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## **Documentos de Trabajo**

### **Macroeconomic Impacts of the Reform of Public Services in Uruguay – A CGE Analysis**

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# **Macroeconomic impacts of the reform of public services in Uruguay - A CGE analysis <sup>1</sup>**

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<sup>1</sup> This document summarizes some of the results of the project entitled “MODELO DE EQUILIBRIO GENERAL COMPUTABLE PARA ANALIZAR LOS IMPACTOS MACROECONÓMICOS DEL PROCESO DE REFORMA DE LOS SERVICIOS PUBLICOS EN URUGUAY”, financed by OPP and World Bank, URU/01/010-028. Inés Terra coordinated the team that worked in this project, which was integrated by Pedro Barrenechea, Alvaro Forteza, Gabriel Katz, Héctor Pastori, Andrés Pereyra, Darío Saráchaga and Inés Terra. The authors of this document assume full responsibility for its contents. The bulk of the study was carried out in the second semester of 2002 and there have been some changes in the regulatory frame of public services since then. These changes are acknowledged in the discussion, but the simulations summarized here are the original ones. Nevertheless, we think that these simulations remain valid today.

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### **Abstract**

This paper investigates the macroeconomic impacts of the reform of public services in Uruguay. A computable general equilibrium (CGE) model is used to simulate different policy scenarios, analyzing the reforms of the regulatory framework of public services, changes in their investment policies, modifications in the competitive environment and reforms in their tax structure. The results show that the macroeconomic effects of the proposed reforms are relatively small.

### **Resumen**

El presente trabajo analiza los impactos macroeconómicos de la reforma de los servicios públicos en Uruguay. A tales efectos utilizamos un modelo de equilibrio general computable (CGE) para simular distintos escenarios de política, tales como cambios en el marco regulatorio de los servicios públicos, cambios en sus políticas de inversión, modificaciones en su entorno competitivo y reformas en su estructura tarifaria. Los resultados obtenidos indican que los efectos macroeconómicos de las reformas propuestas son en general de escasa magnitud.

Keywords: Social Accounting Matrix, Computable General Equilibrium Models, public services, public sector reform.

JEL classification: E17, H11, H32, L42.

## **I. INTRODUCTION**

In the late 1980s, after decades of poor economic management, many Latin American countries started a process of economic reform. Although the progress and scope of this process differed from country to country, its basic principles were similar, one of them being reliance on market forces to determine the allocation and distribution of resources. While Uruguay made considerable progress in achieving macroeconomic stability during the 1990s and embarked on a series of macroeconomic reforms, "...the country's approach and pace of reform did not provide sufficiently prudent fiscal scope to absorb external shocks....nor insulate the economy from regional contagion" (World Bank, 2003).

Following four years of economic stagnation, Uruguay faced in 2002 its most severe economic crisis in decades. In this context, international financial institutions provided Uruguay with technical and financial support in order to boost economic growth, improve the competitiveness of the Uruguayan economy and set the stage for recovery of sustained economic growth. Greater efficiency in the provision of public services and infrastructure was regarded by multilateral institutions as crucial for improving the general welfare of population and contributing toward the return to growth. Though some reforms in this area have already been undertaken and coverage and quality of the main public services in the country are high relative to the region, considerable challenges remain in further liberalizing key services and infrastructure sectors, strengthening regulatory frameworks, promoting private sector investment, reducing tax distortions and increasing competitiveness of service provision. The main goal of this paper is precisely to analyze the effects of the proposed reform of public services on the Uruguayan economy.

## **II. BRIEF OVERVIEW OF PUBLIC SERVICES IN URUGUAY**

Although there are certain general characteristics underlying the provision of public services in Uruguay and a common logic in the regulatory reforms undertaken since the beginning of the nineties, each sector has its own defining characteristic. Moreover, these particular characteristics determined to a large extent the success or failure of the proposed reforms.

In this section we give a brief overview of public services in Uruguay, underscoring the most salient features of the market organization and of the agents involved, the leading economic indicators of the sectors and the characteristics and objectives of the regulatory reforms implemented thus far.

### **II.1 Railroad transportation sector**

The railroad transportation services were originally developed and supplied in Uruguay by British companies. In 1945 services were nationalized and became administered by the National Railroad Administration (AFE). Since then, this monopolistic public enterprise has been in charge of the infrastructure of railway network and of the provision of passenger and cargo transport services. In 1985 the passenger transport services were virtually interrupted and only some short - haul routes remained. In 1993 a concession for the exploitation of

suburban passenger transport services in Montevideo was established, but it was revoked in 1996.

In 2002, 822 thousands of tons of freight were transported, concentrated in few products and few routes, mainly in the countryside. The volume of cargo transported has been steadily decreasing since the year 2000. Except for some specific type of cargo with important volumes, railroad cargo transport cannot compete with truck traffic in view of the current financing conditions of the different modes of transportation. The most important foreseeable opportunity for railroad cargo transport in the near future lies in the development of the forestry sector, which will require the transport of big volumes of cargo in medium and long distances in the north of the country. Transport costs are key for this sector, therefore requiring important investments in transport as long as the institutional framework enables them.

In regard to the participation of the private sector in the railway sector, there is the possibility to establish concession - type arrangements for the exploitation of transport services. This has already been done in the country, although results have not been very successful. Over the last couple of years there have been some attempts to introduce some reforms following the experiences in Great Britain and other developed countries. The intended effects of these reforms are to introduce competition in the railroad infrastructure market and to release AFE from infrastructure costs and enable it to compete reasonably in the railroad transport market. However, most of the reforms have not yet been implemented.

A new government took office in March 2005. The authorities have announced a change in rail policies: the public administration will attempt joint ventures with private firms, rather than consession of public work (as the previous administration did).

## **II. 2 Electric energy sector**

In the period 2001-2003, hydroelectric generation accounted for more than 95% of total electricity generated in the country. However, the availability of hydroelectric energy is highly variable and is not predictable with the prevailing techniques. In fact, in 2004, when demand rose and an important drought affected Uruguay, thermic generation reached 20% of total electrical generation.

Uruguay's electric system is linked with the Argentinean system through 500 kV transmission lines. Argentina's availability of cheap natural gas and the size of its electrical generation system (which is 10 times the size of Uruguay's system) have enabled Argentina to become an important energy exporter in the region. This close linkage with the Argentinean system would allow to entirely meeting Uruguay's electrical demand with Argentinean energy, if it were not for the restrictions in the Argentinean transmission network.

The electrical wholesale market in Argentina is going through a price crisis as a result of the emergency measures adopted by the Argentinean government in January 2002. The wholesale price in Argentina has plummeted following the "pesification" of the economy. This situation does not allow the development of the generation system in Argentina, and has led several firms to financial default. As a result, the investment in electricity in Argentina has basically

paralyzed. Therefore energy imports from Argentina are no longer safe, and there is a serious possibility that the Uruguayan demand is not fully covered.

Furthermore, the Argentinean government modified the natural gas purchase agreements of Uruguayan agents, setting the prices in dollars (they were formerly in pesos). This constituted discriminative behavior in the regional gas market, raising the price of a crucial input for electric energy generation and hindering the possibility of an integrated and fair energy market for generators of both countries.

Residential consumption accounts for the most part of electric energy consumption, mainly due to the use of electric energy in heating, water heating and cooking. Large industrial consumers represent less than 25% of the demand. Uruguayan demand remained relatively stable, which allowed the electric company to postpone some investment decisions for a while. But now the authorities are pressed to increase the generation capacity to reduce the risk of been unable to cover demand during peaks of high consumption of energy.

The passing of the Law N° 16.832 in 1997 and of other related resolutions in the following years implied a major regulatory reform in the electric energy sector. The law authorized potential competition in electric generation. On the other hand, the transmission and distribution of electricity remained public sector activities supplied by UTE, the monopolistic state enterprise. Besides, the law created an Electric Wholesale Market in which all local generators as well as bids from foreign suppliers compete.

### **II. 3 Fuel sector**

The two main laws that regulate the functioning of the fuel market in Uruguay are Law N° 8.764 from 1931, that granted the public enterprise, ANCAP, monopoly rights on imports and exports of hydrocarbons and on oil refining, and Law N° 17.448 from 2002, that established the demonopolization of imports, exports and refining of crude oil, allowing ANCAP to associate with private partners. Although the second law was partially derogated by a Referendum in 2003, it provided a new framework for introducing regulatory changes in the functioning of the fuel market.

Since Uruguay does not produce fossil fuels, oil has to be imported. ANCAP's prices and taxes are set by the Executive Power according to fiscal criteria, with no regard for efficiency considerations. This causes severe distortions in domestic prices in comparison to international prices (see Table 1). Tax incidence differs between oil derivatives, but it is quite relevant and represents an important source of incomes for the Uruguayan State (see Table 2).

**Table 1 - Comparison of average import and domestic prices - 2002**

	Import price	Max/Min import price	ANCAP's price	Imported volume / produced volume	ANCAP's price / import price
Gasoline (Supra 95)	234	100%	438	1%	187%
Gas Oil	189	139%	304	67%	161%
Fuel Oil	158	122%	167	24%	106%

Source: National Energy Office.

**Table 2 – Tax structure in the fuel market**

Taxes	Super gas	Gasoline (Supra 95)	Gas Oil	Heavy Fuel Oil
ANCAP	81%	48%	78%	81%
Sales tax (IMESI)	0%	54%	22%	0%
Value added tax (IVA)	19%	0%	0%	19%

Source: Elaboration based on information provided by the National Energy Office for 2002.

The distribution of liquid derivatives takes place in three modalities: direct sales from ANCAP to large consumers (those with monthly purchases bigger than 500 cubic meters); sales to intermediate consumers through four local distributors; and retail sales (gasoline and gas oil) through gas stations. There are four distributing firms in Uruguay: Esso, Shell, Texaco and DUCSA, the latter being a subsidiary firm of ANCAP. The three private distributors are linked to ANCAP through detailed contracts that establish the margins received by the distributors; the discounts offered to gas station owners and the transport costs. Besides, there are 550 gas stations, 10% of them owned by the distributors and the others owned by small firms linked to the distributors by long term contracts (10 to 15 years). The prevailing regulatory framework, incorporated in the contracts between ANCAP and the distributing firms and between them and gas station owners, determine that each derivative has the same price around the country. The contracts also regulate the number of permits for gas stations in the country, leading to reduced competition among distributors and enabling ANCAP to control the operative margins of each group of agents in the market.

Since 1995, as part of a general association strategy with private partners, ANCAP has been seeking regional partners for the commercialization of fuel in order to adjust to potential competition in the domestic market. In 1998 ANCAP signed an agreement with the Argentinean distributor Sol Petróleo for the distribution in Argentina of automotive gasoline produced in one of ANCAP's refineries. The agreement implied selling 220 thousands barrels/month, equivalent to 400 thousand cubic meters per year, an amount similar to the annual sales of automotive gasoline of ANCAP in the Uruguayan market.

#### **II. 4 Gas sector**

There is no natural gas production in Uruguay, so it has to be imported from Argentina. In 1998, ANCAP and UTE signed an agreement with the Province of Entre Ríos (Argentina)

purchasing gas transport capacity in exchange for financial support to build a gas pipe in that Province. The agreement enabled the construction of a gas pipe in Entre Ríos that will allow transporting 2 to 4 million m<sup>3</sup>/day of gas to Uruguay. Besides, in March 1999 the Executive Power signed a concession contract for 30 years with Gaseoducto Cruz del Sur S.A., a consortium integrated by Pan American Energy, British Gas and Wintershall, whereby the firm was committed to build a central gas pipe joining Punta Lara (in the Argentinean coast), Colonia and Montevideo, and a series of other smaller gas pipes to supply cities in Colonia, San José and Canelones. However, this concession did not entirely solve the problem of transporting Argentinean gas to Montevideo, since the starting point of the gas pipe lies 30 km away from the existing gas network in Buenos Aires.

Natural gas demand in the country comprises three different sectors: electric energy generation; large consumers, especially industrial ones, that could be connected to the distribution network in the near future and would use natural gas to substitute fuel oil, gas oil and wood; and residential consumers, whose connection to the distribution network will take longer due to economic reasons. The demand of the first sector will determine the economic feasibility of the construction of gas pipes in Uruguay. The industrial and residential demand will be much lower than the demand for electric energy generation, at least in the next 10 years.

## **II. 5 Telecommunications sector**

The National State Telephone Administration (ANTEL) was created in 1974 by Decree - Law N° 14.235. ANTEL acted both as a telecommunications enterprise and a sectoral regulator, and its objectives included the provision of urban and long distance (national and international) telecommunication services, the provision and control of all activities related to public and private telecommunications, and the administration, defense and control of the national radioelectric space. The law granted ANTEL a monopolistic position regarding all its activities, though it only held exclusive rights to the provision of telephonic services. However, the interconnection to ANTEL's telecommunication network, a crucial element for the existence of other operators in the market, requires the authorization of the public enterprise. Law N° 16.211 introduced some regulatory changes, allowing ANTEL to integrate mixed (public - private) firms to provide telecommunication services. Although this law was derogated by a Referendum, some important articles related to the telecommunication sector remained unrevoked. Finally, the last Budget Law (Law N° 17.296) maintained ANTEL's monopolistic and exclusive rights to the provision of public basic telephonic services, while authorizing competition in other services. Articles 612 and 613 of the law, which provided the legal base for the liberalization of the sector, were derogated by a Referendum, thus endangering the development of the reform. Nonetheless, the Government was able to authorize several companies to operate in the international long distance and data transmission markets in 2001, and to organize an auction procedure to assign the use of the radioelectric space for mobile phone services that same year.

Currently, local telephone services are monopolically provided by ANTEL. Until the end of 2001, ANTEL also held a monopoly for the provision of international telephonic services. ANTEL's tariffs were higher than those prevailing in the neighbor countries, and the firm obtained important revenues that determined gross benefits for the firm and transfers to the



General Government. Following the entry of new operators into the market, different service qualities and prices have appeared. However, competition has not yet developed completely because several entry barriers remain. These entry barriers prevent private operators of long distance and mobile telephony from accessing local nets with reasonable costs. Interconnection problems are directly related to difficulties in the regulatory process.

