# NICARAGUA: STRUCTURAL ADJUSTMENT POLICY ANALYSIS IN THE NINETIES [1]

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## Abstract

Three of the most relevant aspects of structural adjustment are presented in this paper: exchange policies, tariff policies, and fiscal policies. They are evaluated with a Computable General Equilibrium (CGE) model. The model is used first to assess the exchange rate as the most relevant macroeconomic variable both for inflation control and for the promotion of exports. Secondly, the CGE considers how trade liberalization sustained on Ricardian principles of comparative advantages within a framework of trade integration agreements. Finally, the CGE analyzes public expenditure contraction as a central element in the new role the state has in the economy. The model is based on a Social Accounting Matrix built for 1991, a key year for these transformations.

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## I. Introduction

The beginning of the nineties brought major changes in Nicaragua's economic structure, and even more in its citizens' perception of their country's future. The government encouraged reforms that affected structures built during the 1980s. The new vision of development incorporated an "outward integration" founded on a sustained growth of exports, a reduction in the state's participation in the economy, the promotion of the private sector as the main investor, the privatization of public companies, the dismantling of protectionism, and trade liberalization against a backdrop of price, monetary and fiscal stability, within a regional economic integration framework.

Three of the most relevant aspects of adjustment are presented in this paper: exchange policies, tariff policies, and fiscal policies. They are evaluated with a Computable General Equilibrium (CGE) model. The model is used first to access the exchange rate as the most relevant macroeconomic variable both for inflation control and for the promotion of exports. Secondly, the CGE considers how trade liberalization sustained on Ricardian principles that make use of the comparative advantages within a framework of trade integration agreements. Finally, the CGE analyzes public expenditure contraction as a central element in the new role the state has in the economy. The model is based on a Social Accounting Matrix (SAM) built for 1991, a key year for these transformations.

We analyze the effects of devaluing the exchange rate by 5%, 10%, and 15% under different investment scenarios and different savings rates for the corporate sector, in the backdrop of fiscal discipline that characterized the behavior of public finances those years.

Then, we look into different tariff lowering scenarios analyzing the impact of 20%, 40%, 60%, 80% reduction, and a total import tax elimination.[2] Tariff liberalization is simulated under different scenarios of government income policies, with controlled exchange rates, foreign savings flows, corporate taxes and investment behavior. We achieve a very rich, if not exhaustive, panorama approached from different angles. Finally, the results of a 5%, 10%, 15%, 20%, and 25% reduction in public spending under differentiated investment and foreign balance scenarios are studied. In all simulations the effect on prices, production, and sectoral employment, trade, income distribution, and macroeconomic variables are considered. The paper consists of 5 parts. In Section 2 we will briefly describe the economic structure of Nicaragua and relevant aspects of adjustment policies. Section 3 briefly describes the SAM. Section 4 describes chief aspects of the Nicaraguan economic structure based on SAM data. Section 5 analyzes the simulations and their results. Finally, in Section 6 contain some conclusions.

[2]In Nicaragua, export tariffs are virtually non-existent.

## II. Basic aspects of structural reforms

### *2.1. Before the 1980s*

In 1951, five countries - Nicaragua, Guatemala, El Salvador, Honduras, and Costa Rica - constituted a Central American economic cooperation committee with the purpose of achieving political and economic integration in the region. This led in 1963, to creation of the Central American Common Market (CACM). At that time, Nicaragua was an essentially agricultural country exporting primary products, with an industrial sector amounting to only 15% of the Gross Domestic Product (GDP). An "import substitution" or "inward growth" strategy sought to develop a domestic industrial capacity and to affect the harmful effects of the deteriorating terms of trade in the post-war era. The most important strategies were inter-regional trade liberalization, a common foreign tariff and as incentives for integration industries under fixed exchange rates. A common tariff was applied on imports from third countries including specific tariffs as very high *ad valorem* rates for consumer goods and lower rates for intermediate and capital goods.[3]

Inter-regional trade rapidly grew. Exports for the region attained a peak of U.S. $1.129 billion in 1980. Nicaraguan exports were the internal growth engine for the 1950 through 1978[4] period. However, more than two thirds of the exports consisted of primary products. Besides, expansion led to a dual economy with a small, relatively modern, exporting sub-sector and a large traditional technologically obsolete agricultural sector. Nicaragua was a small country with a high degree of protectionism and a fixed exchange rate of 7 *Córdobas* for 1 dollar.

It can be argued that, at least for Nicaragua's case, the CACM as an industrializing process, failed. Final goods, previously imported, were now internally produced in assembly plans, whereas intermediate and capital goods were increasingly imported. This put pressure on the external account.[5] We can say that instead of import substitution a change in import composition took place.[6]

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[3]In Nicaragua the non-weighted, *ad valorem* tariff was an average of 54.4%.

[4]Their value rose from U.S.$45 million in 1955 to around U.S$600 million by he end of the seventies.

[5]Imports reached U.S.$700 million by the end of this period. The combination of the political crises of the early eighties along with low international prices for exportable goods, over-valued currencies and problems with foreign debt, led to imposition of trade barriers

*2.2. The 1980s*

During the 1980s, the *Sandinista* government radically changed the country's economic orientation. The state nationalized domestic trade, foreign trade, and the financial system and created state corporations that were "the people's property". As a result, state participation in the economy, by 1989, was 22.3% in the primary sector, 40.2%in the secondary sector, and 44% in the tertiary sector, contrasting within the 0%, 10%, and 42.7%, respectively in 1978. Agrarian reform involved a third of the land, it democratized property and fostered collectivization of agriculture. The strategy turned into an agroindustrial integration plan, with huge development projects sponsored by the government.

The manufacturing industry produced mainly for the local market and there was little capital investment. Credit was cheap and readily available. Therefore, corporations had a "soft budgetary restriction" (Kornai, 1979). However, the secondary sector of the economy lost competitiveness in responding to the internal demands of the armed conflict. Nicaraguan industry, under these circumstances and with obsolete equipment and strong restrictions on production, lost its marketing and technological edge. Thus, the economy emerged in the 1990s in crisis.

Taken together, armed conflict, the American trade and financial embargo and natural disasters prevented implementation of a development strategy. Hyperinflationary occurred with acute fiscal and foreign unbalances. The fiscal deficit reached 28% of the GDP on the inside of a vicious inflation-devaluation-inflation circle.

*2.3. The 1990s*

In 1988, the *Sandinista* government began putting adjustment measures into effect. The administration of Violeta Chamorro after 1990 strengthened these. Hyperinflation[7] stopped under the combined influences of a fixed exchange rate, monetary, and fiscal discipline. Foreign funds now financed the monetary and fiscal deficits; domestic credit contracted.

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and bilateral agreements to replace the regional agreement. Hence, inter-regional exports plummeted to a little more than U.S.$400 million in 1986.

[6]During the 1960s and the 1970s, Nicaraguan imports of consumer goods went from 38.3% of total imports to 24.9%, and their place was occupied by intermediate and capital goods imports.

[7]Inflation had surpassed 50% a month on the last year.

With hyperinflation controlled, the conditions were in place for the new growth strategy, a practice common to Central American countries: an "outward integration" process based on promoting exports, dismantling protectionism,[8] opening trade, and reducing the state's role in the economy. A simultaneous process of privatization of state corporations[9], lowering of tariffs, trade liberalization and private investment promotion were started, all within a structure of price, monetary and fiscal stability and inside a framework of regional integration. A brief summary of the trade, tariff and fiscal policies follows.

### *2.3.1. Trade policy*

Export promotion requires real exchange rate depreciation. Through fixing the nominal exchange rate in 1991 was a decisive move that helped stop the price rise, it resulted in overvaluation that hindered export growth. Therefore, in January 1993 a policy of gradual depreciation of the exchange rate at a rate above the inflation rate was adopted. This real devaluation promoted the export drive between 1994 and 1996. To avoid the devaluation-inflation-devaluation vicious circle, structural fiscal adjustment, monetary and credit contraction and a measurable amount of foreign resources were required to support this process. Further, trade liberalization abolished export and import licensing and the requirement to sell foreign currency to the Bank Central. Finally, the trade discussions with Central America, Mexico, Peru, and Ecuador continued and Nicaragua joined the World Trade Organization (WTO) in 1995.

### *2.3.2. Tariff policy*

In 1986, only *ad valorem* tariffs were left, reducing the nominal rate and in a range from 1% to less than 100%. A more significant change occurred in 1990, when the average nominal rate fell from 43.2%to 15.2% in 1991 to 14.8% in 1992. Against the backdrop of fixed exchange rates, the immediate impact was to increase imports, worsen the trade balance, and impact local production.
On March 1st., 1993, the Central American Tariff System (CATS) came into effect. This increased slightly the nominal rate to an average of 18.3%. Rate dispersion was lower than in 1986, correcting a structure highly protectionist of final good industries. This process

[8]The new "outward" development strategy dismantled the CACM protectionist system of the 1960s, reducing tariff dispersion as well as the greater protection enjoyed by final goods.

[9]In 1990 there were 351 state corporations. By the end of 1993, 270 had been privatized and 38 had been liquidated.

continued selectively during 1994 through 1996, when tariffs were eliminated on many raw materials and the maximum rate lowered for many products. The 1994 agreement with the IMF Enhanced Structural Adjustment Facility (ESAF) anticipated a tariff ceiling of 35% in 1996 and 32% in 1997.

*2.3.3. Fiscal policy*

State presence in the economy was drastically reduced. The privatization of state corporations reduced state employment by more than 65%, but contributed to rising unemployment from 11.1% in 1990 to 21.8% in 1993. If underemployment is included the rate went from 39.4% to 60% with 70% of the populations living in destitute conditions (ECLA, 1993).

The fiscal deficit was financed exclusively through foreign resources, though after 1995, domestic bonds (Tributary Bond Certificates) that financed up to 15% of this deficit were issued.

Along with the reduction of current expenses, fall in social expenditures[10]and in public investment (that fell from 20% of the GDP during the eighties to 8% in the 1991 through 1993 period) took place. What public investment occurred was fully funded by foreign resources.

The ESAF agreement contemplates a greater promotion of public savings, a greater reduction in employment and service privatization.

Although it is too soon to evaluate the new "outwards oriented" strategy, there have been several positive signs. The real GDP, after a number of years with negative growth[11], expanded by more than an average 4% between 1994 through 1996. The value of exports increased by more than 40% in 1995 and 20.6% in 1996, including an upsurge in fishing, and nontraditional exports as well as in tourism. Forty percent of total exports were directed towards the U.S., 25% to the European Economic Community, and 25% to the Central America (destiny of nontraditional products). Though imports also grew (they

[10]Social expense has increased as a proportion of total expense. However, given the reduction of the latter, the expense on health per capita was reduced from U.S.$25 in 1990 to U.S.$12.5 in 1996, and education went from U.S.$26 to U.S.$23.5 in those years respectively (FIDEG, 1997).

[11]The GDP decreased by an average of 0.2% between 1990 to 1993.

represented 55.6% of the GDP in 1996), the trade deficit as a proportion of the GDP was reduced from 29.8% to 24.1% between 1991 and 1996.

Much of this growth, however, was sustained by foreign resources. Nicaragua between 1990 to 1994 was among the highest recipients of international aid. Excluding the payment of foreign debt service and the overdue amount owed to the World Bank and the Intern-American Development Bank (IDB), the aid added up to $2.64 billion USD (Avendaño, 1994). The problem is that with a decrease in this aid, further advance will depend on domestic economic policies. Hence the importance of analyzing these policies under different frameworks.

## III. The SAM of 1991 (see Appendix 1)

The basic information for building the SAM for Nicaragua is the input-output matrix built by the *Secretaría de Planificación y Presupuesto de la República* (SPP) (Planning and Budget Office of the Republic), *Dirección de Cuentas Nacionales* (National Accounts Administration), 1986. Based on this matrix, the "MOCECA: *Modelo de coherencia económica del Istmo Centroamericano*" (Economic Coherence Model for the Central American Isthmus) (PFSA - CADESCA - CCE, Panama, 1992) was built. Afterwards, Patrick Dumazert updated the 1986 MOCECA to 1991 and called it "*Modèle MOCECA et Fenêtre Agricole"*, CADESCA-IRAM (1993). However, this latter paper has the disadvantage of not coinciding with the National Account totals reported by Nicaragua's Banco Central. So, for the inside consistency of the matrix we took as reference the totals published in the Annual Report (*Informe Anual*), Banco Central de Nicaragua, years 1991 and 1992 (where the revised data for 1991 already appear), as well as the *"Indicadores de Actividad Económica"* (Economic Activity Indicators), Banco Central de Nicaragua (1993).

For foreign remittances, the source was *"Remesas y economía familiar en El Salvador, Guatemala y Nicaragua"* (Remittances and Household Economy in El Salvador, Guatemala, and Nicaragua), CEPAL (ECLA), LC/MEX/l.154, (1991).

Finally, the information on the Balance of Payments comes from the Banco Central. Information on Public Finances comes from the Finance Ministry and import tariff information came from Customs.

The Input-Output Matrix of 1986 had 73 sectors that are grouped into 12. There were two aggregation criteria. The first one takes into consideration foreign trade participation, as in the case of Agriculture for Exportation, Other Agricultural Products (that include nontraditional agricultural exports), Fishing, Agroindustry, Manufacturing Industries, Mining, and Other Services (that include tourism, transportation, and telecommunications). The second criterion was to aggregate sectors according to their importance in the GDP and

in national economy. They are the cases of Basic Grains, Stock-Raising, Construction, Trade, and Government Services (basically, health and education).[12]

The year 1991 was selected for the construction of the SAM. We decided not to select 1990 because it was a completely atypical year for the country and for the information, as we were told by the authorities of Nicaragua's Banco Central. To select 1991, we took into account the fact that we were at the beginning of a structural adjustment process. Besides, this year witnessed the re-establishment of relative prices, hyperinflation came to a halt due to a fixed exchange rate, the realest reduction in import tariffs was implemented and the strongest contraction of public spending in all the adjustment period was carried out.
It is important to note that we did not obtain information that was more disaggregated than that published in the sources shown in Section 2.1, which is why the disaggregated figures were apportioned with the National Accounts totals.

