press. PP. 328-347.
Kehoe, T. and Kehoe, P.(1994a): "Capturing NAFTA's Impact With Applied General Equilibrium Models". Federal Reserve Bank of Minneapolis. Quartely Review. Spring, Volume 18, No. 1.
_____ (1994b): "A Primer on Static Applied General Equilibrium Models". Federal Reserve Bank of Minneapolis. Quartely Review. Spring, Volume 18, No. 1.
Kehoe, T. and Serra-Puche, J. (1991): "A General Equilibrium Appraisal of Energy Policy in Mexico". Empec (1991) 16: 71-93.
_____ (1983): "A Computational General Equilibrium Model with Endogenous Unemployment, An Analysis of the 1980 Fiscal Reform in Mexico". Journal of Public Economics 22, pp.1-26, North-Holland
Kehoe, T. and et. al. (1988): "A General Equilibrium Analysis of the Indirect Tax Reform in Spain". El Colegio de México. Documento de Trabajo No. XI-1988.
Kehoe, T. and Walley, J. (1985): "Uniqueness of Equilibrium in Large-Scale Numerical General Equilibrium Models". Journal of Public Economics 28, p.247-254.
Kehoe, T, Serra Puche, J; and Solis, L. (1982): "A General Equilibrium Modelo of Domestic Commerce in Mexico". El Colegio de México. Documento de Trabajo, No. 1982-IV.
Kouparitsas, M. (1998): "Dynamic Trade Liberalization Analysis: Steady State, Transitional and Interindustry Effects". Federal Reserve Bank of Chicago. Working Papers Series WP98-15. December.
_____(…) "A Dynamic Analysis of NAFTA". Federal Reserve Bank of Chicago. Economic Perspectives.

_____(1999): “Why Do Countries Pursue Bilateral Trade Agreements? A Case Study of North American”. Federal Reserve Bank of Chicago. Working Papers Series WP97-20. February.

Llop, M. (2001): “Un Análisis de Equilibrio General de la Economía Catalana”. Tesis Doctoral. Universitat Rovira I Virgili.

López de Silanes, F.; Markusen, R.; and Rutherford, T. (1994) **:** "The Auto Industry and the North American Free Trade Agreement" in Modeling Trade Policy: Applied General Equilibrium Assessments of NAFTA edited by Joseph F. Francois, Clinton R. Shiells. Cambridge University Press. PP. 223-249.

Noyola, P. (1985): "Urban Migration in Mexico: A General Equilibrium Analysis”. Tesis de Doctorado. Stanford University, 1985.

O'Ryan, R. and et.al. (): "Ensayo sobre Equilibrio General Computable: Teoría y Aplicaciones". Documento de Trabajo. Universidad de Chile.

Roland-Holst D., Reinert, K. and Shiells, C. (1994): “A General Equilibrium Analysis of North American Economic Integration” in Modeling Trade Policy: Applied General Equilibrium Assessments of NAFTA edited by Joseph F. Francois, Clinton R. Shiells. Cambridge University Press. PP. 47-82.

Roland-Holst, D. (1991): "Estimaciones de Equilibrio General de los Efectos de la Eliminación Bilateral de tarifas entre México y Estados Unidos". Cuadernos Económicos de I.C.E. No.48, 1991/2.

SECOFI (1994): "Fracciones Arancelarias y Plazos de Desgravación”. Tratado de Libre Comercio de América del Norte. México: Miguel Ángel Porrúa.

Serra-Puche, J. (1979): "Un Modelo de Equilibrio General para la Economía Mexicana: Un Análisis de Políticas Fiscales". Tesis de Doctorado. Universidad de Yale.

SHCP (2002): "Balance Fiscal en México. Definición y Metodología".

Shoven, J. and Walley, J. (1973): "A General Equilibrium with Taxes: A Computational Procedure and an Existence Proff". Review of Economics Studies, 40, pp 475-495.