The service that has experienced the greatest development in the last couple of years is mobile telephony. This service was originally provided in the country by MOVICOM, which was the only firm operating in the market between 1992 and 1994. Consumer prices were initially very high, therefore enabling MOVICOM to obtain important revenues and to finance network investments in just a few years despite having a reduced number of customers (less than 6,000). In 1994 ANTEL entered the market creating ANCEL, leading to a significant decline in prices and increasing the number of consumers. The mobile telephony market remained a duopoly until the end of 2001, and there was no real competition between both firms: the technological decisions were determined to a greater extent by ANTEL, with MOVICOM following suit. This situation changed in the last couple of years as a result of two auctions of mobile phone frequencies, with MOVICOM - BELLSOUTH and CTI Móvil entering into the market as competitors.

## **II. 6 Water and sewerage sector**

Law N° 11.902, dated December 19<sup>th</sup> 1952, created the Administration of Sewerage Works of the State (OSE), with the responsibility of providing potable water and sewer services in Uruguay. However, the Local Government of Montevideo remained in charge of the provision of sewer services in the capital city. In 1993 and 1996, OSE signed concession agreements with private firms, URAGUA and Aguas de la Costa, for the provision of potable water and sewerage in some areas in the countryside.

OSE's supply of water and sewerage has grown strongly in the last decade. Water services coverage reaches 96% in the country, while sewerage coverage reaches only 25%. New connections have determined an expansion of services for costumers with the lowest consumption rates and water production has been growing at a faster pace than revenue, thus leading to increasing losses. OSE's tariff structure has not been adapted to meet the enterprise's costs and exhibits several problems such as unjustifiable differences between residential and commercial tariffs, different costs but equal tariffs in Montevideo and the countryside and highly concentrated delays in payments.

As regards the sewerage services provided by the Local Government of Montevideo, the coverage reaches 72% of the 433 thousand households in the capital city. Until 2001, sewerage services were financed by three taxes whereby the Local Government received approximately US\$ 18 millions/year, while the costs (including investments) amounted to US\$ 40 millions; deficits were covered by the municipal government. In 2001, a new tariff with fixed and variable annuities substituted those taxes. It is assumed that this new system will substantially increase the Local Government's revenues and reduce the financial deficits. However, delays in payments have risen from 18% to 30% in the last couple of years.

With reference to the concessionaires, URAGUA serves almost 50 thousand water connections. Coverage for sewerage services is rather low in the geographical area encompassed by the firm. On the other hand, Aguas de la Costa has experienced an important growth in the number of connections and services despite its small size.

In 2004, the Constitution of the Republic was reformed by a plebiscite to forbid private provision of water and sewage. As a result, URAGUA left the country. There is still some legal controversy about the scope of the reform, so some private suppliers might remain.

### **III. THEORETICAL MODEL**

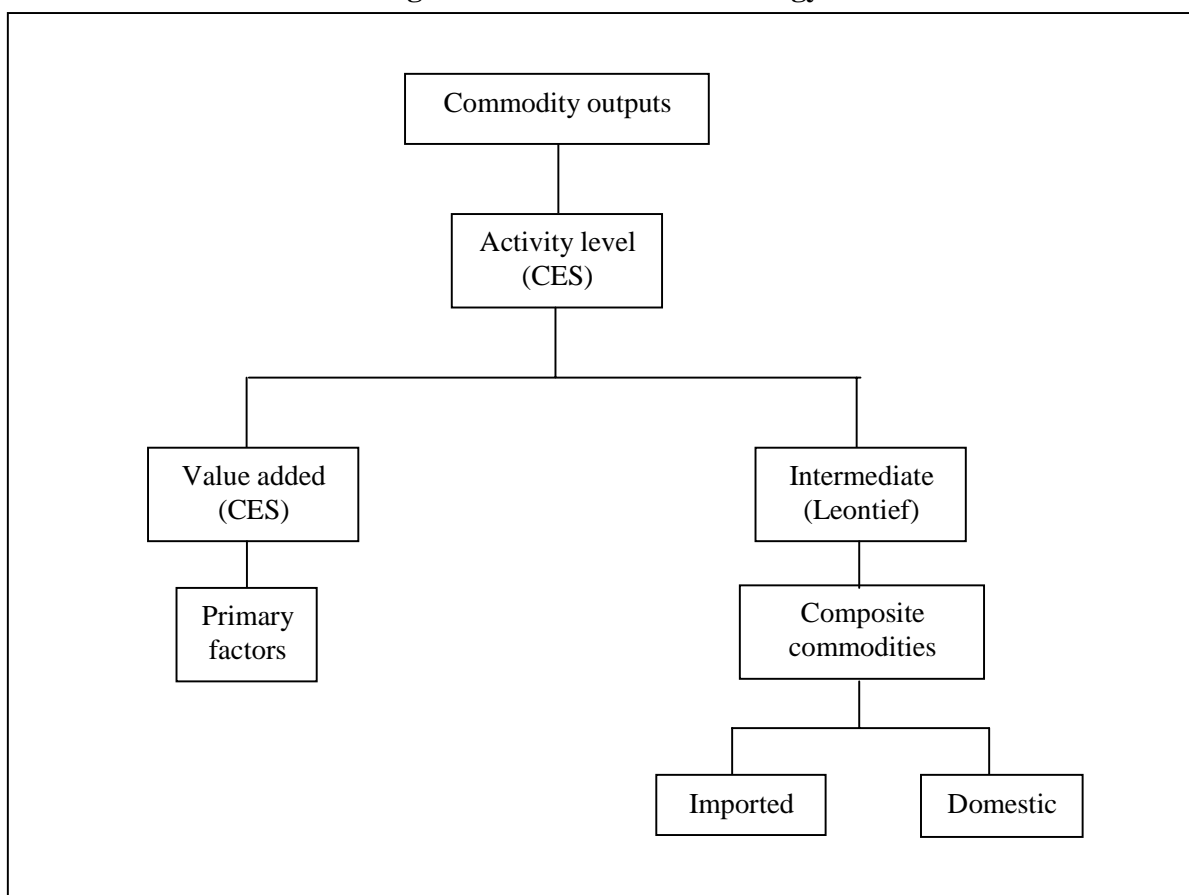
The general equilibrium model implemented in this work is based on Löfgren, Lee Harris and Robinson (2001), who follow the tradition set by Dervis, De Melo and Robinson (1982). The model comprises a series of simultaneous equations, many of which are non – linear, which define the behavior of the different agents. In some cases, equations reflect simple behavior rules captured by fixed coefficients, as is the case of *ad valorem* taxes. For production and consumption decisions, agents' maximizing behavior is captured by non – linear, first – order optimality conditions. The model also includes a series of constraints that must be satisfied by the system as a whole or by each particular agent; these constraints cover macroeconomic aggregates and commodities and factor markets, ensuring the corresponding equilibrium.

This section gives a brief overview of the main characteristics of the model, avoiding any mathematical notation. A more detailed presentation of the model can be found in Löfgren, Harris and Robinson (2001).

#### **III.1 Activities, production and factor markets**

Each producer (represented by an activity) is assumed to maximize profits, defined as the difference between revenue earned and the cost of factors and intermediate outputs. Profits are maximized subject to a technological restriction, taken as given the prices of production factors. The technological restriction is represented by a nested production function: at the top level, the technology is specified as a CES production function combining quantities of aggregate intermediate input and value - added. At the second level, aggregate intermediate input is a Leontief function of disaggregated intermediate inputs, whereas value – added is itself a CES function combining capital and labor. Intermediate inputs are composite commodities comprising domestic and imported commodities; an Armington function reflects the assumption that commodities produced in different regions are different from each other in quality.

**Figure 1 – Production technology**



Source: Adapted from Löfgren, Lee Harris and Robinson (2001).

Each activity produces one or more goods, but each good is produced by only one activity. The revenue of each activity is defined as the product of the level of the activity and the commodity prices at the producer level. In factor markets it is assumed that the quantity supplied of each factor is fixed at the observed level and each activity uses a set of factors up to the point where the marginal revenue product of each factor is equal to its wage (also called factor price or rent). Factor demand is a decreasing function of factor price.

Although this is a static model, short - and long – term effects can be taken into account by adopting different assumptions regarding adjustments in the factors markets. Long – term equilibrium implies perfect sectorial factor mobility and flexible wages, thus leading to full employment. Factor wage is set at the price that equals factor supply and demand, and is the same for the whole economy. Alternatively, it is possible to explore unemployment levels that would stem from considering fixed wages in the short - term.

## III.2 Institutions

Institutions are represented by households, enterprises, the government and the rest of the world.

Households receive incomes from the factors of production and transfers from enterprises and from the government; they use their income to make transfers to other institutions, pay taxes, consume goods and save. Transfers and direct taxes are defined as fixed shares of household income. Household savings depend on the macroeconomic closure rule chosen: either a fixed savings rate can be assumed, or it can depend on investment levels. Consumption expenditure is determined as a residual, and is allocated across different commodities according to a utility function from which lineal demand functions can be derived. Consumption is obtained as the product of the consumed quantities and the market prices of the consumed commodities.

Enterprises are assumed to retain capital incomes and receive transfers from other institutions. Enterprise incomes are allocated to direct taxes and savings. Finally, their savings are transferred to the households.

The government collects *ad valorem* taxes and uses its income to purchase commodities for its consumption and to make transfers to other institutions. It is assumed that government consumption is fixed in real (quantity) terms and transfers are indexed according to a consumer price index. Government savings can be treated either as an endogenous or an exogenous variable.

## III.3 Commodity markets

Aggregated domestic output is allocated between exports and domestic sales on the assumption that suppliers maximize sales revenue for any given aggregate output level, subject to imperfect substitutability between exports and domestic sales, expressed by a CET function. In the international market, export demands are infinitely elastic at given world prices. The price received by domestic suppliers for exports is expressed in domestic currency and is obtained by multiplying the international price by the exchange rate and then deducting transaction costs of domestic marketing and export taxes.

Domestic demand is equal to the sum of intermediate demand, government consumption, household consumption, investment and stock variation. All domestic market demands are for a composite commodity made up of imports and domestic output, the demands for which are derived on the assumption that domestic demanders minimize costs subject to imperfect substitutability. This is captured by an Armington function. Commodities are valued at market prices. In the case of imported commodities, import prices paid by domestic demanders are obtained by multiplying the international price by the exchange rate and including import tariffs and transaction costs.

## III.4 Macroeconomic balances

The model includes three macroeconomic balances: the government balance, the external balance (the current account of the balance of payments) and the savings – investment balance. Table 3 displays several alternative closure rules for these balances.

**Table 3 – Alternative closure rules for macroeconomic balances**

<b>Constraint</b>		
<b>Government</b>	<b>External balance</b>	<b>Savings - Investment</b>
1 – Flexible government savings; fixed tax rates, transfers and government expenditures.	1 – Fixed trade balance and foreign savings; flexible real exchange rate.	1 – Fixed capital formation; uniform savings rates point change for selected institutions.
2 – Fixed government savings; uniform tax rate point change for selected institutions.	2 – Flexible foreign savings; fixed real exchange rate.	2 – Fixed capital formation: scaled savings rates for selected institutions.
		3 – Flexible capital formation; fixed savings rates for all non – government institutions.
		4 – Fixed investment and government consumption absorption shares; uniform savings rate point change for selected institutions.
		5 – Fixed investment and government consumption absorption shares; scaled savings rates for selected institutions.

Source: Adapted from Löfgren, Lee Harris and Robinson (2001).

For the government balance, tax rates, transfers and government expenditures are considered fixed by default, whereas government savings is a flexible residual. Alternatively, it can be assumed that government savings is fixed and some tax rates of selected domestic institutions (households and enterprises) are adjusted endogenously to generate a fixed level of government savings. There are also other closure rules options that were not considered in this work.

For the external balance (which is expressed in foreign currency), the default closure is that the trade balance is fixed, whereas the exchange rate is variable. Given that all other items in the external balance are fixed, foreign savings is also fixed. If, *ceteris paribus*, foreign savings are below the exogenous level, a depreciation of the real exchange rate would correct this situation by simultaneously reducing spending on imports and increasing earning from exports, thus leading to the exogenous level of foreign savings. Under an alternative closure, the real exchange rate is fixed while foreign savings (and the trade balance) is flexible. However, this option was not taken into account in this work.

For the savings – investment balance there are 5 possible closure rules. It can be assumed that closures are either investment – driven (the value of savings adjust) or savings – driven (the value of investment adjusts). The default closure is investment – driven: real investment quantities are fixed and the value of savings adjusts to that level. In order to generate savings that equal the cost of the investment bundle, the base – year savings rates of selected non – government institutions (typically households) can be allowed to vary or, alternatively, can be multiplied by a certain endogenous scalar. A third option is savings – driven: all non –

government savings rates are fixed and the quantity of each commodity in the investment bundle is multiplied by an endogenous scalar so as to assure that the investment cost will be equal to the savings value. Fourth, investment and government expenditure can be considered fixed shares of nominal absorption, so the residual share for household is also fixed. The savings rates of selected non - government institutions are adjusted in the same proportion. Finally, a variation of the last closure rule is to scale the savings rates of selected institutions so as to generate enough savings to finance investment.

#### **IV. MODEL CALIBRATION**

We calibrated the model on the data of the year 2000, which is the most recent year for which detailed information on the Uruguayan economy from various relevant sources is available. We built a social accounting matrix (SAM) for Uruguay using National Accounts, input – output tables, trade data, information on household income and expenditure, on government’s financial operations and on the balance of payments. Due to the particular goals of this study, special attention was paid to information regarding public enterprises and government accounts.<sup>3</sup>

Following Reinert and Roland – Holst (1992), the Social Accounting Matrix was constructed in two stages, using a “top – down” approach.<sup>4</sup> The first step was to create a National Accounting Matrix by representing the Uruguayan National Accounts in matrix form. Besides National Accounts, several information sources were used so as to build this aggregated matrix: data on government income and expenditure were obtained from the Social Security Administration (BPS), from the Budget and Planning Office (OPP), the Municipal Government of Montevideo and the National Customs Authority. Information regarding household and enterprise incomes, expenditures and savings was taken from the 1994 Household Income and Expenditure Survey and the Continuous Household Survey for the year 2000, whereas data regarding transactions with the rest of the world were provided by the Central Bank of Uruguay and the Balance of Payments.