From Public Finances, we obtained the disaggregation between Indirect Taxes: GVT (General Value Tax) and CST (Consumption Selective Tax).

Concerning import taxes, only the total is reported. We established the ITR (Import Tariff Rights) average rate for different sectors with Customs information. As for the GVT (General Value Tax) for imported products, the rates varied from 18.17% to 33.41% for industrial goods and to 53% for services, but these rates were reported, as was the Consumption Selective Tax, within the GVT and CST totals for activities, that is, for already composite goods.

The division of households into high, intermediate and low follows MOCECA methodology, which also distinguishes them according to their sectoral (agricultural and stock raising, manufacturing, and services) participation. However, in the words of the authors themselves: "it is its weakest side because existing information to sustain it is very scarce and imprecise". A chain of assumptions is made to estimate it, based on rural labor information. in the rural sector, high income households are the owners of large estates, the

[12]It would have been interesting to keep some of the sectors from the Input-Output Matrix separate in the SAM. For example, Agroindustry (sector 6) from the SAM in Basic Agroindustry (sugar, etc.) and Other Agroindustries; Manufacturing (sector 7) in Consumer, Intermediate and Capital Goods Industries; Services from sector 11 in Education and Health and those from sector 12 in Transportation and Communications, Banks and Insurance, Water and Electricity, Housing, and Other Services. This would have resulted in a 20 sector matrix similar to the 1991 MOCECA. We would not work this way while building the SAM due to lack of information from National Accounts, so it was not possible to achieve the inner consistency of this matrix.

intermediate income households are the "rich" farmers, and the low income households belong to poor farmers, the semi-proletarian and the workers. For the urban-industrial sectors, high income households are those of big firm owners, intermediate income households are of small and medium-sized firm owners as well as those of company management, and low income households are made up by workers. Finally, in the service sector, high income households are the managers, intermediate income households are those of the self-employed and cooperativists, and low income households belong to wage-earners.

Regarding the foreign sector, it is very important to highlight the fact that, as in every year since 1990, the weight of donations is very high. For example, in 1991 the International Development Agency donated $844 million, which equal more than half the GDP. However, most of that money was used to settle debts and previous engagements, so 891.7 million *córdobas* (approximately $180 million) were effectively included in the matrix, for this was what entered the government cash flow according to the Finance Ministry.

The data used to estimate remittances were the amounts provided by the ECLA, plus part of the mistakes and omissions from the balance of payments accounts (this was added because some officials from Nicaragua's Banco Central suggested it). Remittances were distributed according to the criteria of the surveys performed (MOCECA, 1991). Income due to foreign investment (equal to 50.5 million *córdobas*, according to balance of payments data) was attributed to high income households. Private donations of 64.4 million were attributed to corporations. Also, interest payments were included in the SAM. Finally, government transfers and company dividend distribution according to MOCECA 1991 criteria were also considered.

## IV. Economic structure and social accounting matrix

Table 1 shows some data of the Nicaraguan economy taken from the SAM. The primary sector represents around 30% of the GDP and it contributes two thirds of total exports (including, sugar and meat which are in the agroindustrial sector). The Agriculture for Export and the Fishing sectors ship most of their production to foreign markets and show a positive balance of trade (The Other Agricultural Products had an exporting boom four years later). Cattle-raising and Basic Grains sell most of their output domestically. One fourth of the basic grain supply is imported. The primary sector is the most important one for a new "outward" development strategy, though it has a pronounced dichotomy with a relatively modern exporting subsector and a traditional and technologically obsolete agriculture.

**Table 1**

**Data on the social accounting matrix of Nicaragua**

| | Imp/Dom. | Exp/Prod | % GDP | Tariff/Imp | % Import | %Export | Exp- |
|---|---|---|---|---|---|---|---|

| | Sales | . | | | | | Imp |
|---|---|---|---|---|---|---|---|
| **Agricultural exports** | 92.2% | 75.3% | 7.5% | 8.0% | 4.5% | 33.4% | 354.28 |
| **Basic grains** | 25.1% | 0.0% | 4.1% | 6.5% | 3.1% | 0.0% | -117.51 |
| **Other agricultural products** | 47.8% | 32.5% | 1.1% | 11.1% | 1.4% | 3.1% | -3.11 |
| **Fishing, forestry, & hunting** | 55.6% | 78.0% | 1.0% | 8.0% | 0.4% | 5.7% | 74.47 |
| **Stockbreeding** | 6.7% | 0.0% | 9.0% | 7.6% | 1.9% | 0.0% | -71.97 |
| **Agroindustry** | 22.9% | 17.0% | 12.6% | 7.7% | 11.2% | 20.3% | -105.50 |
| **Manufactures** | 161.5% | 15.6% | 17.4% | 6.6% | 58.7% | 12.8% | -2021.41 |
| **Construction** | 24.4% | 0.0% | 2.2% | 8.0% | 1.9% | 0.0% | -73.10 |
| **Mining** | 56.0% | 64.9% | 0.5% | 11.4% | 0.4% | 2.9% | 30.62 |
| **Trade** | 5.2% | 0.0% | 23.8% | 8.0% | 2.3% | 0.0% | -88.08 |
| **Government services** | 18.1% | 0.0% | 10.9% | 8.0% | 6.0% | 0.0% | -227.60 |
| **Other services** | 26.8% | 23.2% | 11.8% | 6.6% | 8.2% | 21.9% | 33.40 |
| **TOTAL** | 39.7% | 15.1% | 100.0% | 7.0% | 100.0% | 100.0% | -2215.51 |

The industrial sector, only 20% of the GDP, is extremely dependent on capital good and raw material imports. Imported industrial final goods represent almost 40% of the total domestic supply. Two thirds of industry exports go to Central American countries. There is a deficit balance of trade. Only the mining sector has a positive balance, though it only represents 3% of exports and 0.5% of the GDP. The tertiary sector is 50% of the GDP: tourism, transportation and communications (in the Other Services sector) produce important positive balances.

The data in the SAM for Nicaragua show that there are limited links between the primary and industrial sectors (see Table 2). The primary sector buys only 15% of its intermediate inputs from agroindustry and 15% from manufacturing. On the other hand, agroindustry buys 35% of its intermediate inputs from the primary sector and the manufacturing industry buys less than 1% from that same sector. The only exceptions are agriculture for exportation (sugar) and cattle raising, which sell a good portion of their production to the agroindustry for processing before the products are sold domestically or outside the country.

**Table 2**

**Primary and industrial sector links (SAM)**

| | Agric Export | Basic Grains | Other Agric | Fish.,Fores.,Hunt | Stockbreeding |
|---|---|---|---|---|---|
| **Agroindustry** | 3.6% | 1.5% | 0.9% | 0.8% | 8.5% |
| **Manufacture** | 3.3% | 2.7% | 2.0% | 4.8% | 2.4% |

| | Agroindustry | Manufacture |
|---|---|---|
| **Agricultural exports** | 26.5% | 0.0% |
| **Basic grains** | 1.0% | 0.0% |
| **Other agricultural products** | 0.1% | 0.0% |
| **Fishing, forestry, & hunting** | 0.6% | 0.5% |

| | | |
|---|---|---|
| **Stockbreeding** | 6.6% | 0.0% |

Imports tariffs are quite homogeneous with rates ranging from 6.5% and 11.4%. The average effective tariff is 7%.

Nicaragua has a pronounced dependency on external aid (see Table 3): 13% of household total incomes come from remittances[13] and 31% of total government income comes from external donations (listed under the "other incomes" category).

**Table 3**

**External support to income**

| Households | % Remittances | Rem/Income |
|---|---|---|
| **High** | 6.3% | 2.5% |
| **Middle urban** | 59.0% | 22.2% |
| **Middle rural** | 3.1% | 6.7% |
| **Lower urban** | 28.4% | 21.7% |
| **Lower rural** | 3.1% | 4.0% |
| **TOTAL** | 100.0% | |

| Government income | % Remittances |
|---|---|
| **IGV** | 28.4% |
| **ISC** | 14.3% |
| **Tariffs** | 9.4% |
| **Direct imports** | 8.9% |
| **Transfers** | 7.5% |
| **Other income** | 31.5% |
| **TOTAL** | 100.0% |

Agriculture for exportation employs half of rural labor (Table 4). Cattle raising is another important source of rural employment. In the urban sector, more than 80% of workers are in the service area.

**Table 4**

**Factor demands (SAM)**

| | Agric Exp | Basic Grains | Other Agric | Fish, Forest. Hunt | Stock-breeding | Agro-ind | Manuf | Constr | Mining | Trade | Gov. Serv | Other Servs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Employment** | 10.3% | 1.7% | 1.0% | 0.8% | 6.7% | 4.1% | 8.1% | 2.6% | 0.4% | 21.2% | 26.6% | 16.4% |

[13]Most remittances are received by urban households, partly because of the characteristics of the survey used for the SAM, which was the one held by ECLA (1991).

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Urban** | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 5.2% | 10.2% | 3.2% | 0.5% | 26.7% | 33.4% | 20.7% |
| **Rural** | 50.0% | 8.4% | 5.0% | 3.9% | 32.7% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% | 0.0% |
| **Capital** | 7.6% | 7.1% | 2.0% | 1.3% | 13.7% | 17.2% | 13.7% | 1.5% | 0.6% | 27.0% | 0.0% | 8.3% |

The manufacturing sector provides more than half the tariff revenue, while agroindustry and manufacturing contributes three quarters of total indirect taxes (Table 5). The urban sectors and corporations are the most important source of direct taxes.

**Table 5**

**Tariff Structure**

| | **Agric Exp** | **Basic grains** | **Other Agric** | **Fish,for hunt** | **Stock-breeding** | **Agro-ind** | **Manuf** | **Constr** | **Mining** | **Trade** | **Gov. Serv** | **Other Servs** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tariff | 5.1% | 2.8% | 2.1% | 0.4% | 2.1% | 12.3% | 55.1% | 2.2% | 0.6% | 2.6% | 6.8% | 7.7% |
| Indirect tax | 2.0% | 3.4% | 0.4% | 0.7% | 4.4% | 35.8% | 38.8% | 2.2% | 0.3% | 2.5% | 1.6% | 7.9% |

| | **High** | **Middle urban** | **Middle rural** | **Lower urban** | **Lower rural** | **Firms** |
|---|---|---|---|---|---|---|
| Direct tax | 13.9% | 51.2% | 3.8% | 7.6% | 0.0% | 23.5% |

## V. Simulations and results (see model in Appendix 2)

A number of simulations were carried out separately to evaluate the impact of the three different economic policies: devaluation of the *córdoba*, tariff liberalization, and public expenditure reduction. These policies were the core of the reforms implemented in the nineties. Separate simulations analyses allow us to better identify the effects - at times complementary, at times contradictory - of these policies on production, employment, trade, consumption and income distribution. For each case, different macroeconomic "closures" and magnitude of policy application were carried out.

### *5.1. Devaluation*

Devaluation has a direct impact on import prices with 40% of domestic sales imports representing more than 50% of the GDP. Because 47% of fixed capital gross formation is made up of imports, two exercises were carried out: in the first, aggregate investment is fixed and corporate savings are allowed to vary, whereas in the second one, investment is endogenous and the corporate savings rate is fixed. In both, foreign savings and government income are endogenous, but public spending is fixed to represent more accurately the fiscal effort the government made during the 1990s.

A currency devaluation in any of the closures brings forth a large reduction in foreign savings inflows and a substantial improvement in the external balance. When aggregate investment is fixed, a significant increase in private savings must take place with the endogenization of its savings rate, while in the second exercise with free investment, this rate must be adjusted. Therefore, we have falls in consumption in the first case and in investment in the second, with reductions in the real GDP in both cases.

In the following section, the results of devaluing the *córdoba* by 5%, 10%, and 15% under both investment "closures" are discussed.

#### *5.1.1. Fixed investment*

*5.1.1.a. Prices.* Devaluation causes the consumer price index to increase (by 1% when the *córdoba* suffers a 5% devaluation and by 2.5% with a 15% devaluation), whereas the GDP price index increases by 0.24% with a 15% devaluation. For factors, only rural labor benefits form this policy favoring the agroexporting sectors. Capital returns are visibly lower. To a lesser degree, urban labor and land payments also drop. As we will see below, this is directly related to shifts in production and sectoral employment.

**Table 6**
**Impact on prices (Base year percentage change)**

| DEVALUACION | 5% | 10% | 15% |
|---|---|---|---|
| GDP deflactor | -0.13 | -0.05 | 0.24 |
| Consumer price index | 0.87 | 1.86 | 2.48 |
| Producer price index | 0.00 | 0.00 | 0.00 |
| | | | |
| *Factor payments* | | | |
| Rural labor | 3.30 | 6.62 | 9.97 |
| Urban labor | -0.15 | -0.21 | -0.17 |
| Capital (urban & rural) | -1.49 | -2.91 | -4.24 |
| Land | -0.22 | -0.51 | -0.90 |
| | | | |
| Exchange rate | 5.00 | 10.00 | 15.00 |

*5.1.1.b. Production, employment, and trade.* Price behavior is partly explained by the GDP contraction in real terms (of - 0.44% to - 1.76%). The effects of a devaluation are radically different for each sector. Sectors, oriented towards foreign markets - such as agriculture for exportation (that employs half the rural labor), fishing and mining - grow notably, as do other services with a positive balance of trade. However, the decrease in consumption brings about a strong contraction of the primary sectors selling domestically (the cases of basic grains and cattle production sectors whose supply decreases by up to 4.3% and 8.3%, respectively). This causes a decline in the primary sector as a whole that can reach up to 0.6%. Also, the manufacturing sector, which depends heavily on imports, suffers a fall of almost 5%. Construction decreases due to the rise in import costs; trade falls because of the contraction in consumption and in the GDP. Therefore, the secondary sector is most affected by its dependency on imports.