Sobarzo, H. (1994a): “The Gains for Mexico from a North American Free Trade Agreement-An Applied General Equilibrium Assessment” in Modeling Trade Policy: Applied General Equilibrium Assessments of NAFTA edited by Joseph F. Francois, Clinton R. Shiells. Cambridge University Press. PP. 83-99

_____ (1994b): "Interactions between Trade and Tax Reform in Mexico: Some General Equilibrium Results". Colegio de México. Documento de Trabajo, Núm. III-1994.

_____ (1992): “A General Equilibrium Analysis of the Gains from Trade for the Mexican Economy of a North American Free Trade Agreement”. The World Economy 15, pp. 83-100.

_____ (…): "A Consolidated Social Accounting Matrix for Input-Output Analysis". Colegio de México. Capítulo de Tesis Doctoral.

Trela, I. and Whalley, J. (1994): "Trade Liberalization in Quota-Restricted Items: The United States and Mexico in Textiles and Steel" in Modeling Trade Policy: Applied General Equilibrium Assessments of NAFTA edited by Joseph F. Francois, Clinton R. Shiells. Cambridge University Press. PP. 256-298.

Young, L. and Romero, J. (1994): “A Dynamic Dual Model of North American Free Trade Agreement” in Modeling Trade Policy: Applied General Equilibrium Assessments of NAFTA edited by Joseph F. Francois, Clinton R. Shiells. Cambridge University Press. PP. 301-327.

Zarazaga, C. (1999): "Measuring the Benefits of Unilateral Trade Liberalization Part 1: Static Models". Reserve Bank of Dallas. Third Quarter, 1999.

Appendix 1. Model´s Equations

a) Production Functions

(1) $$Q_j = \beta_j Y_j^{b_j} M_j^{1-b_j}$$

(2) $$Y_j = Min\left\{\frac{x_{ij}}{a_{ij}},...,\frac{x_{9j}}{a_{9j}},\frac{VA_j}{v_j}\right\}$$

(3) $$VA_j = A_j K_j^{\alpha_j} L_j^{1-\alpha_j}$$

b) Domestic and Import Production Demands

(4) $$Yj = \frac{Q_j}{\beta_j}\left[\frac{b_j}{1-b_j}\frac{P_{m_j}(1+T_{a_j})}{P_j}\right]^{1-b_j}$$

(5) $$M_j = \frac{Q_j}{\beta_j}\left[\frac{b_j}{1-b_j}\frac{P_{m_j}(1+T_{a_j})}{P_j}\right]^{-b_j}$$

c) Intermediate Inputs, Value Added and Production Factors Demands

(6) $$x_{ij} = a_{ij} * Y_j$$

(7) $$VA_j = v_j * Y_j$$

(8) $$L_j = \frac{VA_j}{A_j}\left[\frac{\alpha_j}{1-\alpha_j}\frac{w(1+T_{CSS})}{r}\right]^{-\alpha_j}$$

(9) $$\mathrm{K}_j = \frac{VA_j}{A_j}\left[\frac{\alpha_j}{1-\alpha_j}\frac{w(1+T_{CSS})}{r}\right]^{(1-\alpha_j)}$$

d) Prices

(10) $$P_{Vj} = A_j^{-1}\alpha_j^{-\alpha_j}(1-\alpha_j)^{-(1-\alpha_j)}\left[w(1+T_{CSS})\right]^{(1-\alpha_j)} r^{\alpha_j}$$

(11) $$P_j = \left(\sum_{i=1}^{9} P_i a_{ij} + P_{Vj} v_j\right)(1+T_{pj})$$

(12) $$P_{Pj} = \beta_j^{-1} b_j^{-b_j}(1-b_j)^{-(1-b_j)} P_j^{b_j}\left[P_{mj}(1+T_{aj})\right]^{(1-b_j)}$$