The second stage was to disaggregate certain cells of the matrix using additional information, expanding the National Accounting Matrix into a full SAM. The disaggregated SAM includes 30 economic activities, 36 commodities, 2 production factors (labor and capital), 3 institutions (household, enterprises and government), 6 tax accounts, a savings – investment account and an account for the rest of the world. Households are disaggregated by income decile groups and the foreign sector is not differentiated by origin. The resulting matrix comprises 92 files and rows, and is measured in millions of 2000 dollars, although units of measure and amounts are less relevant in this type of exercise than the variables’ ratio accuracy (relative weight).<sup>5</sup>

Taking this information as a benchmark and using behavior parameters such as factor substitution elasticities and elasticities of substitution between domestic and imported

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<sup>3</sup> For a discussion of SAMs and their use in economy – wide policy analysis see Dervis, de Melo and Robinson (1982), Pyatt and Round (1985) and Reinert and Roland – Holst (1997).

<sup>4</sup> A more detailed account of the construction of the SAM can be found in Katz et al. (2004).

<sup>5</sup> See Katz et al. (2004) for an accurate definition of the different accounts, their values and their information requirements.

commodities found in the literature, we calibrated all other parameters in order to replicate the base data. The calibration process and the numerical resolution of the model follow classic procedures used in most static CGE models. The model was numerically solved with the software GAMS (General Algebraic Modeling Systems).

## V. SIMULATIONS

We assessed the macroeconomic impacts of reforms of the regulatory framework of public services, changes in their investment policies, modifications in the competitive environment and reforms in their tax structure. These reforms can be simulated through changes in three groups of parameters: technical coefficients, sectoral capital stocks and tax rates. Improvements in technical efficiency are captured by changes in the technical coefficients of the model. Investment policies in public enterprises can be captured by changes in the capital stock of the activities. Finally, changes in the tax structure and in the prices of public services induced by new regulatory and competition policies are captured by changes in the activities' tax rates. In order to capture the price effect of changes in the regulatory or competitive environment, implicit tax rates for public services were defined. An expected decline in the price of a public service due to the introduction of competition was then simulated as a reduction in the activity's implicit tax rate; should competition be represented by foreign firms, a reduction in the equivalent import tariff on the activity's imports was simulated.

Table 5 shows the different types of simulations performed for each of the public sectors considered.

**Table 5 – Simulations performed**

<b>Public service</b>	<b>Efficiency</b>	<b>Capital stock</b>	<b>Specific tax</b>
Railroad transportation	X		
Electric energy (generation)	X	X	
Fuel	X		X
Gas	X		
Telecommunications			X
Water and sewerage	X	X	

Each scenario is defined by a particular combination of efficiency – capital stock – specific tax for each and every public service considered. In turn, each particular combination is coupled with different closure rules for the government and the factor markets. We specified two closure rules for the government and two for the factor markets. Therefore, there are 4 possible scenarios for each efficiency – capital stock – specific tax combination, leading to 44 simulations:

**Table 6 – Scenarios for the simulations**

<b>Scenario</b>	<b>Factor markets closure</b>	<b>Government closure</b>
A	Long – term (full employment)	Endogenous government savings (exogenous tax rates)
B	Short – term (unemployment)	Endogenous government savings (exogenous tax rates)
C	Long – term (full employment)	Exogenous government savings, endogenous value added tax
D	Short – term (unemployment)	Exogenous government savings, endogenous value added tax

As already mentioned, the standard model of Löfgren, Lee Harris and Robinson (2001) allows to simulate two closure rules for the external account (Rest of the World) and five for the savings – investment account. Since the number of possible scenarios then becomes too big, and since the main goal of this study is to assess the welfare effects of the reforms, attention was focused on scenarios with exogenous foreign savings, flexible real exchange rate and fixed investment and government expenditure. As mentioned by Löfgren, Lee Harris and Robinson (2001), scenarios where foreign savings, investment or government expenditure are assumed endogenous might lead to erroneous evaluation of the welfare effects in the present model.

## **VI. SIMULATION RESULTS**

This section reviews the main results of the 44 simulations performed. These are comparative static exercises, and the results are presented as percent variations from the initial equilibrium (the benchmark). For each simulation, the results for the scenario with long – term (full employment) and fixed tax rates (endogenous government savings) closures are initially analyzed. Then, the main changes stemming from considering short – term (unemployment derived from fixed wages) and exogenous government savings closures are commented.

The rationale for each of the simulations is explained below. An Annex to this paper displays tables showing the simulation results for the long-term (full employment) and fixed tax rates (endogenous government savings) closure. Quantitative results for other model closures are available upon request from the authors.



## **VI.1 RAILROAD TRANSPORTATION SECTOR**

Privatization of two railroad lines is assumed, and an increase in railroad activity occurs. Privatization determines an increase in productivity leading to heightened factor use and service supply.

This simulation allows an evaluation of the effects of an increase in the productivity of the railroad transportation sector, given the productive structure prevailing in Uruguay. It could be argued that this policy change might be accompanied by an increased demand from some railroad services consumers, such as the forestry sector. Precisely, the reform in the railroad sector policy might intend to meet this increased demand. Assuming no increase in the demand for railroad transportation services, the resulting supply increase could only be absorbed by substituting other services as a result of lowered prices.

### **VI.1.1 Simulation parameters**

The productivity coefficient is increased by 20%.

### **VI.1.2 Results with full employment (long – term) and fixed tax rates**

A 33% increase in the use of labor and capital is achieved (Table A3), with a 60% increase in the sectoral GDP (Table A2). On the other hand, factor use in the other sectors declines. However, such reduction in factor use is rather unimportant, given the small relative size of the railroad transportation sector in the economy.

The price of railroad services was endogenously lowered by almost 14% (Tables A8 and A9). No variation in the real exchange rate is observed, while factor wages exhibit a small reduction.

Since railroad transportation services are non – tradable, there are no direct effects of the increase in railroad productivity on foreign trade (Tables A5 and A6). Indirect effects taking place via other activities are rather unimportant.

Government finances experience no significant changes (Table A11).

Households experience mild welfare gains, evenly distributed among income deciles (Table A12).

No significant changes occur in this scenario at the aggregate level (Table A1). There are no major changes in aggregate demand and supply.

Within this simulation, investment in the railroad sector would reach approximately US\$ 30 million, much lower than the US\$ 60 million suggested by existing estimates of possible

investment projects.<sup>6</sup> Sensitivity analyses were performed, varying the expected productivity increase and demand elasticities for railroad services, but it was not possible to achieve a US\$ 60 million investment in this scenario. This may suggest that the projected investments could only take place under a different scenario, assuming a considerable increase in the demand for railroad transportation services.

### **VI.1.3 Alternative closure rules: short – term scenario and endogenous tax rates**

In the short-term scenario, similar increases in factor use and sectoral GDP were obtained. As in the long – term scenario, changes in factor use and the sectoral GDP of the other sectors were relatively small. No significant effects on exports, imports and prices were observed either.

In scenarios with endogenous value added tax rates, small increases in tax revenues were achieved, whereas in scenarios with exogenous tax rates minimal increases (0.0007 percentage points of GDP) in government deficits took place. Also, slightly lower household welfare gains were achieved, which indicates that estimates based on endogenous tax rates over – estimate them. However, differences were again minimal, indicating that errors in assessing welfare gains when allowing government savings to vary endogenously are qualitatively negligible.

## **VI.2 ELECTRIC ENERGY SECTOR**

As already mentioned, the prevailing regulatory framework authorizes private generation of electricity. This would allow the entry of firms that could take advantage of economies associated with the use of disposable products as fuel for generating electricity or that might use heat released during the generation process for industrial purposes. On the other hand, the integration with Argentina might increase the energetic risk faced by Uruguay. Therefore, the government is considering a project to establish a big generating plant built by UTE or by concessionaires. However, the construction of such a plant would render smaller plants (associated with large consumers) economically unappealing. Therefore, there is a trade – off between safety and cost. In view of this situation, two scenarios were simulated: in the first one, it is assumed that no bigger plant is built, but investments in smaller, more productive generators take place; in the second scenario, it is assumed that the government opts to build the new generating plant.

### **VI.2.1 Scenario 1**

Private generation of electric energy leads to an increase in productivity. A group of large consumers invests in electric energy generation in order to take advantage of energy contained in some disposable products such as rice husk. There is also productivity gains associated with the use of heat released in the generation process for industrial purposes. This could lead to investments in private electric energy generation for an estimated value of US\$ 150 million.

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<sup>6</sup> Approximately 33% of the US\$ 80 million of initial capital stock in the railroad sector. This estimation should be taken carefully in view of the difficulties faced to assess the initial capital stock. Therefore, results should be considered only in qualitative terms.

This simulation aims to assess the possible impacts of an increase in sectoral productivity, given the productive structure of the economy. Other exogenous shocks that might simultaneously affect the electric sector are not taken into account; in particular, the joint effect of a productivity increase and of heightened demand for electricity is not considered. Therefore, this simulation should not be interpreted as a projection, but as a comparative static exercise.

### **VI.2.1.1 Simulation parameters**

The productivity coefficient is increased by 8%. It must be taken into account that, in order to attain an 8% average growth in productivity in the electricity sector, the new generators should experience a substantially higher increase.

### **VI.2.1.2 Results with full employment (long – term) and fixed tax rates**

A 9% increase in the use of labor and capital in the electric sector is achieved (Table A3). Electric supply increases by more than 18% (table A2) as a result of the combination of the productivity increase and the enhanced use of factors. Some of the other sectors exhibit increases (the largest taking place in leather industries, with more than 3%), while some experience reductions (export industries, wood and paper and chemical industries, water and sewerage services). In the context of this model, growth in expanding sectors responds to a greater availability of electric energy combined with its lower price, whereas decline in the activity of contracting sectors responds to the reallocation of resources towards electric energy generation and expanding sectors. The model assumes that the total factor endowment in the economy is fixed, so a sectoral reallocation of resources takes place as a result of the technical change in electric generation. Should total factor availability increase as a result of population growth and capital accumulation, sectors that contracted in the simulation might eventually grow. Therefore, the analyzed technological change in the electricity generation sector might not necessarily lead to a decline in the activity of some sectors, but to lower growth.

Augmented generation of electric energy would result in a substantial increase in exports (23%) and in electric energy (14%) and fuel oil (14%) imports (Tables A5 y A6). The increase in exports and imports should be interpreted with caution, because the model assumes a rigid technology and does not allow to accurately represent import substitution that would be associated with enhanced domestic generation of electric energy. The same can be said about the estimated increase in imports of fuel oil. The price of electricity in the domestic market falls by approximately 4% (Table A8). This decrease originates in the augmented supply caused by the productivity increase that can only be absorbed by demand through a price reduction.

Household welfare increases slightly, particularly for middle and upper class households (Table A12).

No significant variations in macroeconomic aggregates are observed (Table A1).

### **VI.2.1.3 Alternative closure rules: short – term scenario and endogenous tax rates**

Increase in factor use in the short – term is similar to the one achieved in the long – term, though the rise in labor use is slightly inferior and in capital use is marginally larger. Increase in sectoral GDP is almost the same, while growth in leather industries and decline in export industries, wood and paper and chemical industries is higher in the short run. According to these results, fixed wages might cause bigger quantity – adjustments and smaller price – adjustments in the short – term. Effects on exports, imports and prices are very similar in the short and the long run.

The modification of the government closure rules had small effects on results. Slight increases in value added tax revenues were achieved, though smaller in the endogenous value added tax rates scenario. Impacts on sectoral factor use, production, foreign trade and prices remained quite similar. In theory, the assumption of exogenous government savings is more appropriate than the scenario with endogenous government savings for assessing household welfare effects. Nevertheless, equivalent variations are very similar in both scenarios.

## **VI.2.2 Scenario 2**

A central energy generating plant is built, while productivity remains unchanged. The rise in capital stock results from a political decision, not being caused by productivity increases, lower taxes or higher prices. The political decision is simulated by depicting electric energy generation as an activity not driven by private profit seeking; there is no profit maximization in the activity, and factor use is exogenously fixed. Capital supply for the rest of the economy is the difference between total capital supply minus fixed capital in the electrical sector. Therefore, this scenario implies a reallocation of capital from competitive sectors to electricity sector. Resulting profits or losses are directly transferred to the government in the form of taxes or subsidies.

### **VI.2.2.1 Simulation parameters**

An exogenous US\$ 150 million increase in the capital stock in the electricity sector is assumed as a result of the construction of the generating plant.

### **VI.2.2.2 Results with full employment (long – term) and fixed tax rates**

Factor use increases 8%, reflecting the political decision of investing in the sector (Table A3). Investment amounts to approximately US\$ 145 million. Private investment in smaller but more efficient generators is crowded out by public investment in the new plant. Factor use in a larger - than - economically - efficient scale causes losses that result in a bigger government deficit; the investment is justified on strategic, not efficiency, grounds. The activity's output also goes up by 8% as a direct result of the rise of resources allocated in the sector without changes in productivity (Table A2). Slight increases arise in other activities' sectoral GDP, the greatest taking place in the leather industries (1.28 %). Other sectors contract as a result of reallocation of resources towards electric energy generation, the greatest decline occurring in export industries (1.41 %).

A 10% increase in electricity exports (Table A5) is achieved, while electricity and fuel oil imports grow slightly over 6%. Domestic price of electricity falls 2% (Table A9). As in the first scenario, changes in exports and imports should be interpreted with caution: the construction of the new plant might lead to import substitution, not captured by the model.

A modest increase of household welfare is observed for all income deciles (Table A12). However, this increase results from the bigger government deficit and from the fact that the model does not incorporate the future costs of a higher debt. On the other hand, the construction of the generating plant should lead to enhanced energy security, reducing the risk of facing a shortage of electric supply. The model cannot capture the resulting welfare gains.

No significant changes in macroeconomic aggregates are observed (Table A1).