**Table 7**
**Impact on production (real GDP) (Base year percentage change)**

| | Production | | |
|---|---|---|---|
| **Devaluation** | **5%** | **10%** | **15%** |
| *Aggregate GDP* | | | |
| Total GDP | -0.44 | -1.03 | -1.76 |
| Primary GDP | -0.11 | -0.32 | -0.63 |
| Secondary GDP | -1.07 | -2.13 | -3.19 |
| Tertiary GDP | 0.51 | 1.00 | 1.47 |
| *Sectorial GDP* | | | |
| Agricultural exports | 3.39 | 6.57 | 9.56 |
| Basic grains | -1.35 | -2.78 | -4.30 |
| Other agricultural | 0.08 | 0.16 | 0.21 |
| Forestry, hunting, & fishing | 2.22 | 4.27 | 6.18 |

| | | | |
|---|---|---|---|
| Livestock | -2.73 | -5.48 | -8.29 |
| Agroindustry | -0.57 | -1.14 | -1.73 |
| Manufactures | -1.67 | -3.32 | -4.94 |
| Construction | -0.56 | -1.14 | -1.72 |
| Mining | 2.05 | 4.20 | 6.42 |
| Trade | -0.26 | -0.57 | -0.93 |
| Government services | 1.13 | 2.19 | 3.18 |
| Other services | 1.28 | 2.64 | 4.10 |

The situation of the agroalimentary industry deserves special attention, since a devaluation causes a strong increase in its exports. However, domestic consumption is simultaneously depressed, so much so that the final result is a contraction (which grows as devaluation rises) in the agroalimentary sector. Changes in employment follow from the change in production. An increase in rural labor demand in the agroexporting sector more than offsets the drops in the basic grains and cattle raising sectors. However, the impact on urban labor is unfavorably reflecting changes in manufacturing, construction and trade. Devaluation causes a strong increase in total exports and in exports by sector (up to 15.6%) and it brings about a reduction in imports (of up to - 18.1% in total imports), reducing the external balance deficit by half in the case of a 15% devaluation (from 443 to 220 million dollars). Adding in household remittances and government donations leads to a surplus in the current account.

**Table 8**

**Impact on foreign trade (Base year percentage change)**

| **Devaluation** | **5%** | **10%** | **15%** |
|---|---|---|---|
| *Exports* | | | |
| Agricultural exports | 4.32 | 8.39 | 12.24 |
| Other agricultural | 6.27 | 12.46 | 18.58 |
| Forestry, hunting, & fishing | 3.31 | 6.39 | 9.25 |
| Agroindustry | 7.36 | 14.82 | 22.38 |
| Manufactures | 1.10 | 2.09 | 2.97 |
| Mining | 3.38 | 6.80 | 10.25 |
| Other Services | 7.77 | 15.79 | 24.05 |
| TOTAL | 5.25 | 10.47 | 15.66 |
| | | | |
| *Imports* | | | |
| Agricultural exports | -3.10 | -5.96 | -8.61 |
| Basic grains | -14.48 | -27.06 | -38.01 |
| Other agricultutal | -11.39 | -21.49 | -30.49 |
| Forestry, hunting, & fishing | -6.50 | -12.34 | -17.61 |
| Livestock | -11.66 | -22.00 | -31.21 |
| Agroindustry | -10.98 | -20.77 | -29.55 |
| Manufactures | -5.41 | -10.49 | -15.28 |
| Construction | -6.76 | -12.77 | -18.14 |

| | | | |
|---|---|---|---|
| Mining | -4.31 | -8.48 | -12.52 |
| Trade | -7.68 | -14.51 | -20.63 |
| Government services | -5.56 | -10.54 | -15.02 |
| Other services | -8.58 | -16.31 | -23.29 |
| TOTAL | -6.76 | -12.94 | -18.61 |
| Real trade balance* | -15.31 | -29.59 | -42.99 |

*The balance of the Trade Balance is -2215.8 millions of *cordobas* for the base year and -1876.6, -1560.1 and -1263.2 millions for the Devaluation experiment of 5%, 10%, and 15%, respectively

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*5.1.1.c. Income distribution.* Income is redistributed to rural workers, with expanded agroexportation. Their shares increases by 2.2% with the maximum devaluation. The capitalist or urban professional sector sees its income share fall by 3.9%. Similarly, the rural intermediate income sector (farmers focused on stock raising and basic grain activities) is visibly affected with their share falling up to 15% with the highest devaluation. Concerning the intermediate and lower urban households, their share in general income distribution increases but their incomes are reduced (though to a lesser degree than other kinds of households).

**Table 9**
**Impact on income distribution**

| **Devaluation** | **5%** | **10%** | **15%** |
|---|---|---|---|
| Base year percentage change | | | |
| Hogares | | | |
| High capitalist | -8.36 | -16.84 | -25.43 |
| Middle urban | -4.30 | -8.66 | -13.09 |
| Middle rural | -12.73 | -25.68 | -38.89 |
| Lower urban | -0.63 | -1.24 | -1.82 |
| Lower rural | 0.93 | 1.85 | 2.75 |

| **Devaluation** | **Base** | **5%** | **10%** | **15%** |
|---|---|---|---|---|
| Participation in total income | | | | |
| Households | | | | |
| High capitalist | 32.2 | 31.0 | 29.8 | 28.3 |
| Middle urban | 34.5 | 34.7 | 35.0 | 35.3 |
| Middle rural | 6.2 | 5.7 | 5.2 | 4.5 |
| Lower urban | 16.6 | 17.3 | 18.2 | 19.2 |
| Lower rural | 10.5 | 11.2 | 11.9 | 12.7 |

*5.1.1.d. Other aggregate variables.* We have already pointed out the large improvement in the foreign sector, with the current account turning from deficit into surplus when

remittances and donations are considered. This brings an outflow of foreign savings (Table 10). Domestic source tax revenues, fall, particularly indirect taxes because of the contraction of the "fiscal industry" (liquor and tobacco industries).

**Table 10**

**Results of other aggregate variables**
**(Base level in millions of Cordobas. Base year percentage change)**

| Devaluation | Base Level | 5% | 10% | 15% |
|---|---|---|---|---|
| Government consumption | 1483.9 | 0.00 | 0.00 | 0.00 |
| Investment | 1463.8 | 0.00 | 0.00 | 0.00 |
| Private consumption | 6675.2 | -5.38 | -10.61 | -15.69 |
| Family savings* | 2.5 | -646.51 | -1303.88 | -1972.61 |
| Government savings | 730.1 | -2.74 | -5.4 | -8.02 |
| Enterprise savings | 150.2 | 241.92 | 489.6 | 743.29 |
| Net foreign savings | 581.0 | -58.39 | -112.86 | -163.96 |
| Remittances | 800.9 | 0.00 | 0.00 | 0.00 |
| Government income | 2505.9 | -0.16 | -0.31 | -0.45 |
| Tariffs | 267.0 | -2.18 | -4.38 | -6.61 |
| Indirect tax | 804.0 | -1.51 | -2.94 | -4.28 |
| Households direct tax | 192.2 | -5.09 | -10.25 | -15.49 |
| Enterprise direct tax | 59.2 | -1.49 | -2.91 | -4.24 |
| Consumption tax | 404.62 | -4.55 | -8.16 | -11.83 |

Contraction of high and intermediate household incomes leading to lower direct and indirect taxes. There is a decrease in tariff incomes because of the reduction of imports. Only donations - fixed in dollars- experience a nominal increase due to the devaluation. Tax revenues in total drop slightly. With fixed public spending, this generates government dissavings that fluctuate between 2.7% and 8%. Finally, private consumption, the most affected macroeconomic variable, drops up to 15.7%.

*5.1.2. Endogenous investment.* When investment is endogenous devaluation produces a strong contraction (up to 86% with a maximum devaluation, Table 15) partly due to its high imported content. It bears the burden of foreign sector adjustment. Policies behave as before (see Table 11). However, there are differences in factor incomes. Rural labor is favored since now there is a smaller reduction in the stock raising and basic grains sectors, notwithstanding the expansion in the agroexporting sectors.

**Table 11**

**Impact on on prices (Base year percentage change)**

| Devaluation | 5% | 10% | 15% |
|---|---|---|---|
| GDP deflator | 0.08 | 0.59 | 1.72 |
| Consumer price index | 0.77 | 1.68 | 2.55 |
| Producer price index | 0.00 | 0.00 | 0.00 |

| | | | |
|---|---|---|---|
| *Factor payments* | | | |
| Rural labor | 4.82 | 9.62 | 14.37 |
| Urban labor | -1.21 | -2.12 | -2.55 |
| Capital (urban & rural) | -0.84 | -1.52 | -1.95 |
| Land | 3.17 | 6.30 | 9.41 |
| | | | |
| Exchange rate | 5.00 | 10.00 | 15.00 |

In general, factoral returns to land improve. Corporate savings are no longer the adjustment variable, therefore, capital returns are barely modified. The most serious impact is on urban workers due to the fall of investment and industrial activity. Real GDP contracts even more (Table 12) than in the previous case. The secondary sector is the most affected one (its declines range from 3.2% to 11.1%). In particular, the manufacturing and construction sectors are most depressed. The behavior of the other sectors and of employment follows a pattern similar to that of the first closure, when investment is fixed.

**Table 12**
**Impact on production (real GDP) (Base year percentage change)**

| **Devaluation** | **5%** | **10%** | **15%** |
|---|---|---|---|
| *Aggregate GDP* | | | |
| Total GDP | -0.63 | -1.56 | -2.83 |
| Primary GDP | -0.04 | -0.10 | -0.19 |
| Secondary GDP | -3.18 | -6.84 | -11.14 |
| Tertiary GDP | 1.52 | 2.99 | 4.29 |
| *Sectoral GDP* | | | |
| Agricultural exports | 1.66 | 3.17 | 4.53 |
| Basic grains | -0.48 | -0.92 | -1.32 |
| Other agricultural | 0.51 | 0.99 | 1.46 |
| Other services | -5.57 | -10.55 | -14.95 |
| TOTAL | -8.27 | -16.20 | -23.82 |
| Real trade balance* | -17.54 | -34.44 | -50.64 |
| *The balance of the Trade Balance is -2215.8 millions of *cordobas* for the base year and -1827.2, -1452.8 and -1093.8 millions for the Devaluation experiment of 5%, 10%, and 15%, respectively. | | | |

The depreciation of the *córdoba* when investment is flexible results in a smaller expansion of exports but a greater contraction of imports causing an even stronger effect on foreign savings than in the previous closure (Table 13). Devaluation with flexible investment results in less important redistributive effects (Table 14).There is a general increase in household income, except for upper level urban professionals. Rural workers improve their income

share. For macro variables (Table 15), results show government savings falling less: the greatest fall is in indirect tax collection with a smaller decline in consumer and direct taxes.

**Table 13**
**Impact on foreign trade (Base year percentage change)**

| **Devaluation** | **5%** | **10%** | **15%** |
|---|---|---|---|
| *Exports* | | | |
| Agricultural exports | 2.40 | 4.66 | 6.79 |
| Other agricultural | 3.79 | 7.31 | 10.58 |
| Forestry, hunting, & fishing | 2.36 | 4.51 | 6.44 |
| Agroindustry | 5.80 | 11.42 | 16.68 |
| Manufactures | 0.40 | 0.26 | -0.64 |
| Mining | 3.81 | 7.54 | 10.96 |
| Other services | 10.77 | 22.04 | 33.30 |
| TOTAL | 4.75 | 9.43 | 13.87 |
| | | | |
| *Imports* | | | |
| Agricultural exports | -3.55 | -7.14 | -10.87 |
| Basic grains | -7.44 | -13.93 | -19.49 |
| Other agricultural | -5.72 | -10.71 | -15.05 |
| Forestry, hunting, & fishing | -3.19 | -6.02 | -8.59 |
| Livestock | -7.33 | -13.89 | -19.70 |
| Agroindustry | -5.79 | -10.86 | -15.24 |
| Manufacturas | -8.95 | -17.93 | -27.01 |
| Manufactures | -36.60 | -67.44 | -91.82 |
| Mining | -5.22 | -10.64 | -16.27 |
| Trade | -8.15 | -15.37 | -21.74 |
| Government services | -6.37 | -11.93 | -16.64 |
| Other services | -5.57 | -10.55 | -14.95 |
| TOTAL | -8.27 | -16.20 | -23.82 |
| Real Trade Balance | -17.54 | -34.44 | -50.64 |

Finally, consumption falls less than in the previous closure (of -1.7% in the most extreme case). The decline in investment, the most affected variable, produces a decline in the real GDP greater than in the previous case. The results clearly a policy dilemma: how should real devaluations be used to stimulate exports as the growth engine and to improve the external balance? Fixed public expenditures accompanied by fixed aggregate investment (first closure) improves the foreign balance and redistributes income to lower income households, mostly rural ones, but it contracts the economy and brings a welfare loss. On the other hand, shifting the weight of the devaluation to investment instead of to

consumption (second closure) has harder effects on production and welfare, and softer ones on income distribution. An alternative for the government could be to tie real devaluations to a public investment stimulus to the economy. This, however, requires sustained foreign support to savings.