(13) $$P_{Qj} = (1+T_{IVA})P_{Pj}$$

e) Consumption and Saving Demands

(14) $$ING = wL_O + rK_O + TNSEP + TGP + INTNSEP + INTGP + WNSEP$$

(15) $$ca = \frac{\delta(1-tr)ING}{P_Q}$$

(16) $$sh = \frac{(1-\delta)(1-tr)ING}{P_I}$$

(17) $$c_i = \frac{\Phi_i \delta (1-tr)ING}{P_{Qi}}$$

f) Production Factors Markets

(18) $$L_d = L_e + \overline{L}_g$$

$$\mathrm{K}_d = K_e + \overline{K}_g$$

(19) $$\mathrm{L}_e = \sum_{j=1}^{9} L_j$$

$$K_e = \sum_{j=1}^{9} K_j$$

g) Government

(20) $$\Gamma = \frac{C_g}{I_g}$$

(21) $$INGG = RTA + RTR + RTP + RTCCS + BEP$$

(22) $$RTA = \sum_{j=1}^{9} T_{aj} P_{mj} M_j$$

(23) $$RTR = trING$$

(24) $$RTP = \sum_{j=1}^{9} T_{pj} \frac{P_j Y_j}{(1+T_{pj})}$$

(25) $$RTIVA = T_{IVA} \sum_{i=1}^{9} P_{Pi} C_i$$

(26) $$RTCSS = T_{CSS} wL_O$$

(27) $$GG = \sum_{i=1}^{9} P_{Pi} CG_i + IPC * TGP + INTGP + INTGSE + (1+T_{CSS}) w_g L_g + rK_g + TPG$$

(28) $$\mathrm{dg} = sg - I_g$$

h) Aggregated Capital Account

(29) $$I_O = sh + \left(\frac{sg}{P_I}\right) + \left(\frac{CC}{P_I}\right)$$

(30) $$I_D = \left\{\frac{I_1}{f_1}, \ldots \frac{I_i}{f_i}, \ldots \frac{I_9}{f_9}\right\}$$

i) Foreign Sector

$$(31) \qquad X_i = X_{0i}\left(\frac{P_{Wi}}{P_{Pi}}\right)^{\theta i}$$

$$(32) \qquad CC = \sum_{i=1}^{9} P_{mi}M_i - \sum_{i=1}^{9} P_{Pi}X_i - TNSEP - INTSEP - WNSEP$$

Q_j = Total Production of sector j

Y_j = Domestic Production of sector j

M_j =Imports of sector j

X_{ij} = intermediate inputs from sector i and utilized by sector j.

VA_j = value added of sector j.

L_j = labor utilized by sector j.

K_j = capital utilized by sector j.

P_{mj} = Import price of sector j

P_j =internal price of sector j

Ta_j = tariff applies to sector j

a_{ij} = production from sector i needed to produce a unit of the sector j.

v_j= value added to total domestic production of sector j.

w = wage

r =capital rent

Tcss = social security contributions (rate)

P_{Vj} = price of value added of sector j

T_{pj} = effective production tax – import tax – production subsidies

P_{pj} = price to producer of sector j

P_{Qj} = price to final consumer

T_{IVA} = value added tax (effective)

L_O = Labor supply

K_O = Capital supply

TNSEP = Net transfers from foreign sector to families

TGP = governmental transfers to families

INTNSEP = net interest paid by foreign sector to families

INTGP = net interest paid by government to families

WNSEP = wages of people working abroad

ca= aggregated consumption

sh = aggregated private saving

tr = income tax

ING = personal income

P_Q = Laspeyres consumer price index

P_I = Laspeyres investor price index

Φ_i = consumption of sector i to total consumption

L_g = labor used by government (fixed)

K_g = capital used by government (fixed)

L_e = labor used by production sectors

K_e = capital used by production sectors

C_g = total public consumption

CG_i = public current consumption from sector i.