### **VI.2.2.3 Alternative closure rules: short – term scenario and endogenous tax rates**

Factor use and sectoral GDP increase is the same in the short and the long term. Leather industries' growth rate and the decline in exporting industries, wood and paper and chemical industries are slightly larger in the short run. Quantity – adjustments are also bigger and price – adjustments are lower in the short term, though differences are not significant. Impacts on exports, imports and prices are very similar in the short and the long run.

In the scenarios with endogenous value added tax rates an increase in value added tax revenues is achieved, thus enabling the government to balance its budget. The necessary increase in value added tax revenues is higher in the short term than in the long term. In the short term, a minor reduction in employment arises; this causes a reduction in government revenues and requires a bigger adjustment. No important differences in equivalent variations were achieved in relation to the government closure rule. Alternatively assuming that the government adjustment takes place either through higher indebtedness or through an endogenous variation in value added tax rates does not result in significant changes in the equivalent variation associated with the investment.

## **VI.3 FUEL SECTOR**

The elimination of ANCAP's monopoly on fuel production and imports of oil was expected to lead to tougher competition in the domestic market, therefore causing an improvement in the enterprise's technical efficiency and driving it to seek foreign markets. Four different simulations were performed in order to assess the possible effects of these reforms: in the first scenario, the elimination of ANCAP's monopoly rights is simulated. In the second and third scenarios, the variation in factor productivity needed to preserve the refinery's output level following the demonopolization is estimated; the third experiment differs from the second one in that it is assumed that ANCAP associates with foreign firms to export fuel. Finally, the fourth scenario analyses the effect of a change in tax policy.

### **VI.3.1 Scenario 1**

ANCAP's monopolistic control of fuel production and distribution is eliminated. Given the small size of the domestic market and the existence of scale – economies, it is unlikely that a new refinery will be built, so ANCAP's refinery should not face competition from other plants in the domestic market. However, it will face competition from imported fuel. This constraint can be modeled as a quantitative restriction on imports of oil derivatives that prevents imports. This can be modeled by introducing an import tariff equivalent to the quantitative restriction. The demonopolization would motivate the entry of imported fuel that would compete with domestic production, and would be the same as removing the quantitative restriction and opening the domestic market to foreign competition. This would cause a decrease in domestic prices of oil derivatives whose magnitude depends on the effectiveness of competition policies implemented.

The impact of a change in the degree of competition is analyzed through a simulated change in the elasticity of substitution between domestic and imported fuel. It can be assumed that if the fuel market becomes very competitive following the reform, the elasticity of substitution between domestic and imported fuel would tend to infinity, domestic and international prices would converge, and significant changes in the quantities of domestic and imported fuel would take place. On the other hand, in a less competitive environment, importers would extract rents derived from the difference between import and domestic prices, and variations in the quantities of domestic and imported fuel would be much smaller. In order to perform these experiments, different substitution elasticities in the Armington function were simulated.

#### **VI.3.1.1 Simulation parameters**

The tariff equivalent of a quantitative restriction on imports can be computed as:

$$\text{Import tariff} = \frac{\text{Domestic Price}}{\text{Import Price}} - 1$$

The estimated import tariffs for gasoline and gas oil were 24% and 14%, respectively. The elimination of ANCAP's monopoly rights was simulated by lowering those import tariffs to zero. The experiment was repeated for each of the four macroeconomic closure rules considered, and a sensitivity analysis considering different substitution elasticities in the Armington function was also performed.

#### **VI.3.1.2 Results with full employment (long – term) and fixed tax rates**

The effects of demonopolization in the fuel market are virtually insignificant at the aggregate level (Table A1). There are no relevant effects on production, consumption, tax revenues or government expenditure. The most important effects are those related to foreign trade: both imports and exports rise by 0.6%. Government deficit increases by a mere 0.01% of GDP, mainly due to the decline of monopolistic rents (considered as equivalent import tariffs) transferred by ANCAP to the central government.

However, the sectoral effects of the reform are quite important, particularly with regard to the refinery. Following the opening of the domestic market to imported fuel, the prices of imported gasoline and gas oil fall by 15% and 11% respectively, while imports rise (Tables A6 and A10). Refinery output decreases 4.3%, affecting all types of oil derivatives. The price of gas oil declines by 7%, while the price of gasoline and other derivatives increase (Table A9) as a result of an excess demand resulting from the decrease in the refinery output. Refinery's labor and capital demand fall by 4.5% and 4.3% respectively, while labor use of several export industries rises. There is a reallocation of resources from the refinery towards agriculture, rice and barley, meat, rice, leather industries and other export industries, and towards the transportation sector.

The effects on income distribution are rather small: the poorest households (those belonging to the first five income deciles) benefit from the reform, while higher income households experience welfare losses (Table A12).

It is worth noting that these results were achieved under the assumption that domestic and imported commodities are no close substitutes (the Armington elasticity of substitution was assumed to be 10). The results are in fact very sensitive to this assumption. When low substitution elasticity values are used, the price effect is important while the quantity effect is small, implying that the economic feasibility of the refinery would not be affected. On the other hand, if trade liberalization and competition policies are simultaneously implemented, leading to perfect substitution between domestic and imported commodities, results change drastically. As an example, if an Armington substitution of 2 is used, the output of the refinery decreases 1.2%, whereas if a value of 30 is assumed, the output of the refinery would drop by 39%, making it difficult for the refinery to remain operative.

Nevertheless, in any scenario the most relevant results are related to foreign trade and resource allocation between the refinery and export industries; the effects on other variables are minimal. Therefore, a representative agent of the economy would hardly be affected by a reform in the fuel market, whereas specific groups of agents linked to export industries and to the transportation sector would clearly benefit from it. The refinery workers and the State could be negatively affected unless measures aiming at productive restructuring are adopted.

Finally, two further remarks should be made. The relatively small effects of the reform may be related to the type of general equilibrium model used in this exercise. The literature suggests that the effects are significantly larger in the presence of economies of scale and non-competitive markets. Besides, the magnitude of the effects is also related to the estimated equivalent import tariffs. These estimates are clearly imperfect because import prices vary greatly within a year, frequently as a result of political decisions.

### **VI.3.1.3 Alternative closure rules: short – term scenario and endogenous tax rates**

Similar results are achieved when assuming different labor market closure rules or endogenous tax rates. Decline in factor use and in output is slightly higher, while export industries' growth rate is lower. Other effects are very similar in the short and the long term.

As regards government closure rules, assuming endogenous value added tax rates leads to small increases in value added tax revenues that were fixed in the other scenarios. Effects on foreign trade, production, sectoral factor use and prices remain the same. In theory, assuming exogenous instead of endogenous government savings is more appropriate for assessing household welfare effects. Equivalent variations are nonetheless very similar in both scenarios.

### **VI.3.2 Scenario 2**

In this scenario, demonopolization of the fuel market is combined with a productivity increase that reduces ANCAP's production costs and enables it to compete with imported fuel and to export. We intended to estimate the magnitude of the productivity increase needed to avoid a decline in refinery output.

#### **VI.3.2.1 Simulation parameters**

A technical change affecting factor productivity was simulated. This technical change affects administrative, distributive functions and the like, but does not change input - output coefficients of the fuel production function; thus, the quantity of intermediate inputs per unit of output remains unchanged, affecting only factor requirements per unit of output. This implies a variation in total factor productivity in the value added CES function. The experiment is the same as the one conducted in Scenario 1: equivalent import tariffs on gasoline and gas oil were reduced to zero. Several simulations were performed until a value of the productivity parameter that left the refinery output unchanged was found.

#### **VI.3.2.2 Results with full employment (long – term) and fixed tax rates**

With a productivity increase of 18%, refinery output remains constant when demonopolization of the fuel market takes place. Macroeconomic results are slightly higher than in the previous scenario: private consumption rises by 0.5%, while GDP grows by 0.4%. On the other hand, sectoral and foreign trade effects are lower; there is a minor reallocation of resources towards export sectors and services (Table A2). A decline in factor use in the refinery is observed as a result of increased productivity (Table A3). Gasoline and gas oil imports increase, but less than in Scenario 1 (Table A6). Domestic prices of gasoline and gas oil decline by 1.4% and 9.2% respectively, but this does not lead to an increase in consumption because of the low demand elasticity assumed (see Table A9). Productivity increase causes a 1% rise in labor wages, while capital rent increases by 0.1%. All households obtain welfare gains, the larger being for high - income deciles (Table A12).

The simulation shows that a significant productivity increase is required to maintain the refinery output level when demonopolization takes place. The question remains whether it is possible to reach such productivity increase. The rise in productivity affects the production function, thus influencing both exports and domestic market sales. Nevertheless, as export prices are fixed, this productivity increase determines a decline in domestic prices in order to face competition of imported commodities. Other possibility, not explored in this experiment, is that part of the productivity increase may be related to a decline in transport costs and export commercialization costs. On the other hand, remarks previously made about the value



of substitution elasticities and the estimation of equivalent import tariffs are also valid in this scenario: a 9% rise in productivity is required so as to maintain the refinery output when an Armington elasticity of 2 is assumed, whereas a 30% increase is needed when a value of 30 is assumed. Finally, the small reaction of household consumption following price changes must be interpreted with caution: it is likely that if other functional forms had been used, price effects would have been lower, and the growth of household consumption would have been higher.

### **VI.3.2.3 Alternative closure rules: short – term scenario and endogenous tax rates**

Imposing nominal wage rigidities in the short run would cause a rise in employment: although the refinery still “expels” workers, employment rises in other sectors, thus motivating a 1.3% increase in total employment. In this scenario, we assumed unemployment and fixed wages. Thus the rise in labor demand fostered by productivity gains raises employment. Capital is reallocated from the refinery to export sectors, as with the previous closure rules. The productivity increase needed to keep the refinery output constant is somewhat lower: in fact, with an 18% increase, the refinery output would rise. GDP, private consumption, exports and imports increase by 1.2% in this simulation, while fiscal deficit declines. Also, welfare gains are larger in the short run: equivalent variations rise by 1.5% on average, with a larger increase for high - income households.

Simulations with endogenous value - added tax rate lead to a small rise in value added tax revenues that were fixed in other scenarios. Effects on foreign trade, output, sectoral factor use and prices remained very similar.

### **VI.3.3 Scenario 3**

In this scenario, demonopolization of ANCAP’s monopoly rights to fuel production and distribution, a technical change that originates a rise in factor productivity and the introduction of policy measures aiming to promote fuel exports were simulated. The latter intends to answer the following question: how do previous conclusions change if ANCAP manages to associate with private partners in order to secure access to foreign markets?

In previous scenarios, demonopolization causes the entry of imported fuel that competes with domestic output. The resulting effect depends on the regulatory framework and the degree of competition prevailing when demonopolization takes place. When a high value for substitution elasticity between domestic and imported commodities is assumed, this could lead to an important decline in the refinery output. In Scenario 2 it was concluded that this decline could be avoided by implementing a technical change leading to an 18% rise in factor productivity. Scenario 3 aims to estimate the magnitude of the productivity increase required to keep the refinery output constant if, at the same time, the elasticity of substitution between domestic and exportable commodities rises. The impact of an association between ANCAP and a foreign investor was analyzed changing this elasticity of substitution. If this investor has fluent access to foreign markets, the elasticity of substitution between domestic and exportable commodities may rise, and sales in foreign markets might compensate losses in the domestic market.

### **VI.3.3.1 Simulation parameters**

In order to simulate the demonopolization of the domestic fuel market, equivalent import tariffs were reduced to zero, as in Scenarios 1 and 2, while an increase from 0.8 to 10 in the elasticity of transformation (CET) function was assumed so as to simulate the effects of gaining access to foreign markets. Besides, as in Scenario 2, several changes in factor productivity were simulated using the CET function scale parameter. Finally, a sensitivity analysis was performed using different Armington elasticities.

### **VI.3.3.2 Results with full employment (long – term) and fixed tax rates**

The joint implementation of these three policy measures has minor effects on the macroeconomic aggregates. The most important impacts are a 0.7% rise in exports and a 0.6% increase in imports. There are no significant effects on output, consumption, revenues and government expenditure. Global results are similar to the ones in previous scenarios; the largest differences arise in sectoral effects, particularly in the refinery.

When the domestic market is opened up for unrestricted trade, imports increase and gasoline and gas oil import prices fall by 15% and 10%, respectively (Tables A6 and A10). Unlike in the other scenarios, gasoline exports rise by 16% while gas oil exports increase 189%, starting from very low values. In order to maintain the refinery output level, factor productivity must increase 16%. Prices of gas oil and gasoline decrease by 9% and 1% respectively, while prices of other oil derivatives remain almost constant (Table A8). Labor and capital demand in the refinery falls by 14% and there is a reallocation of resources towards export sectors (agriculture, rice and transportation). This reallocation takes place because the trade balance is assumed to remain constant.

Effects on income distribution are minimal. Workers are the main beneficiaries, since their wages rise by 1%; capital rent increases by 0.1%. All household groups achieve marginal welfare gains, the largest increase taking place for high - income households (Table A12).

This simulation shows that an increase in the elasticity of substitution between domestic and export sales reduces the productivity increase needed to keep the refinery operative. These results are highly sensitive to the elasticity of the transformation function. Also, these results were achieved assuming an Armington elasticity of 10, and are very sensitive to this assumption as well. In case demonopolization leads to a very competitive market structure, the productivity increase needed to keep the refinery output unchanged would be higher. If, on the other hand, the degree of competition were lower, the required productivity increase would also be lower.

### **VI.3.3.3 Alternative closure rules: short – term scenario and endogenous tax rates**

As in Scenario 2, when unemployment is assumed, the rise in labor productivity leads to an increase in activity while wages remain constant. GDP, absorption and household consumption increase by more than 1%. With a 16.3% rise in productivity, refinery output increases while the decline in factor use is somewhat smaller than in the long run. Welfare

gains are much higher than in the long run: all household groups achieve welfare gains, the main beneficiaries being again high - income deciles.

The effects on foreign trade, output, sectoral factor use and prices were similar than in the previous scenario when endogenous value added tax rates are assumed. Equivalent variations were very similar in the long run scenario with exogenous value added tax rates and in the long run scenario with endogenous value added tax rates.