**Table 14**
**Impacts on income distribution**

| **Devaluation** | **5%** | **10%** | **15%** |
|---|---|---|---|
| Base year percentage change | | | |
| Households | | | |
| High capitalist | -0.39 | -0.60 | -0.49 |
| Middle urban | 0.55 | 1.24 | 2.19 |
| Middle rural | 0.23 | 0.59 | 1.13 |
| Lower urban | 0.34 | 0.86 | 1.65 |
| Lower rural | 4.13 | 8.27 | 12.40 |

| **Devaluation** | **Base** | **5%** | **10%** | **15%** |
|---|---|---|---|---|
| Participation in total income | | | | |
| Households | | | | |
| High capitalist | 32.2 | 31.9 | 31.6 | 31.3 |
| Middle urban | 34.5 | 34.5 | 34.5 | 34.5 |
| Middle rural | 6.2 | 6.2 | 6.2 | 6.2 |
| Lower urban | 16.6 | 16.5 | 16.5 | 16.5 |
| Lower rural | 10.5 | 10.9 | 11.3 | 11.6 |

**Table 15**
**Results of other aggregate variables**
**(Base level inmillions of Cordobas. Base year percentage change.)**

| **DEVALUACION** | **Base level** | **5%** | **10%** | **15%** |
|---|---|---|---|---|
| Government consumption | 1483.9 | 0.00 | 0.00 | 0.00 |
| Investment | 1463.8 | -26.91 | -55.55 | -85.75 |
| Private consumption | 6675.2 | -0.82 | -1.40 | -1.70 |
| Family savings* | 2.5 | -128.57 | -253.57 | -371.83 |
| Government savings | 730.1 | -1.43 | -3.20 | -5.45 |
| Enterprise savings | 150.2 | -0.85 | -1.52 | -1.96 |
| Net foreign savings | 581.0 | -66.88 | -131.33 | -193.12 |
| Remittances | 800.9 | 0.00 | 0.00 | 0.00 |
| Government income | 2505.9 | -0.13 | -0.30 | -0.49 |
| Tariffs | 267.0 | -3.64 | -7.69 | -12.13 |

| | | | | |
|---|---|---|---|---|
| Indirect tax | 804.0 | -3.06 | -6.12 | -9.11 |
| Households direct tax | 192.2 | 0.34 | 0.84 | 1.59 |
| Enterprise direct tax | 59.2 | -0.84 | -1.52 | -1.94 |
| Consumption tax | 404.62 | -1.95 | -4.05 | -6.28 |

*5.2. Tariff elimination*

Nicaragua's trade policy during the 1990s moved to growing liberalization, regional integration and efforts to negotiate free trade agreements in an active tariff deregulation framework. The Banco Central in particular abandoned its foreign trade and its international operations monopoly; 1991 is the key year in trade liberalization. The maximum combined tariff[14]of 200% that prevailed in 1990 was reduced to 40%. that year tariffs became more homogeneous. Liberalization continued during the 1990s, though sectoral effects were not uniform.

Tariff collection in 1991 represented 3.6% of the GDP and 15.5% of tax revenues. Even though there still was tariff dispersion among sectors, this differential effect is not accounted for in the simulations. The effective tariff paid by sectors for the "mixture" of imports fluctuated between 6% and 11.5%.

A simulation liberalizing tariffs has two immediate and direct effects: reduced government revenues and lower prices for imported products. In trade liberalization simulations, two alternative macroeconomic closures were carried out for the foreign sector: in one, the exchange rate is allowed to fluctuate and foreign savings are fixed, in the other one, the exchange rate is fixed while foreign savings are allowed to vary. As in other simulations, public expenditure is exogenous or fixed.

*5.2.1. Free exchange rate and fixed foreign savings*

Liberalization ranges from 20% to zero tariff. the following discussion deals with the results of the simulation that considers total liberalization.

*5.2.1.a. Prices.* In either case, when government income is assumed fixed (GF) or when it is allowed to vary (GL), a slight deflation occurs: lower than 2% in the National Consumer Price Index (NCPI) and of 3.2% in the GDP deflator (Table 16). The exchange rate depreciates to balance the external account: by 3.3% in the GF case and by 2.6% in the GL case. In the GL case, the devaluation necessary to equilibrate the trade balance is less because of the reduction in investment (see below) that has a high import content. There is a slight increase in factor prices; price increments linked with the agro are the most

[14]Nicaragua has a combination of Import Tariff Rights (ITR), Temporary Protection Tariffs (TPT), and Tax Stamps (TS).

significant ones. Rural labor increases but urban labor is static in the GL case due to a deterioration - linked to the fall of investment - in the secondary sector (see following section).

**Table 16**

**Impact on prices (Base year percentage change)**

| | Fixed government income | | | | | Liberalized government income | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Tariff liberalization** | **20%** | **40%** | **60%** | **80%** | **100%** | **20%** | **40%** | **60%** | **80%** | **100%** |
| GDP deflator | -0.62 | -1.26 | -1.90 | -2.56 | -3.23 | -0.62 | -1.24 | -1.87 | -2.52 | -3.17 |
| Consumer price index | -0.05 | -0.62 | -0.82 | -1.22 | -1.44 | -0.32 | -0.73 | -1.05 | -1.20 | -1.67 |
| Producer price index | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Factor payments* | | | | | | | | | | |
| Rural labor | 0.55 | 1.11 | 1.68 | 2.26 | 2.86 | 0.49 | 0.98 | 1.49 | 2.00 | 2.51 |
| Urban labor | 0.08 | 0.16 | 0.24 | 0.33 | 0.42 | 0.00 | 0.02 | 0.03 | 0.05 | 0.06 |
| Capital (urban & rural) | 0.11 | 0.21 | 0.32 | 0.43 | 0.55 | 0.17 | 0.35 | 0.52 | 0.71 | 0.89 |
| Land | 0.11 | 0.23 | 0.34 | 0.46 | 0.57 | 0.32 | 0.64 | 0.96 | 1.28 | 1.61 |
| Exchange rate | 0.63 | 1.28 | 1.93 | 2.59 | 3.26 | 0.51 | 1.02 | 1.54 | 2.06 | 2.59 |

*5.2.1.b. Production, employment, and trade.* The GDP increases slightly in real terms: up to 0.11% and by 0.02% for GF and GL respectively (Table 17). Sectoral results diverge in both closures. In the GF case, the secondary sector has a slight expansion, especially in construction and manufacturing that use a great amount of imported input. The opposite happens with GL, where the drop in investment depresses the sector.

**Table 17**

**Impact on production (real GDP). (Base year percentage change)**

| | Fixed government income | | | | | Liberalized government income | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Tariff liberalization** | **20%** | **40%** | **60%** | **80%** | **100%** | **20%** | **40%** | **60%** | **80%** | **100%** |
| *Aggregate GDP* | | | | | | | | | | |
| Total GDP | 0.02 | 0.04 | 0.07 | 0.09 | 0.11 | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 |
| Primary GDP | -0.01 | -0.02 | -0.03 | -0.05 | -0.07 | 0.04 | 0.08 | 0.12 | 0.16 | 0.20 |
| Secondary GDP | 0.05 | 0.09 | 0.14 | 0.18 | 0.22 | -0.23 | -0.47 | -0.72 | -0.97 | -1.23 |
| Tertiary GDP | -0.02 | -0.03 | -0.05 | -0.06 | -0.08 | 0.10 | 0.20 | 0.30 | 0.41 | 0.52 |
| *Sectoral GDP* | | | | | | | | | | |
| Agricultural exports | 0.65 | 1.31 | 1.99 | 2.67 | 3.36 | 0.28 | 0.56 | 0.84 | 1.13 | 1.42 |
| Basic grains | -0.48 | -0.97 | -1.47 | -1.98 | -2.5 | -0.16 | -0.32 | -0.48 | -0.65 | -0.83 |
| Other agricultural | -0.26 | -0.53 | -0.81 | -1.09 | -1.38 | -0.14 | -0.29 | -0.45 | -0.61 | -0.78 |
| Forestry, hunting, & fishing | 0.93 | 1.88 | 2.84 | 3.81 | 4.81 | 0.66 | 1.32 | 1.99 | 2.66 | 3.34 |
| Livestock | -0.41 | -0.83 | -1.26 | -1.7 | -2.15 | -0.1 | -0.21 | -0.32 | -0.44 | -0.56 |
| Agroindustry | -0.05 | -0.11 | -0.16 | -0.22 | -0.28 | 0.38 | 0.78 | 1.19 | 1.61 | 2.04 |
| Manufactures | 0.05 | 0.1 | 0.14 | 0.18 | 0.21 | -0.41 | -0.84 | -1.28 | -1.74 | -2.22 |
| Construction | 0.34 | 0.69 | 1.03 | 1.38 | 1.73 | -2.61 | -5.3 | -8.06 | -10.9 | -13.82 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Mining | 1.05 | 2.16 | 3.31 | 4.53 | 5.81 | 0.67 | 1.38 | 2.13 | 2.91 | 3.74 |
| Trade | -0.11 | -0.21 | -0.32 | -0.44 | -0.56 | 0.01 | -0.02 | -0.03 | -0.04 | -0.05 |
| Government services | -0.19 | -0.38 | -0.58 | -0.78 | -0.99 | -0.21 | -0.42 | -0.63 | -0.85 | -1.08 |
| Other services | 0.3 | 0.62 | 0.95 | 1.29 | 1.65 | 0.57 | 1.17 | 1.78 | 2.41 | 3.07 |

What happens in the primary sectors differs. Under GF, export sectors expand due to the devaluation (by 3.5%), but domestic consumption (basic grain and stock-raising) contract (by 2.3%) following the fall in consumption. Since the latter sectors are larger than the export sector, the result is a small decline in primary sector GDP. The opposite occurs in the GL case. Finally, the tertiary sector contacts with GF and expands with GL (in this case the trade sector dictates the modifications). Employment follows production variations and factor redistribution responds partly to the Stolper-Samuelson theorem. Hence, the expansion of agroexporting oriented sectors, by using rural labor intensively, redistributes income to this factor and to land in general. Urban sectors benefit from the economy's expansion in general, but much less than rural sectors (Table 16). Achieving equilibrium in the external balance requires a real devaluation, with exports (primary and alimentary) growing more than imports in percentile terms (Table 18) under both the GL and the GF cases. Imports grow in quantity, with the effects of a tariff outweighing the effects of devaluation.

**Table 18**

**Impact on foreign trade (Base year percentage change)**

| | **Fixed government income** | | | | | **Liberalized government income** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Tariff liberalization** | **20%** | **40%** | **60%** | **80%** | **100%** | **20%** | **40%** | **60%** | **80%** | **100%** |
| *Exports* | | | | | | | | | | |
| Agricultural exports | 1.37 | 2.75 | 4.15 | 5.56 | 6.99 | 0.9 | 1.8 | 2.71 | 3.62 | 4.54 |
| Other agricultural | 0.91 | 1.82 | 2.75 | 3.68 | 4.62 | 0.66 | 1.33 | 2 | 2.68 | 3.35 |
| Forestry, hunting, & fishing | 1.34 | 2.69 | 4.07 | 5.47 | 6.88 | 0.96 | 1.93 | 2.9 | 3.89 | 4.89 |
| Agroindustry | 1.01 | 2.05 | 3.10 | 4.18 | 5.27 | 1.26 | 2.55 | 3.88 | 5.24 | 6.65 |
| Manufactures | 0.28 | 0.56 | 0.84 | 1.12 | 1.40 | -0.24 | -0.49 | -0.75 | -1.04 | -1.34 |
| Mining | 1.33 | 2.72 | 4.17 | 5.69 | 7.28 | 0.9 | 1.84 | 2.82 | 3.84 | 4.92 |
| Other services | 1.44 | 2.93 | 4.46 | 6.04 | 7.66 | 1.57 | 3.18 | 4.85 | 6.57 | 8.34 |
| TOTAL | 1.16 | 2.33 | 3.53 | 4.76 | 6.00 | 0.97 | 1.95 | 2.96 | 3.99 | 5.04 |
| | | | | | | | | | | |
| *Imports* | | | | | | | | | | |
| Agricultural exports | 1.50 | 3.02 | 4.57 | 6.16 | 7.78 | 1.81 | 3.67 | 5.55 | 7.48 | 9.45 |
| Basic grains | 0.66 | 1.32 | 2.00 | 2.68 | 3.37 | 1.61 | 3.27 | 4.98 | 6.75 | 8.58 |
| Other agricultural | 1.88 | 3.84 | 5.87 | 7.99 | 10.21 | 2.74 | 5.61 | 8.63 | 11.8 | 15.14 |
| Forestry, hunting, & fishing | 1.01 | 2.05 | 3.12 | 4.23 | 5.37 | 1.59 | 3.23 | 4.93 | 6.69 | 8.52 |
| Livestock | 0.83 | 1.68 | 2.55 | 3.43 | 4.34 | 1.48 | 3.01 | 4.58 | 6.21 | 7.9 |
| Agroindustry | 0.62 | 1.24 | 1.88 | 2.53 | 3.19 | 1.34 | 2.71 | 4.14 | 5.61 | 7.13 |
| Manufactures | 0.23 | 0.46 | 0.69 | 0.93 | 1.16 | -0.16 | -0.33 | -0.51 | -0.7 | -0.91 |
| Construction | 1.34 | 2.71 | 4.13 | 5.60 | 7.12 | -1.51 | -3.12 | -4.83 | -6.66 | -8.6 |
| Mining | 0.59 | 1.21 | 1.84 | 2.50 | 3.19 | 0.45 | 0.93 | 1.44 | 1.97 | 2.54 |
| Trade | 1.22 | 2.48 | 3.78 | 5.13 | 6.52 | 1.51 | 3.08 | 4.7 | 6.38 | 8.13 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Government services | 0.95 | 1.94 | 2.96 | 4.00 | 5.09 | 1.04 | 2.12 | 3.23 | 4.38 | 5.57 |
| Other services | 0.36 | 0.72 | 1.09 | 1.46 | 1.84 | 0.87 | 1.76 | 2.68 | 3.63 | 4.6 |
| TOTAL | 0.48 | 0.97 | 1.47 | 1.98 | 2.49 | 0.4 | 0.81 | 1.23 | 1.66 | 2.09 |
| Real trade balance* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

* The balance on the Trade Balance is of -2215.8 millions of *cordobas.*

*5.2.1.c. Income distribution.* In the GF case, corporate taxes rise, so the upper level urban professional sector sees its income fall. Rural workers are favored by the expansion of agroexporting, while the intermediate rural sectors (cattle farmers and basic grain producers) are the affected adversely (Table 19). Workers increase their total participation by 0.4% whereas high level urban professionals and intermediate rural workers drop by 0.7% and 0.3%, respectively. With GL all sectors see their incomes grow, with slight changes in their total participations. Redistribution is therefore relatively neutral, but since total incomes rise, liberalization improves welfare.