I_g = public investment

RTA = Tariff tax collection

RTR = income tax collection

RTP = production tax collection (production tax – production subsidies)

RTCCS = social security contributions collection

BEP = public enterprises gains

INTGSE = interest paid by government to foreign sector

GG = public expenditure

sg = gross public saving

dg = public deficit or surplus

I_0 = Investment supply

I_D = Investment demand

CC = Current account

I_i = production of sector i destined to invest.

f_i = part of the total investment demanded by sector i.

Xoi = market portion owned by sector i

Pwi = international price of sector i

θ_i = price elasticity of exporting demand of sector i

Appendix 2 Labor and Capital Intensive Manufacture Classification

Labor Intensive	Capital Intensive
Food, Drinks and Tobacco 11 Meat and Dairy products 12 Packing of Fruits and Vegetables 13 Grinding of Wheat and Products 14 Grinding of Corn 15 Processing of Coffee 16 Sugar and its products 17 Vegetable Edible Oils and Grasses 18 Food for animals 19 Other Nutritional Products	Foods, Drinks and Tobacco 20 Alcoholic Beverages 21 Beer 22 Soft Drinks 23 Tobacco and its products
Textile Industry 25 Threads and Fabrics of Hard Fibers 26 Other Textile Industries 27 Articles of Clothing 28 Leather and its products	Textile Industry 24 Threads and Fabrics of Bland Fibers
Wood Industry 29 Sawmills	Wood Industry 30 Other Wood Industries
Chemical Industry 42 Articles of Plastic	Chemical Industry 33 Refinement of Petroleum 34 Basic Petrochemistry 35 Basic Chemistry 36 Fertilizers 37 Synthetic Resins and Artificial Fibers 38 Medical products 39 Soaps, Detergents, Perfumes and Cosmetics 40 Other Chemical industries 41 Rubber Products
Metallic Products, Machinery and Equipment 49 Structural and Metallic Products 51 Non Electric Machinery and Equipment 52 Electric Machinery and Devices 53 Electro-Domestic devices 54 Electronic equipments and accessories 55 Other electric equipments and devices 56 Automobiles 57 Body and Auto parts 58 Other equipments and materials of Transport	Metallic Products, Machinery and Equipment 48 Metallic Accessories 50 Other Metallic Products
Other Manufacturing Industries (59)	
	Industry of Paper 31 Paper and Cardboard 32 Printing and Publishing
	Products of Non Metallic Minerals 43 Glass and its products 44 Cement 45 Other Products of Non Metallic Minerals
	Basic Metallic Industries 46 Basic Industries of Iron and steel 47 Basic Industries if Non Ferrous Metals

Source: It was elaborated based on Chapa (2003). Chapter 3.

Appendix 3 Results of Simulation 1: Unilateral Trade Liberalization in 1993

Percentage Change

At sector level

Sectors	DI	CP	I	X	Q	PD	M	L	K	PY	PQ
Grains	0.65	0.23	-4.28	2.79	0.48	0.15	2.42	0.39	0.09	-0.96	-1.29
OAP	0.48	0.02	-4.28	3.88	0.50	0.20	5.56	0.48	0.18	-0.93	-1.23
Livestock	0.78	-0.06	-4.28	3.31	0.59	0.55	2.96	0.78	0.48	-0.97	-1.01
Forestry-Fishing	0.44	-0.02	-4.28	2.29	0.27	0.23	1.19	0.46	0.16	-0.98	-1.02
Mining	-1.42	0.01	-4.28	2.34	-0.72	-0.78	0.84	-0.56	-0.86	-0.98	-1.04
LIM	0.25	2.32	-4.28	21.54	3.07	0.79	8.73	1.00	0.70	-0.99	-3.17
CIM	-1.07	0.71	-4.28	5.37	-0.12	-0.80	3.12	-0.59	-0.89	-0.99	-1.66
Construction	0.00	0.00	-4.28	0.00	-4.28	-4.28	0.00	-4.16	-4.45	-1.03	-1.03
Services	-0.46	0.02	-4.28	3.43	-0.13	-0.18	3.29	0.04	-0.26	-0.98	-1.04