#### **VI.3.4 Scenario 4**

In this scenario, sales tax (IMESI) is substituted by a homogeneous value added tax rate on domestic and imported fuel. There is currently very high tax discrimination between the different refined fuels in Uruguay (see Section II.3). This experiment intends to assess the effect of a tax harmonization in the fuel market.

##### **VI.3.4.1 Simulation parameters**

The experiment involves eliminating IMESI and setting a 23% value added tax rate on all refined fuels. As the value added tax on imported commodities is included in import tariffs, the latter rise by 23%.

##### **VI.3.4.2 Results with full employment (long – term) and fixed tax rates**

The effects of eliminating IMESI and raising the value added tax rate are negligible at the aggregate level (Table A1). However, factor wages decline and government deficit falls from 1.26% to 0.74% of GDP as a result of heightened value added tax revenues (Table A11). Sectoral effects are also small: there are no significant changes in sectoral output nor in resource allocation (Tables A2 and A3). Import and domestic prices of all fuels decline, with the exception of gasoline prices (gasoline is subject to the greatest IMESI rates). Gasoline is mainly used for final consumption, while other fuels are mainly used for intermediate consumption. While production costs would rise as a result of the rise in the prices of other fuels, the stability of gasoline prices benefits final consumers. Tax incidence on fuels rises, although multiple alternatives for changing tax structure could be simulated without varying global tax incidence. Welfare variations are also small: this policy measure benefits households belonging to the first two income deciles, while negatively affecting the rest (Table A12).

##### **VI.3.4.3 Alternative closure rules: short – term scenario and endogenous tax rates**

When assuming unemployment in the short term, global results are slightly bigger. GDP falls 0.7%, while employment declines by 1.1%. The variation of government closure rule has very small effects.

#### **VI.4 GAS SECTOR**

The construction of a gas pipe linking Uruguay with the Argentinean network would lead to the substitution of gasoline by Argentinean natural gas as an input for gas production in

Uruguay, thereby lowering gas production costs. In this simulation, it is assumed that gasoline is replaced by natural gas and that the price of Argentinean natural gas is half the price of gasoline.

#### **VI.4.1 Simulation parameters**

Gasoline needed for producing one unit of gas (ica) is replaced by the necessary amount of imported natural gas. It is assumed that the CIF price of imported natural gas is 48% of gasoline price.

#### **VI.4.2 Results with full employment (long – term) and fixed tax rates**

The macroeconomic impacts of this technological change are negligible, because gas use for industrial and residential purposes is rather limited in Uruguay. No changes in GDP, household consumption, foreign trade, factor wages, tax revenues or government deficit are observed (Tables A1, A5, A6, A7 and A11). Gas production increases as a result of the technical change, but no variations are observed in other sectors' output. There is a reallocation of resources towards gas production, mainly from the refinery, whose output declines by 1% (Tables A2 and A3). A significant rise in natural gas imports takes place (Table A4). The domestic price of piped gas falls 24%, whereas the price of liquefied petroleum gas (LPG) falls 32% (Table A8). Domestic prices of gasoline also fall as a result of excess supply. Welfare effects are positive, but limited, with an emphasis on medium and high - income households (Table A12).

It must be taken into account that this simulation only analyses the effects of the introduction of Argentinean natural gas for gas production, not considering the effects on the generation of electricity. Besides, the experiment assumes that there are no changes in tax policies and that imported natural gas is subject to the same tax rates as piped gas.

#### **VI.4.3 Alternative closure rules: short – term scenario and endogenous tax rates**

Results in the short term are very similar to those achieved in the long term: macroeconomic effects are minimal. The same happens when government closure rule is changed and endogenous value added tax rates are imposed, assuming a constant fiscal deficit.

### **VI.5 TELECOMMUNICATIONS SECTOR**

A regulatory change is imposed in the telecommunications sector, generating increased competition in the mobile telephony market, demonopolizing national long distance service and introducing more competition in international long distance service, thereby leading to a decline in prices. Although some of these reforms have already been implemented in Uruguay, they had not been put into operation by the year 2000, the model's base period.

#### **VI.5.1 Simulation parameters**

It is expected that the implementation of these reforms would lead to a 25% decrease in prices for telecommunication services. This decline was simulated by a reduction in activity tax

rates. In the case of public enterprises such as ANTEL, activity taxes are represented by the enterprise's transfers to the central government. It is assumed that enhanced competition leads to lower monopolistic power and lower monopolistic rent extracting capacity. On the other hand, since telecommunication services are essentially non – tradable, Armington elasticity was lowered to 0.1, thus implying virtually no possibilities for substituting domestic services with imports.

### **VI.5.2 Results with full employment (long – term) and fixed tax rates**

Effects are limited at the macroeconomic level (see Table A1). Labor and capital wages increase by 1.2% and 1.3%. Tax revenues fall from 28.3% to 27.5% of GDP, mainly due to the decline in activity tax revenues (Table A11), i.e., ANTEL's transfers to the central government. Fiscal deficit rises from 1.3% to 2.1% of GDP. In view of the severe fiscal constraints faced by the Uruguayan government, these reforms should be accompanied by changes in fiscal policies compensating the loss of government revenues.

Once again, more significant effects arise at the sectoral level, basically in the telecommunications sector (Tables A2 and A3). Prices for telecommunication services fall by 25%, but both output and sectoral factor use increase, the latter by 7% (Tables A2 and A3). A reallocation of resources from tradable sectors toward telecommunications takes place. Household consumption of telecommunication services increases to the detriment of other commodities, but price effect is bigger, thus leading to a decline in expenditures for telecommunication services while expenditures for other commodities increase.

Overall welfare gains are rather insignificant (Table A12). Changes in relative prices determine that the different income deciles are not equally affected: poorer households are negatively affected, while high – income households benefit from these policy measures.

The functional form of household demand and of the production function clearly influences these results. Given the low price elasticity of demand, the competitive effect of the regulatory changes determines a significant reduction of prices without causing a substitution effect. It might be expected that this effect should be more important.

### **VI.5.3 Alternative closure rules: short – term scenario and endogenous tax rates**

Assuming short – term unemployment leads to somewhat larger macroeconomic effects: GDP grows by 1%, while private consumption increases by 1.4%. Other macroeconomic results are very similar to those prevailing in the long – term. Telecommunications sector output rises by 7.9% and fiscal deficit represents 3.8% of GDP. When prices for telecommunication services fall, the sector can absorb more workers without affecting wages. Welfare gains, as measured by equivalent variations, reach 1.3%. Although all household groups benefit, higher emphasis is placed on middle and upper classes.

When government closure is modified, the results are similar to those in the long – term scenario with exogenous tax rates. GDP increases slightly more and telecommunications sector output a little less than in that scenario, while fiscal deficit does not rise because value added revenues increase, compensating the decrease of activity tax revenues.

## **VI.6 WATER AND SEWERAGE SECTOR**

A productivity increase in this sector is expected, leading to improved administration and control. More rigorous control would lead to a decline of approximately 7% in service consumption, whereas an increase in efficiency may take place as a result of an estimated 20% decline in labor costs, without affecting output level. Besides, a US\$ 300 million investment in sewerage by OSE is projected.

These modifications are simulated in two scenarios: in the first one, the possible effects of an efficiency increase are investigated, while in the second scenario the impacts of increasing the sector's capital stock are assessed.

### **VI.6.1 Scenario 1**

Efficiency increases, resulting from the combined effect of heightened revenues and lower labor costs, are simulated by raising the productivity parameter of the CES function combining capital and labor.

#### **VI.6.1.1 Simulation parameters**

The productivity coefficient of the water and sewerage sector is raised by 15%.

#### **VI.6.1.2 Results with full employment (long – term) and fixed tax rates**

Sectoral output increases by more than 22% (Table A2). Labor and capital use increase by more than 6% (Table A3); in fact, in this model output growth is caused by the rise in employment within the sector, which is highly unlikely in the Uruguayan context.

Factor use in other sectors decline slightly. No important changes in foreign trade are observed; this is a non – tradable sector, so no direct effects on imports and exports take place. Indirect effects on other sectors are limited (Tables A5 and A6).

Domestic price for water and sewerage services decreases by more than 9% (Table A8). This reduction responds to an increased supply that is not counterbalanced by greater demand; however, it could be assumed that there is unsatisfied demand for sanitary services in Uruguay, so the bigger supply could be absorbed by formerly rationed demand without causing price decreases.

Small reductions in factor wages are observed, while the real exchange rate remains virtually unchanged.

Household welfare effects are reduced: households belonging to the first income deciles experience negative variations, whereas higher – income households exhibit small gains (Table A12).

No significant changes in macroeconomic aggregates are observed (Table A1). Government deficit increases by 1.28%.

### **VI.6.1.3 Alternative closure rules: short – term scenario and endogenous tax rates**

Increase of sectoral factor use is similar in the short and in the long – term. In the short – run, a slight decrease in aggregate employment is observed as a result of wage rigidities that hinder sectoral reallocation of workers. Indirect effects on other sectors are similar to those prevailing in the long – term.

In the endogenous tax rates scenario, an increase in value added tax revenues enabling the government to balance its budget is observed. The rise in value added tax rates needed to balance government budget is somewhat bigger in the short run than in the long – term as a result of the decline in aggregate employment. As in other scenarios, changing government closure did not significantly affect the results regarding household welfare.

## **VI.6.2 Scenario 2**

In this scenario, an exogenous investment in sewerage is simulated much alike in the second scenario for electricity. Capital stock in the sector is augmented by US\$ 300 million (2% of GDP). Since there is unsatisfied demand for sewerage in the country, it is expected that households are willing to absorb the increased supply of sewerage services without leading to price reductions. In order to simulate this change in the model, an increase in demand for sewerage services is assumed.

### **VI.6.2.1 Simulation parameters**

An exogenous increase in capital stock in the water and sewerage sector is imposed. Simultaneously, demand for sewerage services is doubled.

### **VI.6.2.2 Results with full employment (long – term) and fixed tax rates**

Given the estimated initial capital stock (approximately US\$ 480 million), the projected investment leads to a 63% increase in the sectoral capital stock.<sup>7</sup> A 30% increase in sectoral labor use was also imposed. As a result, sectoral output grows by 44% (Table A2), while other sectors contract slightly (sectoral output variations in the other activities are lower than 1%). The reason for these slight effects on other sectors lies in the small relative size of the water and sewerage sector in the Uruguayan economy.

Since water and sewerage services are a non – tradable sector, no direct effects on import and exports take place; minor effects on other sectors' foreign trade are observed.

No significant changes in macroeconomic aggregates are observed (Table A1). Fiscal deficit increases by more than 1% (Table A11). Households belonging to the first 8 income deciles

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<sup>7</sup> Due to the lack of relevant information, estimates of the initial stock of capital in this sector are particularly rough and the magnitude of the relative change must be interpreted with caution.

experience small welfare gains, while those belonging to the 9<sup>th</sup> and 10<sup>th</sup> deciles experience welfare losses.

The most challenging aspect of this experiment was to conciliate an important resource reallocation towards a particular sector within a general equilibrium framework. The main difficulty was to adequately estimate the rise in demand needed to absorb such an important increase in supply. It was not possible to achieve a consistent aggregate result within the initial conditions of the model: absorption of the increased supply required unrealistic price decreases, and no optimal solutions could be found. A modification in the water and sewerage services consumption parameter was then introduced so as to capture the existing unsatisfied demand for sewerage, leading to small price variations. So an important increase in investment and supply can only be justified on the grounds of an important unsatisfied demand in the baseline scenario.

### **VI.6.2.3 Alternative closure rules: short – term scenario and endogenous tax rates**

A small reduction in employment is achieved in the short run due to wage rigidity. Changes in employment levels of other activities are larger in the short – term, but still rather small. By assumption, labor wages remain constant in the short run, and capital rent becomes more rigid as well. Prices of other activities exhibit small variations, generally lower in the short than in the long – term scenario.

A decrease in value added revenues is achieved in the long – term scenario with endogenous value – added tax rate. On the contrary, an increase in revenues is observed in the short – term scenario with endogenous tax rate. Since government savings is assumed exogenous, no significant variations on household welfare were observed.

## **VII. CONCLUDING REMARKS**

In this paper, we analyze the possible impacts of the reform of public services in Uruguay. We use a static CGE model in order to perform various comparative static exercises aiming at investigating the effects of regulatory reforms on macroeconomic variables and on different sectors and economic agents. Eleven alternative scenarios with 4 possible closure rules were examined, leading to 44 simulations. We did not intend to consider every possible scenario, but only the most relevant ones in view of the main objectives of this study. The model allows policy - makers and involved actors to explore possibilities for policy design and decision - making.

Simulation results show that the macroeconomic effects of the reforms are generally small. Alternative closure rules do not determine significant variations in the results. However, it must be taken into account that CGE models tend to under - estimate global impacts of policy measures when working with competitive market structures. Therefore, results do not provide quantitative predictions and they should be interpreted with caution. Besides, results are very sensitive to the elasticity of substitution between domestic and imported commodities and between domestic market and export sales. Since no estimated parameters values were available in Uruguay, they were taken from the literature; an accurate estimation of parameter values could improve the usefulness of the model.



Possible extensions of this work include: considering alternative closure rules such as sector - specific factors and different external balance closures leading to temporary changes in the productive specialization pattern of the Uruguayan economy, projecting changes in the productive structure of the economy and in demand functions, and improving baseline information used for model calibration.

## BIBLIOGRAPHY

Dervis, K., J. de Melo and S. Robinson (1982): *General Equilibrium Models for Development Policy*. Cambridge University Press, New York.

Katz, G., H. Pastori and P. Barrenechea (2000): “Constructing a Social Accounting Matrix for Uruguay for the year 2000”, *Working Paper 20/04*, Department of Economics, School of Social Sciences, Universidad de la República, Uruguay.

Löfgren, H., R. Lee Harris and S. Robinson (2001): “A Standard Computable General Equilibrium (CGE) Model in GAMS”, *TMD Discussion Paper N° 75*, Trade and Macroeconomics Division, International Food Policy Research Institute, Washington D.C.

Pyatt, G. and J. Round (1985): *Social Accounting Matrices: A Basis for Planning*. World Bank, Washington D.C.

Reinert, K. y D. Roland - Holst (1992): “Detailed social accounting matrix for the USA, 1988”, *Economic Systems Research*, Vol. 4, N° 2.