**Table 19**

**Impacts on distribution of income**

| | **Fixed government income** | | | | | **Liberalized government income** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Tariff liberalization** | **20%** | **40%** | **60%** | **80%** | **100%** | **20%** | **40%** | **60%** | **80%** | **100%** |
| Base year percentage change | | | | | | | | | | |
| Households | | | | | | | | | | |
| High capitalist | -0.84 | -1.70 | -2.58 | -3.49 | -4.42 | 0.14 | 0.28 | 0.42 | 0.57 | 0.72 |
| Middle urban | -0.40 | -0.80 | -1.22 | -1.66 | -2.10 | 0.18 | 0.36 | 0.55 | 0.74 | 0.93 |
| Middle rural | -1.33 | -2.69 | -4.09 | -5.53 | -7.00 | 0.22 | 0.44 | 0.67 | 0.9 | 1.13 |
| Lower urban | 0.00 | 0.01 | 0.02 | 0.02 | 0.02 | 0.13 | 0.26 | 0.39 | 0.53 | 0.67 |
| Lower rural | 0.27 | 0.54 | 0.82 | 1.10 | 1.38 | 0.45 | 0.9 | 1.36 | 1.83 | 2.31 |
| Participation in total income | | | | | | | | | | |
| Households | | | | | | | | | | |
| High capitalist | 32.2 | 32.1 | 31.9 | 31.8 | 31.7 | 32.2 | 32.2 | 32.2 | 32.1 | 32.1 |
| Middle urban | 34.5 | 34.5 | 34.5 | 34.6 | 34.6 | 34.5 | 34.5 | 34.5 | 34.5 | 34.5 |
| Middle rural | 6.2 | 6.2 | 6.1 | 6.1 | 6.0 | 6.2 | 6.2 | 6.2 | 6.2 | 6.2 |
| Lower urban | 16.6 | 16.6 | 16.7 | 16.8 | 16.9 | 16.6 | 16.5 | 16.5 | 16.5 | 16.5 |
| Lower rural | 10.5 | 10.6 | 10.7 | 10.8 | 10.9 | 10.5 | 10.6 | 10.6 | 10.6 | 10.6 |

*5.2.1.d. Other aggregate variables.* With GF, the reduction in government income due to tariff liberalization is compensated through corporate taxes (remember that foreign savings are kept fixed). With zero tariffs these taxes would have to increase in the corporate tax burden (that translates into forced savings of the upper capitalist sector), consumption contracts (Table 20). The alternate closing (GL, where the reduction in government income cannot be compensated) is more interesting. If a modification in foreign aid to the government does not take place, the drop in total fiscal income is of 10.1%. Government dissavings lead to a fall in aggregate investment of 14.7%. To conclude, tariff liberalization with a flexible exchange rate leads to an expansion of the economy and to redistributive effects which favor workers. If the government does not receive external aid, the reduction in tariffs leads to dissavings and, therefore, to reductions in investment.

**Table 20**
**Results oon other aggregate variables**
**(Base level in millions of Cordobas. Base year percentage change.)**

| | | Fixed government income | | | | | Liberalized government income | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Tariff liberalization** | **Base** | **20%** | **40%** | **60%** | **80%** | **100%** | **20%** | **40%** | **60%** | **80%** | **100%** |
| Government consumption | 1483.9 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Investment | 1463.8 | 0.16 | 0.32 | 0.48 | 0.63 | 0.79 | -2.82 | -5.70 | -8.65 | -11.66 | -14.74 |
| Private consumption | 6675.2 | -0.10 | -0.21 | -0.32 | -0.44 | -0.56 | 0.53 | 1.08 | 1.64 | 2.22 | 2.81 |
| Family savings* | 2.5 | -73.42 | -148.64 | -225.71 | -304.71 | -385.69 | -5.48 | -11.02 | -16.63 | -22.30 | -28.03 |
| Government savings | 730.1 | 0.44 | 0.89 | 1.35 | 1.82 | 2.29 | -6.07 | -12.27 | -18.61 | -25.08 | -31.69 |
| Enterprises savings | 150.2 | -1.82 | -3.69 | -5.60 | -7.56 | -9.58 | 0.17 | 0.35 | 0.52 | 0.71 | 0.89 |
| Net foreign savings | 581.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Remitances | 800.9 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Government income | 2505.9 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | -1.94 | -3.92 | -5.94 | -8.00 | -10.10 |
| Tariff | 267.0 | -19.08 | -38.60 | -58.58 | -79.04 | -100.00 | -19.22 | -38.82 | -58.81 | -79.20 | -100.00 |
| Inderect tax | 804.0 | 0.03 | 0.06 | 0.09 | 0.12 | 0.14 | -0.10 | -0.21 | -0.32 | -0.44 | -0.56 |
| Households direct tax | 192.21 | -0.48 | -0.98 | -1.49 | -2.01 | -2.55 | 0.17 | 0.34 | 0.52 | 0.70 | 0.88 |
| Enterprises direct tax | 59.2 | 81.41 | 164.85 | 250.38 | 338.08 | 428.02 | 0.17 | 0.35 | 0.52 | 0.71 | 0.89 |
| Consumption tax | 404.62 | -0.38 | -0.76 | -1.16 | -1.57 | -1.99 | -0.20 | -0.39 | -0.60 | -0.81 | -1.02 |

*5.2.2. Fixed exchange rate and endogenous foreign savings*

The fundamental difference between this and the previous closing lies precisely in a government controlled exchange rate with variable foreign savings. The latter is the adjustment variable with tariff liberalization. It will no longer be necessary to adjust consumption or investment as in the previous closing, but foreign can substitute for government savings. To isolate the effects of trade liberalization under this exchange rate regime, aggregate investment was fixed and tax revenues allowed to vary.[15]

*5.2.2.a. Prices.* The direct effect of tax reduction lowers import prices. The GDP deflator and the NCPI (Table 21) fall by 3.4% and 2.2%, respectively. Urban sectors benefit. Capital returns increase between 0.47% and 2.43% for the 20% and zero tariff scenarios.

[15]An alternate closure with endogenous investment leads to results that are very similar to those of this closure though different in magnitude. In fact, investment expansion only increases foreign savings requirements because of its high import content, but government dissavings remain practically unaltered.

Urban labor shares improve between 0.26% and 1.33%, while rural labor suffers slightly damaged (its reduction reaches up to - 0.21%). These changes are directly related to the expansion of the secondary sector.

**Table 21**
**Impact on prices (Base year percentage change)**

| Tariff liberalization | 20% | 40% | 60% | 80% | 100% |
|---|---|---|---|---|---|
| GDP deflactor | -0.65 | -1.31 | -1.93 | -2.62 | -3.41 |
| Consumer price index | -0.31 | -0.77 | -1.12 | -1.73 | -2.16 |
| Producer price index | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Factor payments* | | | | | |
| Rural labor | -0.04 | -0.09 | -0.13 | -0.17 | -0.21 |
| Urban labor | 0.26 | 0.53 | 0.79 | 1.06 | 1.33 |
| Capital (urban & rural) | 0.47 | 0.95 | 1.43 | 1.92 | 2.43 |
| Land | 0.14 | 0.28 | 0.42 | 0.56 | 0.71 |
| Exchange rate | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

*5.2.2.b. Production, employment, and trade.* Real GDP increases by between 0.08% and 0.33% depending on the magnitude of the tariff cut (Table 22). At a sectoral level, secondary activities expand (up to 1.79%) whereas the rest contact slightly. All primary activities (with the exception of stock raising) have real declines, especially those export oriented. The increase in consumption favors those primary sectors producing for the domestic market, such as stock-raising and basic grains. Unexpectedly, however, the GDP of the latter sector drops in real terms up to 0.5%. The explanation substitution of cheaper imported products. The difficulties of rice and sorghum producers since the 1980s, when they saw the market practically flooded by low priced imports, are well known. So, trade liberalization generates an increase of up to 12.5% in grain imports, obviously affecting the domestic sector.

**Table 22**
**Impact on production (Real GDP) (Base year percentage change)**

| Tariff liberalization | 20% | 40% | 60% | 80% | 100% |
|---|---|---|---|---|---|
| *Aggregate GDP* | | | | | |
| Total GDP | 0.08 | 0.15 | 0.22 | 0.28 | 0.33 |

| | | | | | |
|---|---|---|---|---|---|
| Primary GDP | -0.12 | -0.24 | -0.36 | -0.49 | -0.61 |
| Secondary GDP | 0.43 | 0.86 | 1.30 | 1.75 | 2.21 |
| Tertiary GDP | -0.14 | -0.28 | -0.42 | -0.57 | -0.72 |
| *Sectorial GDP* | | | | | |
| Agricultural exports | -0.41 | -0.82 | -1.24 | -1.66 | -2.09 |
| Basic grains | -0.10 | -0.19 | -0.30 | -0.40 | -0.51 |
| Other agricultural | -0.34 | -0.68 | -1.04 | -1.41 | -1.79 |
| Forestry, hunting, & fishing | -0.05 | -0.11 | -0.16 | -0.21 | -0.27 |
| Livestock | 0.19 | 0.38 | 0.58 | 0.78 | 0.98 |
| Agroindustry | 0.31 | 0.62 | 0.94 | 1.27 | 1.61 |
| Manufactures | 0.38 | 0.78 | 1.18 | 1.58 | 2.00 |
| Construction | 0.27 | 0.54 | 0.81 | 1.08 | 1.34 |
| Mining | 0.39 | 0.80 | 1.22 | 1.64 | 2.08 |
| Trade | 0.01 | 0.02 | 0.03 | 0.03 | 0.04 |
| Government services | -0.36 | -0.72 | -1.09 | -1.47 | -1.85 |
| Other services | -0.10 | -0.20 | -0.31 | -0.41 | -0.53 |

Employment of rural labor is also adversely affected. The industrial sector turns benefits. Manufacturing, agroindustry, construction, and mining witness an expansion of their activities of up to 2%. Because employment expansion in these sectors compensates, by far, the drop in services, redistribution to urban labor increases and, for these same reasons, capitalists also benefit. Exports show a slight increase of up to 0.93%. Even though the nominal exchange rate is fixed, the drop in domestic prices brings about a real exchange rate devaluation favorable to exports (Table 23). Trade liberalization implies a strong import expansion (of 1.45% to 7.71% for a 20% reduction and zero tariff respectively). The balance of payments deficit grows from approximately 440 million dollars to almost 500 million dollars. Thus, an inflow of foreign resources is necessary.

**Table 23**
**Impact on foreign trade (Base year percentage change)**

| **Tariff liberalization** | **20%** | **40%** | **60%** | **80%** | **100%** |
|---|---|---|---|---|---|
| *Exports* | | | | | |
| Agricultural exports | 0.03 | 0.05 | 0.08 | 0.1 | 0.12 |
| Other agricultural | -0.05 | -0.09 | -0.14 | -0.19 | -0.24 |
| Forestry, hunting, & fishing | 0.09 | 0.18 | 0.27 | 0.36 | 0.46 |
| Agroindustry | 0.58 | 1.18 | 1.79 | 2.42 | 3.06 |
| Manufactures | 0.33 | 0.67 | 1.01 | 1.36 | 1.72 |
| Mining | 0.42 | 0.85 | 1.29 | 1.75 | 2.21 |
| Other services | -0.02 | -0.05 | -0.08 | -0.11 | -0.15 |
| TOTAL | 0.18 | 0.36 | 0.55 | 0.74 | 0.93 |
| | | | | | |
| *Imports* | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Agricultural exports | 2.43 | 4.92 | 7.46 | 10.06 | 12.72 |
| Basic grains | 2.64 | 5.37 | 8.21 | 11.16 | 14.22 |
| Other agricultural | 3.58 | 7.35 | 11.32 | 15.5 | 19.92 |
| Forestry, hunting, & fishing | 2.21 | 4.51 | 6.88 | 9.34 | 11.88 |
| Livestock | 2.4 | 4.89 | 7.47 | 10.16 | 12.96 |
| Agroindustry | 2.11 | 4.3 | 6.57 | 8.92 | 11.36 |
| Manufactures | 0.96 | 1.94 | 2.95 | 3.98 | 5.04 |
| Construction | 2.22 | 4.51 | 6.9 | 9.37 | 11.94 |
| Mining | 1.13 | 2.29 | 3.5 | 4.75 | 6.04 |
| Trade | 2.66 | 5.43 | 8.31 | 11.32 | 14.46 |
| Government services | 1.81 | 3.68 | 5.62 | 7.61 | 9.68 |
| Other services | 1.67 | 3.4 | 5.17 | 7 | 8.88 |
| TOTAL | 1.45 | 2.94 | 4.48 | 6.07 | 7.71 |
| Real trade balance* | 2.35 | 4.78 | 7.28 | 9.86 | 12.53 |

*The balance on the Trade Balance is of -2215.8 millions of *cordobas* for the base year and up to 2493.4 for the complete Open Market experiment

*5.2.2.c. Income distribution.* With a tariff reduction all sectors improve their incomes in real terms (up to 1.3% when liberalization is complete Table 24). However, the urban professional sector and their rural and urban intermediate sectors benefit most. Their income shares slightly increases (0.1%) whereas those of urban and rural workers decrease in similar proportion. In sum, notwithstanding the general improvement of income, liberalization under a fixed exchange rate favors capital over labor.