Aggregate Variables

Wage (W)	-1.20	**Intermediate Demand (DI)**	-0.44
Real Wage	0.35	**Private Consumption (CP)**	0.56
Nominal Capital Rent	-0.90	**Investment (I)**	-4.28
Real Capital Rent (R)	0.65	**Exports (X)**	11.14
CPI	-1.54	**Total Production (Q)**	0.29
W/R	-0.30	**Domestic Production (PD)**	-0.38
Private Saving (Sh)	0.78	**Imports (M)**	6.46
Public Saving (Sg)	-28.08		

Source: Chapa (2003)

Note: OAP = Other Agricultural products, LIM =Labor intensive manufacture, CIM = capital intensive manufacture.

Appendix 4 Percentage Distribution of the Assembly and Non Assembly Exports, 1993-99

Year	Grains	OAP	Livestock	Forestry-Fishing	Mining	LIM	CIM	Services
1993	0.02	4.14	1.09	0.93	19.05	55.71	18.34	0.72
1994	0.04	3.72	0.74	0.86	16.71	59.40	17.81	0.71
1995	0.13	3.73	0.85	0.98	13.02	59.75	21.05	0.51
1996	0.06	3.37	0.19	0.86	12.69	64.58	17.76	0.49
1997	0.12	2.94	0.24	0.77	12.64	65.72	17.17	0.41
1998	0.07	3.18	0.24	0.64	11.61	67.58	16.19	0.49
1999	0.06	3.04	0.32	0.61	9.66	70.62	15.12	0.57

Source: It was elaborated based on data from Secretaria de Economia and INEGI.

Note: Exports are non assembly exports + assembly´s trade balance, therefore, temporal imports were not taken into account. LIM = Labor Intensive manufacture CIM = Capital Intensive Manufacture

Appendix 5. Real Exports Growth Rate, 1993-1999.

Percentage

Year	Grains	OAP	Livestock	Forestry-Fishing	Mining	LIM	CIM	Services
1994	192.92	1.66	-23.12	4.67	-0.78	20.62	9.88	11.86
1995	1226.39	35.82	17.33	58.19	3.07	61.83	73.18	6.91
1996	566.55	46.76	-68.97	67.31	20.21	109.17	74.69	24.15
1997	1441.78	41.09	-55.94	64.04	31.76	134.37	86.01	13.10
1998	945.60	64.28	-52.86	46.59	30.33	159.53	88.92	44.85
1999	826.36	72.74	-31.86	53.35	19.24	198.08	93.89	86.31

Source: It was elaborated based on data from Secretaria de Economia and INEGI.
Note: Exports are non assembly exports + assembly´s trade balance, therefore, temporal imports were not taken into account. LIM = Labor Intensive manufacture CIM = Capital Intensive Manufacture

Appendix 6 GNP Growth 1993-1999.

Percentage

Year	Agriculture and Livestock	Mining	LIM	CIM	Services
1994	0.92	2.54	4.24	3.78	8.43
1995	1.79	-0.21	-1.36	-0.56	-17.01
1996	5.42	7.88	11.06	7.21	-8.90
1997	5.62	12.70	23.30	15.80	-0.45
1998	6.46	15.79	33.69	22.08	3.76
1999	10.31	13.37	40.77	24.72	8.94

Source: It was elaborated based on data from Secretaria de Economia and INEGI.
Note: LIM = Labor Intensive manufacture CIM = Capital Intensive Manufacture

Appendix 7 Percentage Distribution of Non Assembly Imports, 1993-1999.