Reinert, K. and D. Roland – Holst (1997): “Social Accounting Matrices”, in Francois, J. and Reinert, K. (eds), *Applied Methods for Trade Policy Analysis: A Handbook*. Cambridge University Press, New York.

World Bank (2003): *Program document for a proposed Public Services and Social Sector Structural Adjustment Loan and Special Structural Adjustment Loan to the Oriental Republic of Uruguay*

**ANNEX**  
**Simulation results**

**Table A1 – Aggregate supply and demand**  
**Long term scenario with fixed tax rates – percentage change relative to the initial equilibrium**

Macroeconomic variables	Baseline data (in millions of US dollars)	Railroad transportation	Electricity		Fuel				Gas	Tele - communications	Water and sewerage	
			Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 3	Scenario 4			Scenario 1	Scenario 2
Absorption	20,550.44	-0.07	-0.36	-0.25	-0.06	0.36	0.33	-0.04	0.04	0.13	-0.06	-0.01
Private consumption	15,221.09	-0.10	-0.48	-0.34	-0.08	0.49	0.45	-0.06	0.05	0.18	-0.08	-0.01
Fixed investment	2,451.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Stock variation	144.74	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Government consumption	2,733.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Exports	3,590.53	-0.05	-0.07	-0.14	0.62	0.57	0.65	-0.19	0.16	-0.09	-0.03	-0.48
Imports	3,902.59	-0.05	-0.06	-0.13	0.57	0.52	0.6	-0.18	0.19	-0.09	-0.02	-0.44
GDP at market prices	20,238.38	-0.08	-0.36	-0.26	-0.06	0.37	0.34	-0.04	0.03	0.13	-0.06	-0.01

**Table A2 – Sectoral GDP at agents prices**  
**Long term scenario with fixed tax rates – percentage change relative to the initial equilibrium**

Sectors	Railroad transportation	Electricity		Fuel				Gas	Tele – communications	Water and sewerage	
		Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 3	Scenario 4			Scenario 1	Scenario 2
Agriculture	-0.15	0.01	-0.08	0.64	1.02	0.94	-1.08	0.01	-0.27	-0.05	-0.59
Cattle raising	-0.05	0.02	-0.09	0.31	0.33	0.29	0.08	0.08	-0.42	-0.09	-0.74
Forestry	-0.1	-0.34	-0.26	0.36	0.68	0.62	-0.39	0.05	-0.27	0.05	-0.48
Other primary sectors	-0.21	-0.75	-0.43	0.31	0.57	0.51	-0.26	0.07	-0.15	0.11	-0.42
Bovine meat	-0.05	0.29	0.02	0.41	0.36	0.32	0.11	0.09	-0.48	-0.11	-0.75
Dairy industries	-0.07	0.06	-0.08	0.21	0.3	0.27	0.02	0.05	-0.45	-0.2	-0.83
Rice and barley	-0.46	0.63	0.19	1.17	1.41	1.29	-1.58	0.08	-0.4	-0.1	-0.68
Leather industries	0.23	3.25	1.28	2.24	0.21	0.06	1.5	0.70	-1.26	-0.61	-0.4
Wood and paper	-0.07	-2.02	-1.03	0.07	0.44	0.38	-0.19	0.13	-0.04	0.27	-0.31
Basic chemical industries and plastics	-0.05	-1.93	-1.00	0.08	0.39	0.34	0.15	0.14	0.34	0.26	-0.28
Ceramic and cement	-0.34	-1.61	-0.86	-0.09	0.41	0.37	-0.29	0.07	0.00	0.38	-0.15
Export industries	-0.06	-2.8	-1.41	0.59	0.54	0.44	0.21	0.35	-0.5	0.28	-0.72
Non - tradable sectors	-0.06	-0.45	-0.31	0.09	0.36	0.32	0.09	0.07	0.06	-0.02	-0.54
Import industries	-0.03	-0.5	-0.29	-0.22	0.22	0.18	0.09	-0.03	-0.33	0.08	-0.26
Wholesale trade	-0.06	-0.18	-0.19	-0.26	0.37	0.34	-0.02	-0.08	-0.14	-0.02	-0.44
Retail trade	-0.06	-0.21	-0.2	0.06	0.38	0.36	0.02	-0.01	-0.21	-0.02	-0.49
Hotels and restaurants	-0.09	-0.47	-0.34	-0.06	0.44	0.4	0.04	0.03	0.01	-0.16	-0.61
Hospitals	-0.10	-0.41	-0.3	-0.07	0.32	0.29	0.10	0.03	-0.10	-0.12	-0.65
Other services	-0.04	-0.18	-0.16	-0.01	0.23	0.21	0.02	0.02	-0.06	-0.01	-0.26
Construction	-0.02	-0.1	-0.08	-0.08	0.09	0.08	0.01	-0.01	0.02	0.02	-0.04
Financial services	-0.09	-0.3	-0.26	-0.07	0.42	0.38	0.10	0.03	-0.14	-0.07	-0.44
Refinery	-0.08	-0.2	-0.21	-4.34	0.00	0.00	0.05	-1.17	-0.05	-0.23	-0.47
Electric energy	-0.04	18.08	8.00	1.07	-0.43	-0.38	0.46	-0.26	-1.63	-0.66	0.41
Natural gas	-0.09	-0.51	-0.36	-1.04	0.6	0.52	0.03	11.86	-0.01	-0.15	-0.76
Water and sewerage	-0.07	-1.28	-0.7	0.33	-0.27	-0.24	1.02	-0.16	-1.14	22.12	44.24
Passenger transportation	-0.09	-0.17	-0.19	0.22	0.7	0.64	-0.55	0.01	-0.21	-0.09	-0.81
Other transportation	0.12	0.22	-0.01	0.62	1.16	1.11	-1.14	-0.02	-0.21	-0.01	-0.23
Railroad transportation	59.88	0.73	0.23	1.33	-0.08	-0.03	0.26	-0.56	-3.4	0.09	-0.43
Tele-communications	-0.07	-0.14	-0.18	-0.06	0.38	0.34	0.07	0.02	6.60	-0.02	-0.41
Post	-0.09	-0.78	-0.49	0.00	0.46	0.41	0.15	0.06	2.90	-0.05	-0.52
<b>TOTAL</b>	<b>0.04</b>	<b>0.21</b>	<b>0.00</b>	<b>0.00</b>	<b>0.32</b>	<b>0.29</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.13</b>	<b>-0.01</b>

**Table A3 – Sectoral labor use**  
**Long term scenario with fixed tax rates – percentage change relative to the initial equilibrium**

Sectors	Railroad transportation	Electricity		Fuel				Gas	Tele-communications	Water and sewerage	
		Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 3	Scenario 4			Scenario 1	Scenario 2
Agriculture	-0.15	0.07	-0.04	0.59	0.81	0.75	-1.08	-0.01	-0.24	-0.06	-0.47
Cattle raising	-0.06	0.08	-0.05	0.27	0.13	0.11	0.08	0.06	-0.39	-0.1	-0.62
Forestry	-0.10	-0.19	-0.14	0.26	0.14	0.13	-0.38	0.01	-0.20	0.02	-0.19
Other primary sectors	-0.22	-0.63	-0.34	0.22	0.13	0.11	-0.25	0.04	-0.09	0.09	-0.17
Bovine meat	-0.05	0.42	0.12	0.31	-0.10	-0.11	0.12	0.06	-0.42	-0.13	-0.49
Dairy industries	-0.07	0.16	0.00	0.13	-0.06	-0.06	0.02	0.02	-0.4	-0.22	-0.63
Rice and barley	-0.46	0.74	0.27	1.09	1.01	0.93	-1.57	0.05	-0.35	-0.12	-0.46
Leather industries	0.22	3.42	1.41	2.12	-0.37	-0.47	1.51	0.66	-1.18	-0.64	-0.07
Wood and paper	-0.07	-1.91	-0.94	-0.01	0.04	0.02	-0.18	0.11	0.01	0.25	-0.09
Basic chemical industries and plastics	-0.05	-1.82	-0.91	0.00	0.00	-0.02	0.16	0.11	0.39	0.24	-0.07
Ceramic and cement	-0.34	-1.53	-0.79	-0.15	0.12	0.11	-0.28	0.05	0.04	0.37	0.01
Export industries	-0.06	-2.69	-1.32	0.51	0.13	0.06	0.22	0.32	-0.45	0.26	-0.49
Non - tradable sectors	-0.07	-0.36	-0.24	0.02	0.02	0.01	0.10	0.05	0.11	-0.04	-0.36
Import industries	-0.03	-0.39	-0.2	-0.3	-0.18	-0.18	0.1	-0.06	-0.28	0.06	-0.04
Wholesale trade	-0.07	-0.08	-0.11	-0.33	0.01	0.01	-0.02	-0.1	-0.1	-0.04	-0.24
Retail trade	-0.06	-0.13	-0.13	-0.01	0.07	0.08	0.02	-0.03	-0.17	-0.04	-0.32
Hotels and restaurants	-0.1	-0.3	-0.21	-0.18	-0.16	-0.15	0.05	-0.01	0.09	-0.19	-0.27
Hospitals	-0.1	-0.4	-0.3	-0.07	0.29	0.26	0.1	0.02	-0.10	-0.12	-0.64
Other services	-0.04	-0.14	-0.12	-0.04	0.08	0.07	0.03	0.01	-0.04	-0.02	-0.18
Construction	-0.02	-0.03	-0.02	-0.13	-0.16	-0.15	0.01	-0.03	0.05	0.00	0.10
Financial services	-0.09	-0.15	-0.14	-0.19	-0.13	-0.12	0.11	-0.01	-0.07	-0.09	-0.13
Refinery	-0.08	-0.03	-0.08	-4.46	-15.9	-14.49	0.06	-1.21	0.03	-0.26	-0.13
Electric energy	-0.05	9.46	8.00	0.99	-0.84	-0.75	0.47	-0.28	-1.57	-0.68	0.64
Natural gas	-0.09	-0.43	-0.29	-1.1	0.3	0.25	0.03	11.83	0.03	-0.17	-0.59
Water and sewerage	-0.07	-1.2	-0.63	0.27	-0.59	-0.53	1.03	-0.18	-1.1	6.18	30.00
Passenger transportation services	-0.09	-0.11	-0.15	0.19	0.51	0.47	-0.55	0.00	-0.18	-0.09	-0.71
Other transportation services	0.11	0.35	0.09	0.52	0.68	0.68	-1.13	-0.05	-0.15	-0.03	0.03
Railroad transportation	33.23	0.81	0.29	1.27	-0.38	-0.3	0.27	-0.58	-3.37	0.07	-0.26
Tele-communications	-0.08	-0.03	-0.09	-0.15	-0.04	-0.04	0.08	-0.01	6.65	-0.04	-0.18
Post	-0.09	-0.66	-0.39	-0.09	0.02	0.01	0.16	0.03	2.96	-0.07	-0.27
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>

**Table A4 – Sectoral capital use**  
**Long term scenario with fixed tax rates – percentage change relative to the initial equilibrium**

Sectors	Railroad transportation	Electricity		Fuel				Gas	Tele-communications	Water and sewerage	
		Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 3	Scenario 4			Scenario 1	Scenario 2
Agriculture	-0.15	-0.12	-0.19	0.73	1.5	1.38	-1.09	0.04	-0.33	-0.03	-0.85
Cattle raising	-0.05	-0.11	-0.2	0.41	0.81	0.73	0.07	0.11	-0.48	-0.06	-1.00
Forestry	-0.10	-0.38	-0.29	0.4	0.83	0.76	-0.39	0.06	-0.29	0.06	-0.57
Other primary sectors	-0.21	-0.82	-0.49	0.36	0.82	0.74	-0.27	0.08	-0.18	0.12	-0.56
Bovine meat	-0.05	0.23	-0.03	0.45	0.58	0.52	0.1	0.11	-0.50	-0.1	-0.87
Dairy industries	-0.07	-0.03	-0.16	0.27	0.62	0.56	0.01	0.07	-0.49	-0.19	-1.01
Rice and barley	-0.46	0.55	0.12	1.23	1.7	1.56	-1.58	0.1	-0.44	-0.09	-0.84
Leather industries	0.23	3.22	1.26	2.26	0.32	0.15	1.49	0.71	-1.27	-0.6	-0.46
Wood and paper	-0.07	-2.1	-1.09	0.13	0.72	0.64	-0.2	0.15	-0.08	0.28	-0.47
Basic chemical industries and plastics	-0.04	-2.01	-1.06	0.14	0.69	0.61	0.14	0.16	0.30	0.27	-0.45
Ceramic and cement	-0.34	-1.72	-0.94	-0.01	0.81	0.73	-0.29	0.1	-0.05	0.40	-0.37
Export industries	-0.06	-2.87	-1.47	0.65	0.81	0.69	0.21	0.37	-0.53	0.29	-0.87
Non - tradable sectors	-0.06	-0.55	-0.39	0.16	0.70	0.63	0.08	0.1	0.02	0.00	-0.74
Import industries	-0.03	-0.58	-0.35	-0.16	0.50	0.44	0.08	-0.01	-0.37	0.09	-0.42
Wholesale trade	-0.06	-0.27	-0.26	-0.19	0.70	0.64	-0.03	-0.05	-0.19	0.00	-0.62
Retail trade	-0.06	-0.32	-0.28	0.13	0.76	0.71	0.01	0.02	-0.26	0.00	-0.7
Hotels and restaurants	-0.09	-0.49	-0.36	-0.04	0.52	0.47	0.04	0.04	0.00	-0.16	-0.65
Hospitals	-0.09	-0.59	-0.45	0.07	0.97	0.89	0.08	0.07	-0.19	-0.09	-1.02
Other services	-0.04	-0.33	-0.28	0.1	0.77	0.7	0.01	0.05	-0.13	0.01	-0.56
Construction	-0.02	-0.22	-0.17	0.01	0.52	0.47	0.00	0.01	-0.04	0.04	-0.28
Financial services	-0.08	-0.34	-0.29	-0.05	0.55	0.5	0.1	0.04	-0.16	-0.06	-0.51
Refinery	-0.08	-0.22	-0.23	-4.33	-15.32	-13.95	0.05	-1.17	-0.06	-0.22	-0.51
Electric energy	-0.04	9.25	8.00	1.13	-0.16	-0.13	0.46	-0.24	-1.66	-0.65	0.26
Natural gas	-0.09	-0.62	-0.44	-0.96	0.99	0.87	0.02	11.88	-0.06	-0.14	-0.97
Water and sewerage	-0.07	-1.38	-0.78	0.41	0.09	0.09	1.02	-0.13	-1.19	6.21	62.5
Passenger transportation services	-0.09	-0.3	-0.3	0.32	1.19	1.09	-0.56	0.05	-0.27	-0.06	-1.09
Other transportation services	0.12	0.16	-0.06	0.66	1.37	1.31	-1.15	0.00	-0.24	0.00	-0.35
Railroad transportation	33.24	0.62	0.14	1.41	0.31	0.32	0.26	-0.53	-3.45	0.11	-0.64
Tele-communications	-0.07	-0.22	-0.24	-0.01	0.64	0.59	0.06	0.03	6.56	-0.01	-0.56
Post	-0.09	-0.85	-0.54	0.05	0.70	0.63	0.14	0.08	2.87	-0.04	-0.65
<b>TOTAL</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>