**Table 24**
**Impacts on distribution of income**

| **Tariff liberalization** | **20%** | **40%** | **60%** | **80%** | **100%** |
|---|---|---|---|---|---|
| Base year percentage change | | | | | |
| Households | | | | | |
| High capitalist | 0.35 | 0.70 | 1.06 | 1.42 | 1.79 |
| Middle urban | 0.25 | 0.50 | 0.75 | 1.00 | 1.26 |
| Middle rural | 0.38 | 0.77 | 1.16 | 1.56 | 1.97 |
| Lower urban | 0.19 | 0.38 | 0.57 | 0.76 | 0.95 |
| Lower rural | 0.02 | 0.04 | 0.07 | 0.10 | 0.13 |
| **Tariff liberalization** | **20%** | **40%** | **60%** | **80%** | **100%** |
| Participation in total income | | | | | |
| Households | | | | | |
| High capitalist | 32.2 | 32.2 | 32.3 | 32.3 | 32.3 |
| Middle urban | 34.5 | 34.5 | 34.5 | 34.5 | 34.5 |
| Middle rural | 6.2 | 6.2 | 6.3 | 6.3 | 6.3 |
| Lower urban | 16.6 | 16.5 | 16.5 | 16.5 | 16.5 |
| Lower rural | 10.5 | 10.5 | 10.5 | 10.5 | 10.4 |

*5.2.2.d. Other aggregate variables.* The fall in of government income produced by the reduction of tariffs is barely compensated by the increase in all tax collections (Table 25). Growth of manufacturing suggests larger revenues from the "fiscal industry", and therefore indirect taxes grow up to 1.13%. Similarly, the improvement in household incomes (especially in the intermediate and upper urban levels) means more direct tax revenues.

**Table 25**
**Results of other aggregate variables**
**(Base level in millionsof Cordobas. Base year percentage change)**

| Tariff liberalization | Base | 20% | 40% | 60% | 80% | 100% |
|---|---|---|---|---|---|---|
| Government consumption | 1483.9 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Investment | 1463.8 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Private consumption | 6675.2 | 0.8 | 1.52 | 2.31 | 3.11 | 3.93 |
| Family savings* | 2.5 | 15.66 | 31.55 | 47.69 | 64.07 | 80.70 |
| Governmen savings | 730.1 | -5.89 | -11.97 | -18.25 | -24.74 | -31.46 |
| Enterprise savings | 150.2 | 0.47 | 0.95 | 1.43 | 1.92 | 2.43 |
| Net foreign savings | 581.0 | 8.98 | 18.23 | 27.78 | 37.62 | 47.78 |
| Remittances | 800.9 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Government income | 2505.9 | -1.88 | -3.83 | -5.83 | -7.90 | -10.04 |
| Tariff | 267.0 | -18.80 | -38.17 | -58.14 | -78.74 | -100.00 |
| Indirect tax | 804.0 | 0.22 | 0.44 | 0.66 | 0.89 | 1.13 |
| Households direct tax | 192.2 | 0.27 | 0.53 | 0.81 | 1.08 | 1.36 |
| Enterprise direct tax | 59.2 | 0.47 | 0.95 | 1.43 | 1.92 | 2.43 |
| Consumption tax | 404.62 | 0.10 | 0.21 | 0.32 | 0.43 | 0.55 |

However, this is insufficient to offset the loss in tariff income (which represents 15.5% of the government's tax income). As tariffs are reduced revenue loss ranges from 1.88% to 10% with zero tariffs. Since expenses are fixed, an even bigger current government deficit is produced and public savings drop to - 31.5% with complete liberalization. Because aggregate investment does not change and private sector income and consumption expand, the situation can only be sustained if there is a growing flow of foreign resources. Absent this, the exhaustion of reserves and pressure to increase imports would force devaluation. Our conclusions reflect what happened in Nicaragua during 1991 and 1992, when a controlled exchange rate and trade liberalization were combined. These measures generated a boom in private consumption (Banco Central, 1995) that forced a 20% devaluation of the *córdoba* for the following year (1993) and the implementation of a sliding nominal exchange rate to increase external competitiveness.

The results of the simulation with trade liberalization show that reduction or elimination of tariffs leads to an expansion of the economy and to palpable efficiency gains. On the other hand, sectoral and employment results depend on how the government responds to the

reduction of its income and on the behavior of the foreign sector. The redistributive effects rest
on how the authorities handle the exchange rate. If the exchange rate floats, redistribution favors workers while a fixed exchange rate favors the corporate sector (rural and urban). In both cases more foreign resources are necessary to support the trade liberalization process. Without foreign resources, investment drops under flexible exchange rates while under fixed rates the foreign deficit cannot be sustained.

### *5.3. Public expenditure contraction*

We carried out two simulations. In both, tax revenues can vary and expenditures are cut (an increase in public savings). In the first simulation, foreign savings are endogenized: this is then the adjustment variable, so aggregate investment is fixed. This closing will allow us to analyze the situation of the early 1990s when investment remained almost constant as a proportion of the GDP. In the second closing, foreign savings are exogenous and aggregate investment can vary. In both cases the exchange rate is allowed to fluctuate and gradual reductions in expenditure are simulated (5%, 10%, 15%, 20%, and 25%).

#### *5.3.1. Variable foreign savings and fixed investment*

The reduction of public spending implies an increment in public savings. In order for the foreign sector to be the adjustment account - given that investment is exogenous -, a currency depreciation in real terms is required to reduce the trade deficit. Consequently, the key effects take place within the urban tertiary sectors.

*5.3.1.a. Prices.* Devaluation is 7.12% with a 25% reduction in expenditure (Table 26). The increase in price indices is slight and less than the devaluation due in part to a fall in real GDP and reduced imports. The GDP deflator increases up to 0.46% and the NCPI up to 1.3%. Factoral redistribution strongly favors rural labor and land, whose shares grow up to 9.6% and 7%, respectively, because of the agroexporting sectors expansion. Public cuts affect urban labor the most. This sector's share falls by 7.5%. Finally, capital returns increase between 0.6% and 3% due to industrial expansion.

**Table 26**
**Impact on prices**
**(Base year percentege change)**

| **Cost reduction** | **5%** | **10%** | **15%** | **20%** | **25%** |
|---|---|---|---|---|---|
| GDP deflactor | -0.62 | -1.26 | -1.90 | -2.56 | -3.23 |
| Consumer price index | 0.21 | 0.70 | 0.77 | 0.99 | 1.26 |
| Producer price index | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | |
| *Factor payments* | | | | | |
| Rural labor | 2.06 | 4.05 | 5.97 | 7.82 | 9.59 |
| Urban labor | -1.63 | -3.19 | -4.69 | -6.13 | -7.51 |

| | | | | | |
|---|---|---|---|---|---|
| Capital (urban & rural) | 0.59 | 1.18 | 1.78 | 2.39 | 2.99 |
| Land | 1.51 | 2.97 | 4.38 | 5.74 | 7.05 |
| Exchange rate | 1.54 | 3.02 | 4.44 | 5.81 | 7.12 |

*5.3.1.b. Production, employment, and trade.* The real GDP slightly contracts, between 0.03% and 0.16% (see Table 27) due to the fall of the tertiary sector caused by the reduction in public spending. The primary sector expands globally between 0.27% and 1.11% dueto the momentum of the agroexporting sectors from the currency depreciation. The growth of agroexporting, fishing, and other agricultural activities compensates by far the slight fall in basic grains and in stock-raising supply (up to 0.7% and 1.7%, respectively). Because that employment follows these patterns, rural labor is the most favored. The secondary sector also expands, mostly the alimentary industry (by up to 2.6%) and mining (by up to 11.6%) since both are important exporters.

**Table 27**
**Impact on production (real GDP) (Base year percentage change)**

| **Cost reduction** | **5%** | **10%** | **15%** | **20%** | **25%** |
|---|---|---|---|---|---|
| *Aggregate GDP* | | | | | |
| Total GDP | -0.03 | -0.06 | -0.09 | -0.12 | -0.16 |
| Primary GDP | 0.27 | 0.51 | 0.73 | 0.93 | 1.11 |
| Secondary GDP | 0.26 | 0.51 | 0.77 | 1.03 | 1.28 |
| Tertiary GDP | -0.22 | -0.45 | -0.67 | -0.89 | -1.11 |
| *Sectoral GDP* | | | | | |
| Agricultural exports | 1.04 | 1.99 | 2.87 | 3.68 | 4.43 |
| Basic grains | -0.15 | -0.29 | -0.43 | -0.57 | -0.71 |
| Other agricultural | 0.47 | 0.9 | 1.3 | 1.67 | 2 |
| Forestry, hunting, & fishing | 1.89 | 3.68 | 5.35 | 6.93 | 8.4 |
| Livestock | -0.39 | -0.76 | -1.1 | -1.43 | -1.73 |
| Agroindustry | 0.55 | 1.09 | 1.6 | 2.1 | 2.58 |
| Manufactures | 0.01 | 0.03 | 0.06 | 0.1 | 0.14 |
| Construction | -0.14 | -0.28 | -0.41 | -0.53 | -0.64 |
| Mining | 2.09 | 4.29 | 6.61 | 9.06 | 11.64 |
| Trade | 0.45 | 0.88 | 1.31 | 1.72 | 2.12 |
| Government services | -4.42 | -8.93 | -13.52 | -18.19 | -22.92 |
| Other services | 2.61 | 5.31 | 8.11 | 11.01 | 14 |

In the first case, the increase in exports exceeds the drop in domestic private consumption (hence the increase in capital returns). The tertiary sector is the most affected by expenditure reduction: as a whole its, supply contracts up to 1.11%. This can be explained by the strong fall of government services (up to 23%). Simultaneously, a reduction in public services explains the significant drop in urban labor's returns. Because the model assumes

full employment, labor released from government services is mostly absorbed by other services favored by the devaluation (tourism, transport and telecommunications, etc.).[16] Concerning foreign trade (Table 28), the real depreciation of the *córdoba* exports expand by up to 12.5% whereas imports fall by a maximum of 7.4%, clearly improving the external balance, which declines from 443 million to 325 million dollars.

[16]As we mentioned before, the CGE model ignores the transition process from one equilibrium to the next, during which - and as can be observed in Nicaragua - unemployment reaches dramatic figures. See Yúnez-Naude (1992).

**Table 28**

**Impact on foreign trade (Base year percentage change)**

| Cost reduction | 5% | 10% | 15% | 20% | 25% |
|---|---|---|---|---|---|
| *Exports* | | | | | |
| Agricultural exports | 1.18 | 2.27 | 3.27 | 4.19 | 5.03 |
| Other agricultural | 1.89 | 3.68 | 5.37 | 6.97 | 8.47 |
| Forestry, hunting, & fishing | 2.41 | 4.70 | 6.85 | 8.88 | 10.78 |
| Agroindustry | 2.45 | 4.83 | 7.13 | 9.35 | 11.48 |
| Manufactures | 0.71 | 1.40 | 2.06 | 2.70 | 3.32 |
| Mining | 2.80 | 5.71 | 8.75 | 11.92 | 15.22 |
| Other services | 5.75 | 11.72 | 17.91 | 24.34 | 30.98 |
| TOTAL | 2.52 | 5.03 | 7.53 | 10.03 | 12.53 |
| | | | | | |
| *Imports* | | | | | |
| Agricultural exports | -0.01 | 0.02 | 0.06 | 0.13 | 0.20 |
| Basic grains | -2.29 | -4.39 | -6.32 | -8.10 | -9.74 |
| Other agricultural | -2.29 | -4.42 | -6.40 | -8.26 | -9.99 |
| Forestry, hunting, & fishing | -2.31 | -4.48 | -6.53 | -8.46 | -10.28 |
| Livestock | -1.75 | -3.37 | -4.87 | -6.25 | -7.52 |
| Agroindustry | -2.08 | -4.02 | -5.82 | -7.49 | -9.05 |
| Manufactures | -0.94 | -1.82 | -2.65 | -3.42 | -4.14 |
| Construction | -2.68 | -5.18 | -7.51 | -9.67 | -11.68 |
| Mining | -1.30 | -2.54 | -3.73 | -4.87 | -5.95 |
| Trade | -2.31 | -4.44 | -6.43 | -8.26 | -9.96 |
| Government services | -7.87 | -15.25 | -22.20 | -28.73 | -34.90 |
| Other services | -2.30 | -4.44 | -6.45 | -8.32 | -10.07 |
| TOTAL | -1.70 | -3.29 | -4.77 | -6.16 | -7.46 |
| Real trade balance* | -4.70 | -9.21 | -13.53 | -17.68 | -21.67 |

*5.3.1.c. Income distribution.* Global income grows up to 0.7% favoring rural sectors, most benefited when investment is fixed. Rural labor increases its income by 0.9% and the rural intermediate sector by 0.2%. Because land returns grow by up to 7%, the intermediate farmer income increases by almost 4%, and their share by 0.2%. In contrast, urban sectors suffer reductions both in their returns and in their participation in income.

**Table 29**

**Impacts on income distribution**

| Cost reduction | 5% | 10% | 15% | 20% | 25% |
|---|---|---|---|---|---|
| Base year percentage change | | | | | |
| Households | | | | | |
| High capitalist | -0.84 | -1.70 | -2.58 | -3.49 | -4.42 |
| Middle urban | -0.40 | -0.80 | -1.22 | -1.66 | -2.10 |

| | | | | | |
|---|---|---|---|---|---|
| Middle rural | -1.33 | -2.69 | -4.09 | -5.53 | -7.00 |
| Lower urban | 0.00 | 0.01 | 0.02 | 0.02 | 0.02 |
| Lower rural | 0.27 | 0.54 | 0.82 | 1.10 | 1.38 |
| Participation in total income | | | | | |
| Households | | | | | |
| High capitalist | -0.1 | 0.0 | 0.8 | -0.5 | 1.9 |
| Middle urban | -0.3 | 0.1 | 1.6 | -0.9 | 3.7 |
| Middle rural | -0.3 | 0.1 | 2.4 | -1.4 | 5.4 |
| Lower urban | -0.4 | 0.1 | 3.2 | -1.8 | 7.1 |
| Lower rural | -0.5 | 0.2 | 4.0 | -2.2 | 8.7 |

*5.3.1.d. Other aggregate variables.* Government revenues grow by up to 2.8% when the cuts in public spending reach 25%. This causes large growth in public savings (up to 65%).