Year	Grains	OAP	Livestock	Forestry-Fishing	Mining	LIM	CIM	Services
1993	2.49	1.15	0.44	0.24	0.59	69.18	25.59	0.31
1994	2.73	1.21	0.48	0.25	0.55	69.24	25.27	0.27
1995	3.09	1.13	0.25	0.31	1.01	66.52	27.30	0.38
1996	4.36	1.03	0.30	0.24	0.91	66.51	26.41	0.24
1997	2.85	0.97	0.46	0.24	0.84	67.76	25.98	0.91
1998	3.04	1.09	0.41	0.21	0.70	68.54	25.76	0.25
1999	3.00	1.21	0.38	0.20	0.61	69.78	24.60	0.22

Source: It was elaborated based on data from Secretaria de Economia and INEGI.
Note: LIM = Labor Intensive manufacture CIM = Capital Intensive Manufacture

Appendix 8 Growth Rate of Non Assembly Imports, 1993-1999.

Percentage

Year	Grains	OAP	Livestock	Forestry-Fishing	Mining	LIM	CIM	Services
1994	32.48	27.05	29.28	21.32	13.28	20.72	19.09	4.31
1995	9.28	-13.58	-50.10	12.49	51.58	-15.58	-6.34	6.19
1996	93.06	-1.15	-25.06	7.26	70.41	5.78	13.57	-16.08
1997	60.21	17.54	45.25	34.58	99.63	36.84	41.83	302.30
1998	96.78	52.36	48.80	38.43	93.18	59.59	62.12	27.17
1999	115.00	86.14	51.28	43.83	85.35	79.49	71.08	25.41

Source: It was elaborated based on data from Secretaria de Economia and INEGI.
Note: LIM = Labor Intensive manufacture CIM = Capital Intensive Manufacture

Appendix 9 Effects of Simulation 2: National Livestock Production substituted by Imports.
Percentage Change

At Sector level

Sectors	DI	CP	I	X	Q	PD	M	L	K	PY	PQ
Grains	-19.53	-1.01	-3.45	19.37	-10.81	-9.95	-15.64	-10.35	-9.85	-9.28	-8.40
OAP	-24.27	-0.38	-3.45	33.37	-4.66	-4.46	-7.87	-4.94	-4.42	-9.31	-9.12
Livestock	7.89	-6.25	-3.45	-100.0	-0.28	-100.0	6179.8	-100.0	-100.0	0.00	-3.29
Forestry-Fishing	7.34	-0.43	-3.45	20.79	4.21	4.54	-3.22	4.11	4.69	-9.20	-8.91
Mining	1.57	-0.38	-3.45	20.91	5.38	5.68	-1.52	5.24	5.83	-9.21	-8.96
LIM	2.16	-1.11	-3.45	67.19	8.64	8.63	8.67	8.22	8.82	-8.17	-8.18
CIM	0.13	-0.88	-3.45	30.48	2.13	2.99	-1.81	2.59	3.16	-9.19	-8.42
Construction	0.00	0.00	-3.45	0.00	-3.45	-3.45	0.00	-3.67	-3.13	-9.13	-9.13
Services	0.08	-0.14	-3.45	33.72	1.30	1.39	-3.83	0.99	1.54	-9.23	-9.16

Aggregated Variables

Wage (W)	-8.90	**Intermediate Demand (DI)**	-0.20
Real Wage	-0.11	**Private Consumption (CP)**	-0.51
Nominal Capital Rent	-9.40	**Investment (I)**	-3.45
Real Capital Rent (R)	-0.66	**Exports (X)**	44.63
CPI	-8.80	**Total Production (Q)**	2.34
W/R	0.55	**Domestic Production (PD)**	0.03
Private Saving (Sh)	-0.55	**Imports (M)**	23.44
Public Saving (Sg)	-36.45		

Source: Chapa (2003)
Note: OAP= Other agricultural products, LIM=Labor intensive manufacture, CIM= Capital intensive manufacture.