**Table A5 - Exports**  
**Long term scenario with fixed tax rates – percentage change relative to the initial equilibrium**

Commodities	Railroad transportation	Electricity		Fuel				Gas	Tele-communications	Water and sewerage	
		Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 3	Scenario 4			Scenario 1	Scenario 2
Agriculture	-0.14	0.46	0.13	1.48	1.99	1.85	-2.64	-0.04	-0.55	-0.04	-0.53
Cattle raising	-0.03	0.76	0.26	0.65	0.29	0.25	0.02	0.09	-0.86	-0.04	-0.64
Forestry	-0.24	0.4	0.07	0.97	1.17	1.08	-0.89	0.05	-0.77	0.10	-0.54
Other primary sectors	-0.60	-0.22	-0.19	1.04	1.22	1.11	-1.18	0.05	-0.14	0.15	-0.41
Bovine meat	-0.02	0.82	0.27	0.68	0.33	0.28	0.11	0.12	-0.72	-0.12	-0.68
Dairy products	-0.04	0.68	0.21	0.44	0.2	0.17	0.00	0.08	-0.73	-0.34	-0.71
Rice and barley	-0.57	1.00	0.37	1.55	1.72	1.56	-2.07	0.1	-0.49	-0.11	-0.62
Leather products	0.27	4.00	1.61	2.55	0.18	0.01	1.70	0.78	-1.42	-0.72	-0.37
Wood and paper	-0.07	-3.42	-1.68	0.13	0.56	0.48	-0.41	0.22	-0.02	0.43	-0.32
Basic chemical products and plastics	-0.02	-3.47	-1.71	0.11	0.46	0.39	0.17	0.23	0.84	0.40	-0.26
Ceramic and cement	-0.77	-3.82	-1.88	-0.19	0.5	0.44	-0.89	0.18	0.18	0.58	-0.12
Exportable commodities	-0.05	-3.39	-1.68	0.75	0.59	0.47	0.25	0.43	-0.60	0.36	-0.7
Non - tradable commodities	-0.04	-0.64	-0.39	0.25	0.35	0.3	0.15	0.13	0.22	0.04	-0.5
Importable commodities	-0.03	-0.79	-0.42	-0.08	0.25	0.2	0.11	0.02	-0.42	0.14	-0.24
Wholesale trade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Retail trade	-0.03	0.49	0.14	0.15	0.08	0.08	0.49	0.03	-0.66	0.02	-0.43
Hotels and restaurants	-0.07	-0.17	-0.21	0.06	0.41	0.36	0.21	0.09	0.18	-0.31	-0.58
Hospitals	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other services	-0.02	0.39	0.13	0.08	-0.10	-0.10	0.34	0.05	-0.19	-0.04	-0.12
Construction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Financial services	-0.06	0.41	0.05	0.07	0.35	0.30	0.61	0.09	-0.59	0.01	-0.52
Gasoline	-0.02	1.13	0.39	-11.67	1.54	15.5	-0.26	0.26	0.00	-0.71	-0.24
Fuel Oil	-0.08	-1.21	-0.69	-5.32	-0.01	-0.11	-12.2	-1.43	0.06	-0.24	-0.51
Gas oil	-0.16	-0.2	-0.22	2.21	9.62	188.84	-12.36	-2.05	-0.03	-0.37	-0.51
Other fuels	-0.08	-0.09	-0.17	-4.68	0.01	0.01	-9.53	-1.28	-0.07	-0.25	-0.44
Electric energy	-0.02	22.62	9.96	1.14	-0.43	-0.39	0.35	-0.19	-1.51	-0.85	0.5
Argentinean natural gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Piped gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Liquefied petroleum gas (LPG)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compressed natural gas for automobile use	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water and sewerage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Passenger transportation services	-0.07	0.49	0.13	0.62	1.07	0.98	-1.35	0.01	-0.37	-0.10	-0.7
Other transportation	0.13	0.77	0.24	1.38	2.11	1.99	-2.59	-0.05	-0.26	-0.10	-0.19

Commodities	Railroad transportation	Electricity		Fuel				Gas	Tele-communications	Water and sewerage	
		Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 3	Scenario 4			Scenario 1	Scenario 2
services											
Railroad transportation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tele-communications	-0.05	0.12	-0.06	0.06	0.26	0.22	0.42	0.07	34.36	0.01	-0.40
Post	-0.07	-0.98	-0.58	0.11	0.44	0.39	0.36	0.12	6.68	-0.06	-0.50
<b>TOTAL</b>	-0.05	-0.07	-0.14	0.62	0.57	0.65	-0.19	0.16	-0.09	-0.03	-0.48



**Table A6 - Imports**  
**Long term scenario with fixed tax rates – percentage change relative to the initial equilibrium**

Commodities	Railroad transportation	Electricity		Fuel				Gas	Tele-communications	Water and sewerage	
		Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 3	Scenario 4			Scenario 1	Scenario 2
Agriculture	-0.16	-0.33	-0.25	-0.2	0.02	0.00	0.56	0.06	-0.02	-0.07	-0.64
Cattle raising	-0.07	-0.55	-0.37	0.08	0.44	0.39	0.04	0.07	-0.04	-0.14	-0.82
Forestry	0.12	-1.27	-0.67	-0.42	0.02	0.02	0.25	0.05	0.40	-0.04	-0.39
Other primary sectors	0.22	-1.20	-0.64	-0.40	-0.07	-0.09	0.64	0.09	-0.20	0.05	-0.41
Bovine meat	-0.11	-0.81	-0.51	-0.12	0.49	0.45	0.01	0.02	0.03	-0.09	-0.9
Dairy products	-0.12	-1.02	-0.6	-0.17	0.54	0.5	-0.04	-0.01	0.06	0.04	-1.05
Rice and barley	0.07	-1.09	-0.63	-0.55	0.02	0.03	0.68	-0.02	0.00	-0.06	-0.94
Leather products	0.03	-0.04	-0.17	0.93	0.38	0.29	0.55	0.35	-0.54	-0.10	-0.54
Wood and paper	-0.07	0.36	0.07	0.01	0.29	0.27	0.08	-0.01	-0.09	0.00	-0.30
Basic chemical products and plastics	-0.08	0.16	-0.04	0.07	0.35	0.32	0.03	0.01	-0.30	0.06	-0.31
Ceramic and cement	0.12	0.83	0.26	0.05	0.37	0.35	0.27	-0.04	-0.18	0.16	-0.18
Exportable commodities	-0.10	-0.04	-0.14	-0.08	0.39	0.37	-0.05	-0.03	-0.02	-0.10	-0.80
Non - tradable commodities	-0.09	-0.27	-0.24	-0.09	0.42	0.39	-0.08	-0.01	-0.09	-0.10	-0.60
Importable commodities	-0.05	-0.17	-0.15	-0.55	0.21	0.19	-0.05	-0.14	-0.03	-0.05	-0.31
Wholesale trade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Retail trade	-0.10	-1.08	-0.6	-0.07	0.75	0.71	-0.57	-0.05	0.33	-0.07	-0.56
Hotels and restaurants	-0.12	-0.81	-0.49	-0.19	0.48	0.45	-0.15	-0.03	-0.18	0.02	-0.64
Hospitals	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other services	-0.07	-0.8	-0.47	-0.1	0.59	0.55	-0.32	-0.02	0.07	0.01	-0.41
Construction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Financial services	-0.12	-1.04	-0.59	-0.23	0.5	0.47	-0.42	-0.03	0.33	-0.14	-0.35
Gasoline	-0.68	-11.85	-5.72	1072.42	346.56	363.38	-72.52	-15.05	-1.14	4.93	-2.76
Fuel Oil	-0.08	13.87	6.11	9.09	0.42	0.37	-0.94	2.09	-1.58	-0.13	0.19
Gas oil	0.79	0.78	0.35	44.07	14.72	21.82	-15.09	8.83	-0.57	1.30	0.06
Other fuels	-0.01	-0.45	-0.31	2.04	0.7	0.65	-4.02	0.54	-0.22	0.03	-0.83
Electric energy	-0.07	13.64	6.04	1.02	-0.42	-0.36	0.56	-0.32	-1.76	-0.48	0.32
Argentinean natural gas	-0.09	-0.51	-0.36	-1.04	0.60	0.52	0.03	11,089	-0.01	-0.15	-0.76
Piped gas	-0.13	-0.68	-0.44	1.33	0.27	0.30	-0.14	-13.98	-0.10	-0.06	0.07
Liquefied petroleum gas (LPG)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compressed natural gas for automobile use	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water and sewerage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Passenger transportation services	-0.12	-1.08	-0.63	-0.33	0.18	0.17	0.57	0.01	0.02	-0.06	-0.97
Other transportation	0.10	-0.66	-0.42	-0.59	-0.36	-0.31	1.21	0.03	-0.12	0.13	-0.3

Commodities	Railroad transportation	Electricity		Fuel				Gas	Tele-communications	Water and sewerage	
		Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 3	Scenario 4			Scenario 1	Scenario 2
services											
Railroad transportation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tele-communications	-0.08	-0.19	-0.2	-0.09	0.4	0.36	0.01	0.01	2.28	-0.03	-0.41
Post	-0.12	-0.47	-0.34	-0.18	0.48	0.45	-0.17	-0.03	-2.81	-0.03	-0.55
<b>TOTAL</b>	<b>-0.05</b>	<b>-0.06</b>	<b>-0.13</b>	<b>0.57</b>	<b>0.52</b>	<b>0.60</b>	<b>-0.18</b>	<b>0.19</b>	<b>-0.09</b>	<b>-0.02</b>	<b>-0.44</b>

**Table A7 – Real exchange rates and factor wages**  
**Long term scenario with fixed tax rates – percentage change relative to the initial equilibrium**

	Railroad transportation	Electricity		Fuel				Gas	Tele- communications	Water and sewerage	
		Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 3	Scenario 4			Scenario 1	Scenario 2
Real exchange rate	0.00	0.60	0.30	0.20	0.10	0.10	-0.30	0.10	0.60	0.00	0.10
Real labor wage	-0.01	-0.61	-0.32	-0.25	0.97	0.88	-0.87	0.14	1.20	-0.04	-0.22
Capital rent	-0.02	-0.37	-0.13	-0.42	0.11	0.10	-0.86	0.08	1.31	-0.08	0.26

**Table A8 – Prices of composite commodities**  
**Long term scenario with fixed tax rates – percentage change relative to the initial equilibrium**

Commodities	Railroad transportation	Electricity		Fuel				Gas	Tele-communications	Water and Sewerage	
		Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 3	Scenario 4			Scenario 1	Scenario 2
Agriculture	0.01	0.08	0.04	-0.98	-0.71	-0.68	1.26	0.21	0.87	0.01	0.00
Cattle raising	-0.01	-0.32	-0.15	-0.54	0.30	0.26	-0.25	0.15	1.11	-0.03	-0.05
Forestry	0.23	-0.51	-0.21	-1.00	-0.47	-0.45	0.41	0.16	1.31	-0.06	0.15
Other primary sectors	0.42	-0.03	0.00	-0.90	-0.42	-0.41	0.64	0.18	0.59	-0.02	0.06
Bovine meat	-0.03	-0.41	-0.19	-0.62	0.28	0.25	-0.31	0.10	1.02	0.04	-0.06
Dairy products	-0.03	-0.46	-0.22	-0.53	0.38	0.34	-0.28	0.11	1.05	0.22	-0.12
Rice and barley	0.34	-0.61	-0.29	-1.25	-0.63	-0.59	1.14	0.10	0.88	0.05	-0.11
Leather products	-0.07	-1.04	-0.45	-0.82	0.25	0.24	-0.63	0.00	0.97	0.25	-0.02
Wood and paper	0.02	1.28	0.6	-0.27	0.12	0.10	-0.12	0.10	0.63	-0.07	0.05
Basic chemical products and plastics	0.00	1.23	0.57	-0.25	0.16	0.14	-0.26	0.11	0.39	-0.05	0.04
Ceramic and cement	0.39	2.42	1.11	-0.13	0.15	0.13	0.23	0.06	0.49	-0.15	0.03
Exportable commodities	0.00	1.32	0.61	-0.46	0.14	0.13	-0.32	0.03	0.80	-0.1	0.02
Non - tradable commodities	0.00	0.48	0.22	-0.34	0.21	0.19	-0.31	0.11	0.57	-0.01	0.02
Importable commodities	0.01	0.4	0.19	-0.3	0.18	0.15	-0.23	0.14	0.70	0.01	0.04
Wholesale trade	-0.01	-0.29	-0.13	-0.39	0.39	0.35	-0.55	0.12	1.03	0.00	0.00
Retail trade	-0.02	-0.44	-0.20	-0.33	0.58	0.53	-0.86	0.11	1.19	-0.02	-0.02
Hotels and restaurants	-0.01	0.11	0.07	-0.35	0.22	0.20	-0.44	0.09	0.37	0.23	0.02
Hospitals	-0.01	-0.33	-0.18	-0.27	0.75	0.68	-0.71	0.12	0.77	0.13	-0.19
Other services	-0.01	-0.22	-0.12	-0.31	0.60	0.54	-0.62	0.12	0.74	0.06	-0.12
Construction	0.00	0.69	0.31	-0.36	0.26	0.23	-0.34	0.1	0.56	0.21	-0.09
Financial services	-0.02	-0.40	-0.15	-0.39	0.28	0.25	-0.86	0.09	1.17	-0.06	0.17
Gasoline	-0.05	-0.92	-0.41	8.34	-1.44	-1.10	0.03	-1.34	0.57	0.53	-0.19
Fuel Oil	0.02	1.45	0.69	0.77	0.21	0.17	17.3	0.4	0.49	0.04	0.10
Gas oil	0.09	0.47	0.24	-7.52	-9.28	-8.76	15.34	1.01	0.60	0.16	0.10
Other fuels	0.02	0.39	0.19	-0.05	0.19	0.16	16.23	0.21	0.64	0.04	0.04
Electric energy	-0.01	-3.91	-1.88	-0.25	0.19	0.17	-0.11	0.08	0.43	0.25	-0.04
Argentinean natural gas	0.02	0.50	0.24	-0.20	0.18	0.15	-0.22	-40.42	0.59	0.03	0.06
Piped gas	-0.02	0.24	0.11	2.33	-0.18	-0.10	-0.39	-24.32	0.54	0.13	0.95
Liquefied petroleum gas (LPG)	-0.03	0.12	0.06	4.12	-0.55	-0.39	-0.26	-32.4	0.04	0.45	-1.19
Compressed natural gas for automobile use	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water and sewerage	-0.01	0.84	0.38	-0.28	0.38	0.34	-0.59	0.09	0.64	-9.51	4.09
Passenger transportation services	-0.01	-0.34	-0.17	-0.71	-0.29	-0.28	0.8	0.16	0.79	0.05	-0.09
Other transportation	0.01	-0.16	-0.07	-1.10	-0.95	-0.91	1.57	0.19	0.65	0.13	0.01