Tariffs are the only form of reduced revenue due to declining imports. Indirect tax revenues grow the most with the expansion of agroindustry and manufacturing, which together represent 75% of the GVT and the CST. Foreign aid fixed in dollars - rises in real terms, with depreciation greater than the price increase. Given that total investment is fixed and that private savings barely grow, foreign dissavings offset the increase in public savings. In real terms, consumption drops up to 1.5%, though it increases in nominal terms. Because investment remains constant, the impact of a reduction in public expenditure generates a fall in the real GDP. Therefore, the reduction in government spending leads to an improvement of fiscal and external balances but it depresses the GDP slightly. Income redistribution favors the rural sectors. Our model assumes full employment, so it does not allow us to capture unemployment effects, nor the impact of reduced health and education services.

**Table 30**
**Results of other aggregate variables**
**(Base level in millions of Cordobas. Base year percentage change)**

| Cost reduction | Base | 5% | 10% | 15% | 20% | 25% |
|---|---|---|---|---|---|---|
| Government | 1483.90 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Investment | 1463.76 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Private consumption | 6675.20 | -0.37 | -0.69 | -0.98 | -1.24 | -1.46 |
| Family savings* | 2.52 | -14.95 | -28.54 | -40.79 | -51.68 | -61.22 |
| Governmen savings | 730.11 | 130.19 | 260.23 | 390.11 | 510.83 | 640.38 |
| Enterprise savings | 150.21 | 0.59 | 1.18 | 1.78 | 2.39 | 2.99 |
| Net foreign savings | 581.00 | -17.93 | -35.11 | -51.59 | -67.42 | -82.65 |
| Remittances | 800.90 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Government income | 2505.93 | 0.59 | 1.17 | 1.74 | 2.29 | 2.83 |
| Tariff | 266.99 | -0.26 | -0.52 | -0.76 | -0.99 | -0.21 |
| Indirect tax | 804.02 | 0.37 | 0.75 | 0.14 | 0.53 | 0.93 |
| Households direct tax | 192.21 | -0.02 | -0.02 | -0.02 | 16.49 | 0.02 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Enterprise direct tax | 59.20 | 0.59 | 1.18 | 1.78 | 2.39 | 2.99 |
| Consumption tax | 404.62 | 0.07 | 0.14 | 0.20 | 0.27 | 0.33 |

*5.3.2. Fixed foreign savings and endogenous investment*

In this simulation, public savings foster investment and therefrom they require a smaller currency depreciation in real terms for the external sector to be balanced. Restoring the health of public finances comes with fostering private activity, allowing the industrial sector to absorb a good part of public unemployment.

*b5.3.2.a. Prices.* The required devaluation is now smaller than in the previous closing, reaching2.93% with an expenditure reduction of 25% (Table 31). Inflation is also lower with the NCPI at 0.5% and the GDP deflator at 0.21% in the case of a maximum expenditure reduction. The impact of the policy change on factor payment is smaller than in the previous closing. It still benefits rural labor, though to a lesser degree (3.9% with a 25% expenditure reduction), whereas urban labor returns fall to a maximum of 6.3%. Capital returns increase (of up to 4%), returns to land rise to a maximum of 3.6%.

**Table31**
**Impact on prices (Base year percentage change)**

| **Cost reduction** | **5%** | **10%** | **15%** | **20%** | **25%** |
|---|---|---|---|---|---|
| GDP deflator | 0.04 | 0.09 | 0.15 | 0.22 | 0.30 |
| Consumer price index | -0.09 | 0.37 | 0.28 | 0.34 | 0.49 |
| Producer price index | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| | | | | | |
| *Factor payments* | | | | | |
| Rural labor | 0.8 | 1.59 | 2.37 | 3.13 | 3.88 |
| Urban labor | -1.33 | -2.62 | -3.87 | -5.1 | -6.29 |
| Capital (urban & rural) | 0.81 | 1.61 | 2.4 | 3.19 | 3.97 |
| Land | 0.74 | 1.47 | 2.19 | 2.91 | 3.62 |
| Exchange rate | 0.61 | 1.2 | 1.79 | 2.36 | 2.93 |

*5.3.2.b. Production, employment, and trade.* Real GDP increases up to 0.6% (Table 32). Reduction in the tertiary sector is more than offset by the expansion of industry which grows up to 7.25%. In the primary sector GDP barely changes (with a maximum reduction of 0.11%). There is a smaller expansion of agroexporting sectors, with more limited devaluation. The stock raising sector no longer contracts. Given the growth of investment and the growth in imports linked to higher GDP, the secondary sector, construction, manufacturing and mining expands. This offsets in part the impact of the reduced public employment. In the case of agroindustry, the reduction in internal consumption is not fully replaced by export demand, so the sector undergoes a marginal drop of up to 0.2%.

**Table 32**

**Impact on production (Real GDP) (Base year percentage change)**

| REDUCCION DEL GASTO | 5% | 10% | 15% | 20% | 25% |
|---|---|---|---|---|---|
| *Aggregate GDP* | | | | | |
| Total GDP | 0.13 | 0.26 | 0.38 | 0.49 | 0.60 |
| Primary GDP | -0.02 | -0.05 | -0.07 | -0.09 | -0.11 |
| Secondary GDP | 1.48 | 2.94 | 4.39 | 5.83 | 7.25 |
| Tertiary GDP | -0.66 | -1.33 | -2.00 | -2.67 | -3.35 |
| *Sectoral GDP* | | | | | |
| Agricultural exports | 0.04 | 0.07 | 0.09 | 0.11 | 0.11 |
| Basic grains | -0.21 | -0.4 | -0.59 | -0.78 | -0.95 |
| Other agricultural | -0.16 | -0.32 | -0.48 | -0.65 | -0.81 |
| Forestry,hunting, & fishing | 0.21 | 0.41 | 0.59 | 0.76 | 0.91 |
| Livestock | 20.88 | 0.01 | 0.03 | 0.05 | 0.08 |
| Agroindustry | -0.06 | -0.12 | -0.18 | -0.23 | -0.28 |
| Manufactures | 1.89 | 3.75 | 5.6 | 7.43 | 9.24 |
| Constrution | 7.25 | 14.42 | 21.5 | 28.49 | 35.41 |
| Mining | 1.4 | 2.82 | 4.24 | 5.66 | 7.1 |
| Trade | 0.38 | 0.76 | 1.14 | 1.51 | 1.89 |
| Government sevices | -4.67 | -9.38 | -14.13 | -18.93 | -23.76 |
| Other services | 1.32 | 2.67 | 4.04 | 5.44 | 6.86 |

Finally, the tertiary sector has a significant fall of 3.35% when the reduction in public spending reaches 25%, because government services represent a little more than one fourth of the economy's tertiary GDP. In the foreign sector (Table 33), the simulation suggests an expansionism imports (given the momentum of investment) of up to 2.2% and an increase in exports of up to 5.2%.

**Table 33**

**Impact on foreing trade (Base year percentage change)**

| Cost reduction | 5% | 10% | 15% | 20% | 25% |
|---|---|---|---|---|---|
| *Exports* | | | | | |
| Agricultural exports | -0.06 | -0.13 | -0.21 | -0.29 | -0.39 |
| Other agricultural | 0.24 | 0.47 | 0.69 | 0.9 | 1.09 |
| Forestry, hunting, & fishing | 0.39 | 0.76 | 1.12 | 1.46 | 1.77 |
| Agroindustry | 0.45 | 0.88 | 1.31 | 1.73 | 2.14 |
| Manufactures | 2.13 | 4.25 | 6.35 | 8.44 | 10.52 |
| Mining | 1.68 | 3.36 | 5.06 | 6.77 | 8.49 |
| Other services | 2.79 | 5.65 | 8.57 | 11.55 | 14.59 |
| TOTAL | 1.03 | 2.07 | 3.12 | 4.17 | 5.23 |
| | | | | | |
| *Imports* | | | | | |
| Agricultural exports | 0.75 | 1.49 | 2.23 | 2.97 | 3.7 |

| | | | | | |
|---|---|---|---|---|---|
| Basic grains | -0.66 | -1.28 | -1.88 | -2.45 | -2.99 |
| Other agricultural | -0.95 | -1.87 | -2.76 | -3.63 | -4.48 |
| Forestry, hunting, & fishing | -1.24 | -2.46 | -3.66 | -4.86 | -6.03 |
| Livestock | -0.2 | -0.38 | -0.54 | -0.68 | -0.81 |
| Agroindustry | -0.77 | -1.52 | -2.25 | -2.95 | -3.63 |
| Manufactures | 1.55 | 3.07 | 4.57 | 6.04 | 7.5 |
| Construction | 5.99 | 11.77 | 17.35 | 22.73 | 27.93 |
| Mining | 0.12 | 0.22 | 0.31 | 0.38 | 0.44 |
| Trade | -0.7 | -1.37 | -2.02 | -2.66 | -3.27 |
| Government services | -6.65 | -13.07 | -19.27 | -25.27 | -31.06 |
| Other services | -1.01 | -2 | -2.95 | -3.88 | -4.79 |
| TOTAL | 0.43 | 0.86 | 1.3 | 1.73 | 2.17 |
| Real trade balance* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

*The balance on the Trade Balance is of -22158 millions of cordobas for the base year

*5.3.2.c. Income distribution.* Income redistribution always favors rural sectors, but somewhat less so in this closing compared to the previous one (Table 34). Rural labor and intermediate farmers, increase their share by up to 0.4%. There are reductions in the shares of intermediate, capitalist and urban workers sectors.

**Table 34**
**Impacts on income distribution**

| **Cost reduction** | **5%** | **10%** | **15%** | **20%** | **25%** |
|---|---|---|---|---|---|
| Base year percentage change | | | | | |
| Households | | | | | |
| High capitalist | -0.02 | -0.03 | -0.03 | -0.02 | -0.01 |
| Middle urban | -0.05 | -0.08 | -0.12 | -0.14 | -0.16 |
| Middle rural | 0.78 | 1.55 | 2.32 | 3.08 | 3.83 |
| Lower urban | -0.50 | -0.99 | -1.46 | -1.92 | -2.36 |
| Lower rural | 0.79 | 1.57 | 2.35 | 3.10 | 3.85 |
| **Cost reduction** | **5%** | **10%** | **15%** | **20%** | **25%** |
| Participation in total income | | | | | |
| Households | | | | | |
| High capitalist | 32.2 | 32.2 | 32.2 | 32.2 | 32.1 |
| Middle urban | 34.5 | 34.5 | 34.4 | 34.4 | 34.4 |
| Middle rural | 6.2 | 6.3 | 6.3 | 6.4 | 6.4 |
| Lower urban | 16.6 | 16.5 | 16.4 | 16.3 | 16.2 |
| Lower rural | 10.5 | 10.6 | 10.7 | 10.8 | 10.8 |

*5.3.2.d. Other aggregate variables.* Industrial expansion increases tax revenues, which grow up to 3.8% with a 25% reduction n government spending. This comes from growth in indirect taxes (fiscal industry) and the increase in import duties (Table 35). The increase in public savings is larger in this closing (of up to 68%) compared to the previous one. Because intermediate and urban professional sectors do not see their incomes deteriorate, direct and consumer taxes also grow. Investment grows up to 33.8%. To conclude, a contraction in public spending causes a significant reduces the public deficit. It also improves the external balance if the *córdoba* depreciates. If the external balance does not vary, the classic "displacement" effect takes place through investment. The contraction in public employment in absorbed in part by the increase in employment in other services or in industry. Redistributive effects favor rural labor, capital, and land.

**Table 35**

**Results of other aggregate variables. (Base level in millions of Cordobas. Base year percentage change)**

| Cost reduction | Base | 5% | 10% | 15% | 20% | 25% |
|---|---|---|---|---|---|---|
| Government consumption | 1483.9 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Investment | 1463.8 | 7.29 | 14.5 | 21.63 | 28.68 | 35.64 |
| Private consumption | 6675.2 | -0.26 | -0.5 | -0.73 | -0.94 | -1.14 |
| Family savings* | 2.5 | 17.58 | 35.02 | 52.34 | 69.54 | 86.63 |
| Governmen savings | 730.1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Enterprise savings | 150.2 | 13.91 | 27.67 | 41.27 | 54.71 | 68.01 |
| Net foreign savings | 581.0 | 0.81 | 1.61 | 2.4 | 3.19 | 3.97 |
| Remittances | 800.9 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Government income | 2505.9 | 0.78 | 1.55 | 2.31 | 3.07 | 3.81 |
| Tariff | 267.0 | 0.94 | 1.88 | 2.81 | 3.75 | 4.68 |
| Indirect tax | 804.0 | 1.13 | 2.25 | 3.36 | 4.47 | 5.56 |
| Households direct tax | 192.2 | -0.05 | -0.08 | -0.11 | -0.14 | -0.15 |
| Enterprise direct tax | 59.2 | 0.81 | 1.61 | 2.4 | 3.19 | 3.97 |
| Consumption tax | 404.62 | 0.68 | 1.35 | 2.02 | 2.69 | 3.34 |

## VI. Conclusions

The Nicaraguan economy emerged from the armed conflict of the eighties with hyperinflation, unsustainable foreign and fiscal gaps, and obsolete industry heavily dependent on imports and a primary sector that sustained the national economy. Despite the fact that a consequence of the armed conflict was a more equitable land distribution than in most Latin American countries, small producers have hardly benefited from agricultural and stock-raising policies. During the 1990s, stabilizing the economy was sustained by extreme monetary, credit and fiscal discipline, accompanied by a modification of the government's role, from a determiner to facilitator of economic growth. The new national development strategy emphasizes the private sector as assigns exports as the driver of economic growth. This program promotes primary sector exports. The fixed exchange rate system implemented in 1991 and 1992 proved to be an efficient anchor for prices, but was insufficient to stimulate primary exports. After 1993, a sliding exchange rate system was implemented to facilitate real devaluation of the currency.