Appendix 10 Effects of Simulation 3: Subsidy to National Grains Producers

Percentage Change

At sector level

Sectors	DI	CP	I	X	Q	PD	M	L	K	PY	PQ
Grains	1.04	5.80	-4.80	14.04	3.27	3.86	-0.06	4.37	3.74	-6.82	-6.28
OAP	0.93	-0.01	-4.80	3.13	0.54	0.22	5.85	0.78	0.17	-0.68	-0.99
Livestock	0.98	0.59	-4.80	4.67	0.94	0.91	2.86	1.37	0.76	-1.41	-1.44
Forestry-Fishing	0.57	0.00	-4.80	1.90	0.33	0.29	1.44	0.74	0.14	-0.78	-0.83
Mining	-1.61	0.02	-4.80	1.94	-0.95	-1.03	0.80	-0.58	-1.18	-0.77	-0.85
LIM	0.35	2.65	-4.80	22.32	3.23	1.00	8.78	1.42	0.80	-1.13	-3.27
CIM	-1.15	0.78	-4.80	4.91	-0.20	-0.91	3.18	-0.49	-1.09	-0.81	-1.52
Construction	0.00	0.00	-4.80	0.00	-4.80	-4.80	0.00	-4.57	-5.15	-0.88	-0.88
Services	-0.47	0.03	-4.80	2.80	-0.17	-0.23	3.45	0.21	-0.40	-0.78	-0.83

Aggregate Variables

Wage (W)	-1.20	**Intermediate Demand (DI)**	-0.42
Real Wage	0.30	**Private Consumption (CP)**	0.74
Nominal Capital Rent	-0.60	**Investment (I)**	-4.80
Real Capital Rent (R)	0.91	**Exports (X)**	11.14
CPI	-1.50	**Total Production (Q)**	0.30
W/R	-0.60	**Domestic Production (PD)**	-0.37
Private Saving (Sh)	0.92	**Imports (M)**	6.53
Public Saving (Sg)	-30.82	**Subsidy**	5.9

Source: Chapa (2003)

Note: OAP= Other agricultural products, LIM=Labor intensive manufacture, CIM= Capital intensive manufacture.

Appendix 11 Effects of Simulation 4: National Grains Production substituted by Imports

Percentage Change

At sector level

Sectors	DI	CP	I	X	Q	PD	M	L	K	PY	PQ
Grains	1.74	-3.51	-3.41	-100.00	-0.77	-100.00	571.15	-100.00	-100.00	0.00	-3.16
OAP	-2.24	-0.20	-3.41	22.49	1.39	1.43	0.80	1.03	1.47	-6.54	-6.51
Livestock	6.99	-0.86	-3.41	19.71	5.34	5.39	2.66	5.05	5.50	-5.79	-5.75
Forestry-Fishing	5.91	-0.26	-3.41	14.12	3.34	3.54	-1.27	3.21	3.65	-6.47	-6.29
Mining	0.95	-0.22	-3.41	14.21	3.55	3.72	-0.44	3.38	3.83	-6.48	-6.32
LIM	4.90	0.32	-3.41	52.11	7.78	7.06	9.52	6.75	7.21	-6.10	-6.72
CIM	0.36	-0.33	-3.41	21.22	1.66	1.98	0.16	1.67	2.11	-6.45	-6.15
Construction	0.00	0.00	-3.41	-3.58	-3.41	-3.41	0.00	-3.58	-3.16	-6.40	-6.40
Services	0.64	-0.07	-3.41	22.42	1.03	1.07	-1.23	0.75	1.19	-6.48	-6.44

Aggregate Variables

Wage (W)	-6.20	**Intermediate Demand (DI)**	1.45
Real Wage	0.22	**Private Consumption (CP)**	-0.09
Nominal Capital Rent	-6.60	**Investment (I)**	-3.41
Real Capital Rent (R)	-0.21	**Exports (X)**	33.88
CPI	-6.41	**Total Production (Q)**	2.32
W/R	0.43	**Domestic Production (PD)**	0.57
Private Saving (Sh)	0.00	**Imports (M)**	18.38
Public Saving (Sg)	-32.58		

Source: Chapa (2003)

Note: OAP= Other agricultural products, LIM=Labor intensive manufacture, CIM= Capital intensive manufacture.