Devaluation with fiscal discipline and investment fixed (first closure), brings about an improvement in the foreign balance and favors lower income households - especially rural ones - but also contracts the economy with general loss of welfare. The result is nothing new: in a small, open and poorly articulated economy like Nicaragua, where imports exceed half of the GDP and have greater weight in the secondary sector and in investment, devaluations are recessive (Krugman and Taylor, 1978).

Previous studies on Nicaragua suggest that a policy of devaluation requires higher public expenditures to compensate for contractionary effects (Arauz, 1992). In the second closure when investment is no longer fixed, results show steeper declines in output and welfare (though softer ones in income distribution). These results indicate that economic reactivation can be based not only on the dynamism of tradable good production, but also on the multiplier effects they can generate. In this sense, a "democratic" reactivation that includes small producers in tradable good production (high elasticity - income sectors) could be more efficient in achieving economic growth and a reduction of rural poverty (IICA, 1991). State investment can also be a pivotal element in the generation and expansion of intersectoral linkages. Such investments, as reported by Nicaragua's Banco Central in its 1996 report, have been financed up to now primarily by foreign loans.

In the second group of simulations, tariff liberalization leads in all cases to gains in efficiency. The effects are more palpable when the exchange rate is fixed and a substitution of public savings for foreign ones takes place. A reduction of tradable goods relative to domestic goods produces an appreciation of the real exchange rate. Corporate sectors - mostly urban ones - are the ones that benefit the most from the lower prices of imports. A reduction of tariffs reduces the ability of competing with imported products, which is reflected in a significant growth of consumer goods imports. The depression of the primary sector is also notable, particularly in the subsector of basic grain producers despite the expansion of consumption. In general, the substitution effect prevails over the income

effect in the liberalization scenario. The aggregation of the manufacturing sector in the SAM does not allow us to capture differentiated impacts in the secondary sector. Based on the aggregate result and on additional information, however, we can state that the domestic production of textiles, clothing, leather and shoes is impacted since it cannot compete with imported products (Dijkstra, 1995, p. 121).

As the expansion of the economy and consumption generates greater fiscal income, this cannot compensate for the decrease in tariff collection such that the fiscal gap deepens. The real exchange rate also appreciates, worsening the foreign gap. Undoubtedly this situation cannot be sustained without the continued inflow of foreign resources. When the exchange rate is left to vary and foreign savings are fixed, the effect of tariff liberalization in production and efficiency, tough positive, is smaller than in the previous case. This is due to the fact that the depreciation of the *córdoba* operates in the opposite direction of tariff reductions on import prices. Distribution of income begins to favor rural workers due to the momentum of agroexporting sectors. In this case, if the government seeks to compensate the loss in tariff income with taxes on the private sector, consumption gets depressed. If the government accepts lower income and a greater fiscal deficit, investment is impacted. An alternative could be expanding public investment, which is closely linked to foreign resources as was stated before.

To summarize, trade liberalization results in gains in efficiency, but is also deepens fiscal or external unbalances, depending on how the exchange rate is handled. The agricultural and cattle-raising sector does not see results from these gains, because the expansion of consumption focuses basically on imported products. Only the agroexporting sub-sectors can benefit when there are devaluations in the real exchange rate. Du to its static nature, the model does not capture each step in the transition process towards efficiency industry, with obsolete equipment and a oligopolic market structure that bases its benefits on fixing a margin over costs based on depressed salaries. Paradoxically, gains in efficiency depend, in part, on a transition away from such industries.

In the contraction of public spending scenario, we found the efficiency gains to be more significant when the exchange rate is allowed to depreciate and when the foreign balance is fixed. Thus we get a "displacement" effect with a strong expansion of investment that fosters industrial activity. The reduction of public employment causes a negative impact on domestic consumption, a phenomenon that may partly explain the depression in the supply of basic

grains and of agro-industrial products[17]. When investment is fixed and the foreign account is liberated, on the other hand, an improvement in the foreign balance occurs along with

[17] We know that an immediate and direct effect of economic reforms – particularly of reducing public spending – is an increase in unemployment and a reduction in the health and education services. The model does not capture this behavior because it assumes full

healthier public finances and an important stimulation of the exporting sector. In this scenario, however, industry is not so favored, and impacts on welfare do not have the "displacement" effect we described before.

The results we presented show the importance of investment in the success of the structural modification processes. The experience that emerged from the internal and external liberalization programs applied to Latin American economies shows that they are not enough to create an environment that fosters the growth of national and foreign private investment. This shows that the active participation of the government is necessary and, especially, that the retraction of the state in the economy should be accompanied by new government regulations, by institutional change and by the creation of new public institutions[18].

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employment and due to the lack of information on the components of public spending, respectively. Regarding employment, we can say that the model is long term, it considers that in sufficiently long period of time, the economy will be employing fully all the Nicaraguan labor force. In contrast, the open unemployment rate went from 11.1% in 1990 to 21.8% in 1993 and, id sub-employment is included, it went from 39.4% to 50.1% during that same period and the employment in the public sector was reduced from 284,000 positions in 1990 to 87,000 in 1996 (Banco Central de Nicaragua, Annual Report, 1996).

[18] The importance of what was just mentioned can be observed in the Nicaraguan case. The recent experience of this country shows that when the state leaves the market, it is common for the private sector not to occupy the space that was left or for it to take advantage of the lack of competition, hence damaging the market (Clemens, 1992). An example is the experience of the incipient Nicaraguan financial market. Its oligopolic, or poorly competitive structure in an unstable macroeconomic environment, where bank supervision is still ineffective, allowed it to establish very high interest rates in "gentlemen's agreements". In fact, Nicaragua had the highest real interest rates of Central America during the first years of the nineties. The real active rates in Nicaragua went from –5.2% in 1989 to 19.4% in 1991 (the year of the SAM used in this study). The 1991 rate was way over that of Costa Rica (12.3%), the Central American country that traditionally has the highest rates (Statistics of the Central American Monetary Council). Also, the bank portfolio directed itself mainly to the trade sector (this behavior had already taken place in the 1960s), affecting the industrial and agricultural and stock-raising sectors (for example, the 102, 000

The stabilizing and "outward" oriented development policies that we studied promote a healing of the fiscal and foreign unbalances, but they cause contradictory effects on the economy. As in other Central America countries, Nicaragua set out on a model of opening to the exterior and of deregulation. Though the contraction in public spending and tariff reduction seem to generate a greater economic efficiency - most of all when a certain exchange rate depreciation is allowed - these policies do not guarantee a harmonious growth of the economy. Along with the need to foster, orient and regulate private and public investment, there is a need for a body of microeconomic policies that foster intersectoral linkages. The foundation for future growth would undoubtedly be in the agricultural, stock-raising and agro-industrial sectors, because they are the most competitive ones in the process of opening to the exterior. International cooperation resources should be oriented towards these policies, since only through their implementation will it be possible to conduct a competitive re-industrialization.

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country families that received some kind of formal credit in 1988 were reduced to 37,000 during 1991 (UNAG, 1993)) causing a contracting sequel.

## VII. Bibliography


Acevedo Vogl, A. (1993). Nicaragua y el FMI: el pozo sin fondo del ajuste. Nicaragua: Latino Editores.

Arauz, A.L. (1992). El efecto de una política devaluativa en una economía pequeña y abierta (caso Nicaragua).CIDE, México, September, Master's Degree Thesis.

Arias Peñate, Salvador, Juan Jovane y Luis NG, Coordinators, (1993). Centroamérica, obstáculos y perspectivas del desarrollo. MOCECA: Modelo de Coherencia Económica del Istmo Centroamericano. CADESCA-CCE, Costa Rica.

Avendaño, N. (1994). La Economía de Nicaragua: el año 2000 y las posibilidades de crecimiento. Nicaragua, Managua, NITLAPAN and CRIES.

Banco Central de Nicaragua Informe anual, several years.

Banco Central de Nicaragua, Indicadores de Actividad Económica, several issues, 1993.

Broke, Anthony, David Kendrick and Alexander Meeraus (1988), "GAMS: A User´s Guide," Redwood City, CA, The Scientific Press.

CEPAL (1991). Remesas y economía familiar en El Salvador, Guatemala y Nicaragua, CEPAL, LC/MEX/L.154, June 25.

CEPAL (1993). Nicaragua: una economía en transición. México, December.

Centro de investigaciones y estudios de la Reforma Agraria. La reforma agraria en Nicaragua 1979-1989, CIERA, Nicaragua, 1989.

Clemens, H. (1993). La estrategia de desarrollo agropecuario de Nicaragua. In*: Por la Búsqueda de una* Estrategia de Desarrollo para Nicaragua, School of Agricultural Economy, ESECA, UNAM, Managua, 11-30.

De Franco, M. (1993), "¿Vale la pena la nueva integración en Centroamérica? Un enfoque de equilibrio general". Instituto Centroamericano de Administración de Empresas.

Devajaran, S., J.D.Lewis and S.Robinson (1994) "Getting the Model Right: The General Equilibrium Approach to Adjustment Policy." Draft, January.

Dijkstra, G. (1995). "La industria tradicional ante las nuevas condiciones de competencia: el caso de Nicaragua", In: T. Alternburg, H. Nuhn, editors, Apertura Comercial en Centroamérica: Nuevos Retos para la Industria. San José: Costa Rica. Friedrich Ebert Stiftung, DEI.

Drud, A., W. Grais and G. Pyatt,(1985) "An Approach to Macroeconomic Model Building Based on Social Accounting Principles". World Bank. May.

Dumazert, Patrick (1993) “Modele MOCECA et Fenetre Agricole”, CADESCA-IRA Documents D’Appui a la Mission, 22-27 November.

FIDEG, “El Observador Económico”, Managua, Nicaragua, several issues.

Funkhauser, Edward (1995), “Remittances form International Migration: A Comparison el El Salvador and Nicaragua”, Reviwe of Economics and Statistics, LXXVII(1), february, pp. 137-146.

Gibson, Bill. (1985) “A structuralist macromodel for post-revolutionary Nicaragua”. Cambridge Journal of Economics, 9, pp 347-369

Kendrick, David A. (1989) “Models for Analyzing Comparative Advantage”. ILPES/UNDP. Kluwer Academic Publishers.

King, Benjamin B. "What is a SAM? A Lauman's Guide to Social Accounting Matrices". World Bank Staff Working Papers, Number 463.

IICA, Instituto Iberoamericano para la Cooperación Agrícola (1991) “Bases para una estrategia de desarrollo agropecuario y agroindustrial en América Latina y el Caribe”. X Conferencia Interamericana de Ministros de Agricultura en Madrid, September, Costa Rica.

International Monetary Fund (1994) “Nicaragua Enhanced Structural Adjustment Facility, Policy Framework Paper, 1994-1997”, April.

Kornai, J. (1979). Resource constrained vs. demand constrained systems. Econometrica 47(4), 801-819.

Krugman, P. & Taylor L. (1978). Contractionary effects of devaluation. Journal of International Economics Vol. 8, 3, 445-456.

Medal Mendieta, José Luis (1993) Nicaragua: Políticas de estabilización y ajuste. Nicaragua, LAC, Managua.

MEDE (1993). Plan nacional de reconversión industrial. Nicaragua, Managua.

Ministerio de Agricultura y Ganadería (1991). Estrategia agropecuaria, forestal y agroindustrial de Nicaragua 1992-1996. Managua: Nicaragua. Dirección General de Planificación.

Pyatt, GAM (1985). "Commodity Balances and National Accounts: A SAM Perspective". The Review of Income and Wealth. Series 31, No. 2, June, pp. 155-169.

-----, and Jeffrey I. Round, (1985) "Social Accounting Matrices for Development Planning". World Bank Reprint Series No.74.

-----, and Jeffrey I. Round, (1984) "Improving the Macroeconomic Data Base: A Sam for Malaysia, 1970". World Bank Staff Working Papers No.646.

PFSA-CADESCA-CCE (1992). "MOCECA: Modelo de coherencia económica del Istmo Centroamericano, Panamá".

Robinson, Sherman, (1989) "Multisectorial Models", en Chenery, H. y T. N. Srinivasan, Handbook of development economics, Elsevier Science Publishing Co. Inc., Amsterdam y Nueva York, Vol. II, pp. 885-947.

Robinson, S., M. and K. Hanson (1990). "The USA/ERS Computable General Equilibrium (CGE) Model of the United States, mimeo, ERS, USDA, report num. AGES 9049

Robinson, S., A. Yúnez-Naude and R. Hinojosa-Ojeda (2000), "Modelos de equilibrio general computable", ch. 1 in *Cambio estructural y apertura comercial en América Central, en la República Dominicana y en Norteamérica: un enfoque de equilibrio general aplicado,* Antonio Yúnez-Naude and Raúl Hinojosa-Ojeda compiladores, El Colegio de México, pp. 17-36

Secretaría de Planificación y Presupuesto de la República (1990). Matriz de insumo-producto de Nicaragua. Año 1986. Managua: Nicaragua. Dirección de Cuentas Nacionales.

Shoven, J. & Whalley,) J. (1992) "Applying general equilibrium". Cambridge University Press

Sobarzo, Horacio E. (1990) "A consolidated social accounting matrix for input-output analysis". Centro de Estudios Económicos (El Colegio de México) Documento de Trabajo, No.IV

UNAG, Unión Nacional de Agricultores y Ganaderos (1993) "Aportes para la estrategia de desarrollo agropecuario de Nicaragua", en 'Por la búsqueda de una estrategia de desarrollo para Nicaragua', School of Agricultural Economy, UNAM, Managua.

Yúnez Naude, Antonio, (1991) "Hacia un tratado de libre comercio norteamericano", Centro de Estudios Económicos (El Colegio de México) Documento de Trabajo, No. IV-91, Septiembre.

----------,1992, "El tratado de libre comercio y la agricultura mexicana: un enfoque de equilibrio general aplicado". Centro de Estudios Económicos (El Colegio de México), Septiembre.

----------, (1995). Trade liberalization and the agricultural sector of Mexico. In E. Echeverri-Carroll (editor). NAFTA and Trade Liberalization in the Americas, pp. 133-160. The University of Texas at Austin, Texas.