Commodities	Railroad transportation	Electricity		Fuel				Gas	Tele-communications	Water and Sewerage	
		Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 3	Scenario 4			Scenario 1	Scenario 2
services											
Railroad transportation	-13.93	-0.42	-0.2	-0.56	0.21	0.18	-0.22	0.14	1.10	-0.01	-0.01
Tele-communications	-0.01	0.17	0.09	-0.35	0.33	0.30	-0.67	0.10	-24.99	-0.01	0.05
Post	-0.01	0.79	0.37	-0.36	0.20	0.18	-0.51	0.08	-4.41	0.04	0.03

**Table A9 – Prices of domestic commodities**  
**Long term scenario with fixed tax rates – percentage change relative to the initial equilibrium**

Commodities	Railroad transportation	Electricity		Fuel				Gas	Tele-communications	Water and Sewerage	
		Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 3	Scenario 4			Scenario 1	Scenario 2
Agriculture	0.01	-0.01	0.00	-1.2	-0.97	-0.93	1.71	0.22	0.94	0.01	-0.01
Cattle raising	-0.01	-0.32	-0.15	-0.54	0.3	0.26	-0.25	0.15	1.11	-0.03	-0.05
Forestry	0.24	-0.53	-0.22	-1.02	-0.49	-0.47	0.43	0.16	1.33	-0.06	0.15
Other primary sectors	0.51	-0.12	-0.05	-1.05	-0.56	-0.54	0.83	0.18	0.57	-0.03	0.06
Bovine meat	-0.03	-0.50	-0.24	-0.66	0.30	0.27	-0.32	0.10	1.06	0.04	-0.07
Dairy products	-0.03	-0.54	-0.25	-0.56	0.40	0.36	-0.28	0.11	1.09	0.24	-0.14
Rice and barley	0.39	-0.76	-0.36	-1.41	-0.76	-0.71	1.35	0.09	0.91	0.06	-0.13
Leather products	-0.12	-1.85	-0.81	-1.14	0.3	0.31	-0.88	-0.08	1.15	0.38	-0.05
Wood and paper	0.02	2.56	1.18	-0.29	0.06	0.06	0.00	0.03	0.61	-0.21	0.06
Basic chemical products and plastics	-0.01	2.36	1.08	-0.25	0.16	0.14	-0.34	0.04	0.06	-0.15	0.03
Ceramic and cement	0.51	3.07	1.40	-0.09	0.14	0.13	0.37	0.03	0.44	-0.21	0.02
Exportable commodities	-0.01	2.26	1.04	-0.67	0.11	0.12	-0.43	-0.09	0.96	-0.22	-0.01
Non - tradable commodities	-0.01	0.54	0.25	-0.41	0.25	0.22	-0.39	0.08	0.51	-0.04	-0.01
Importable commodities	0.00	0.44	0.20	-0.48	0.20	0.18	-0.35	0.08	0.91	-0.05	0.01
Wholesale trade	-0.01	-0.29	-0.13	-0.39	0.39	0.35	-0.55	0.12	1.03	0.00	0.00
Retail trade	-0.02	-0.48	-0.22	-0.34	0.60	0.55	-0.89	0.11	1.21	-0.02	-0.02
Hotels and restaurants	-0.01	0.10	0.06	-0.36	0.23	0.20	-0.45	0.09	0.36	0.23	0.02
Hospitals	-0.01	-0.33	-0.18	-0.27	0.75	0.68	-0.71	0.12	0.77	0.13	-0.19
Other services	-0.01	-0.24	-0.13	-0.31	0.61	0.56	-0.63	0.12	0.75	0.06	-0.13
Construction	0.00	0.69	0.31	-0.36	0.26	0.23	-0.34	0.10	0.56	0.21	-0.09
Financial services	-0.02	-0.41	-0.16	-0.39	0.28	0.25	-0.86	0.09	1.17	-0.06	0.17
Gasoline	-0.05	-0.93	-0.42	8.62	-1.36	-1.00	0.01	-1.35	0.57	0.53	-0.19
Fuel Oil	0.02	1.79	0.84	1.1	0.22	0.18	17.26	0.48	0.45	0.04	0.12
Gas oil	0.10	0.48	0.24	-7.02	-9.13	-8.53	15.15	1.13	0.59	0.18	0.10
Other fuels	0.02	0.37	0.18	0.39	0.24	0.2	15.68	0.33	0.62	0.05	0.01
Electric energy	-0.01	-4.15	-2.00	-0.26	0.19	0.17	-0.1	0.08	0.42	0.26	-0.05
Argentinean natural gas	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Piped gas	-0.03	0.21	0.09	2.76	-0.24	-0.14	-0.42	-27.87	0.52	0.14	1.09
Liquefied petroleum gas (LPG)	-0.03	0.12	0.06	4.12	-0.55	-0.39	-0.26	-32.4	0.04	0.45	-1.19
Compressed natural gas for automobile use	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water and sewerage	-0.01	0.84	0.38	-0.28	0.38	0.34	-0.59	0.09	0.64	-9.51	4.09
Passenger transportation services	-0.01	-0.48	-0.24	-0.79	-0.37	-0.36	0.98	0.16	0.83	0.06	-0.11
Other	0.00	-0.40	-0.17	-1.41	-1.34	-1.27	2.19	0.21	0.68	0.17	-0.01

Commodities	Railroad transportation	Electricity		Fuel				Gas	Tele-communications	Water and Sewerage	
		Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 3	Scenario 4			Scenario 1	Scenario 2
transportation services											
Railroad transportation	-13.93	-0.42	-0.2	-0.56	0.21	0.18	-0.22	0.14	1.10	-0.01	-0.01
Tele-communications	-0.01	0.16	0.08	-0.36	0.33	0.3	-0.68	0.09	-25.71	-0.01	0.05
Post	-0.02	0.83	0.39	-0.38	0.2	0.18	-0.55	0.07	-5.10	0.04	0.02

**Table A10 – Prices of imported commodities**  
**Long term scenario with fixed tax rates – percentage change relative to the initial equilibrium**

Commodities	Railroad transportation	Electricity		Fuel				Gas	Tele-communications	Water and Sewerage	
		Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 3	Scenario 4			Scenario 1	Scenario 2
Agriculture	0.02	0.38	0.18	-0.25	0.17	0.13	-0.20	0.16	0.65	0.03	0.05
Cattle raising	0.01	0.38	0.18	-0.26	0.17	0.13	-0.20	0.16	0.65	0.03	0.05
Forestry	0.02	0.40	0.19	-0.25	0.17	0.14	-0.20	0.16	0.64	0.03	0.05
Other primary sectors	0.02	0.38	0.19	-0.25	0.17	0.13	-0.20	0.16	0.65	0.03	0.05
Bovine meat	0.02	0.39	0.19	-0.25	0.17	0.13	-0.20	0.16	0.64	0.03	0.05
Dairy products	0.02	0.39	0.19	-0.25	0.17	0.14	-0.20	0.16	0.64	0.03	0.05
Rice and barley	0.02	0.39	0.19	-0.25	0.17	0.13	-0.20	0.16	0.64	0.03	0.05
Leather products	0.02	0.38	0.19	-0.25	0.17	0.13	-0.20	0.16	0.65	0.03	0.05
Wood and paper	0.02	0.39	0.19	-0.25	0.17	0.13	-0.20	0.16	0.64	0.03	0.05
Basic chemical products and plastics	0.02	0.39	0.19	-0.25	0.17	0.13	-0.20	0.16	0.64	0.03	0.05
Ceramic and cement	0.02	0.40	0.19	-0.25	0.17	0.14	-0.20	0.16	0.64	0.03	0.05
Exportable commodities	0.02	0.39	0.19	-0.25	0.17	0.14	-0.20	0.16	0.64	0.03	0.05
Non - tradable commodities	0.02	0.39	0.19	-0.25	0.17	0.14	-0.20	0.16	0.64	0.03	0.05
Importable commodities	0.02	0.39	0.19	-0.25	0.17	0.14	-0.20	0.16	0.64	0.03	0.05
Wholesale trade	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Retail trade	0.02	0.50	0.24	-0.20	0.18	0.15	-0.22	0.16	0.59	0.03	0.06
Hotels and restaurants	0.02	0.50	0.24	-0.20	0.18	0.15	-0.22	0.16	0.59	0.03	0.06
Hospitals	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other services	0.02	0.50	0.24	-0.20	0.18	0.15	-0.22	0.16	0.59	0.03	0.06
Construction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Financial services	0.02	0.50	0.24	-0.20	0.18	0.15	-0.22	0.16	0.59	0.03	0.06
Gasoline	0.01	0.31	0.15	-15.45	-15.06	-15.09	13.8	0.15	0.68	0.03	0.04
Fuel Oil	0.02	0.46	0.22	-0.22	0.18	0.14	17.42	0.16	0.61	0.03	0.05
Gas oil	0.02	0.39	0.19	-10.76	-10.38	-10.41	17.06	0.16	0.64	0.03	0.05
Other fuels	0.02	0.39	0.19	-0.25	0.17	0.13	16.5	0.16	0.64	0.03	0.05
Electric energy	0.02	0.50	0.24	-0.20	0.18	0.15	-0.22	0.16	0.59	0.03	0.06
Argentinean natural gas	0.02	0.50	0.24	-0.2	0.18	0.15	-0.22	-40.43	0.59	0.03	0.06
Piped gas	0.02	0.42	0.20	-0.24	0.17	0.14	-0.21	0.16	0.63	0.03	0.05
Liquefied petroleum gas (LPG)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Compressed natural gas for automobile use	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Water and sewerage	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Passenger transportation services	0.02	0.50	0.24	-0.20	0.18	0.15	-0.22	0.16	0.59	0.03	0.06
Other	0.02	0.50	0.24	-0.20	0.18	0.15	-0.22	0.16	0.59	0.03	0.06



Commodities	Railroad transportation	Electricity		Fuel				Gas	Tele-communications	Water and Sewerage	
		Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 3	Scenario 4			Scenario 1	Scenario 2
transportation services											
Railroad transportation	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tele-communications	0.02	0.5	0.24	-0.20	0.18	0.15	-0.22	0.16	0.59	0.03	0.06
Post	0.02	0.5	0.24	-0.20	0.18	0.15	-0.22	0.16	0.59	0.03	0.06

**Table A11 – Government finances**  
**Long term scenario with fixed tax rates - percentage of GDP at market prices**

	Baseline data	Railroad transportation	Electricity		Fuel				Gas	Tele-communications	Water and sewerage	
			Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 3	Scenario 4			Scenario 1	Scenario 2
Revenue	28,26	28.22	28.36	28.24	28.28	28.22	28.22	28.75	28.24	27.48	28.26	28.25
Direct taxes on enterprises and households	5.31	5.31	5.31	5.31	5.31	5.30	5.30	5.28	5.31	5.36	5.31	5.32
Direct taxes on factors	9.50	9.51	9.48	9.49	9.50	9.54	9.54	9.43	9.51	9.60	9.50	9.48
Value added tax	4.29	4.29	4.32	4.32	4.28	4.29	4.29	4.74	4.28	4.35	4.28	4.27
Activity taxes	1.26	1.21	1.30	1.18	1.26	1.26	1.26	1.26	1.26	0.23	1.26	1.31
Sales tax	4.32	4.32	4.34	4.33	4.39	4.29	4.29	4.36	4.29	4.34	4.33	4.30
Import tax	3.56	3.56	3.59	3.58	3.52	3.52	3.52	3.65	3.57	3.57	3.56	3.55
Export tax	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Expenditure	28.26	28.22	28.36	28.24	28.28	28.22	28.22	28.75	28.24	27.48	28.26	28.25
Government consumption	13.51	13.51	13.53	13.53	13.50	13.52	13.52	13.45	13.51	13.58	13.52	13.49
Transfers to the households	15.08	15.09	15.14	15.12	15.13	15.00	15.01	15.11	15.07	15.06	15.09	15.08
Transfers to the rest of the world	0.94	0.94	0.95	0.94	0.94	0.93	0.93	0.94	0.94	0.94	0.94	0.94
Investment minus savings	-1.26	-1.33	-1.25	-1.35	-1.29	-1.23	-1.24	-0.74	-1.27	-2.11	-1.28	-1.26

**Table A12 – Optimal expenditure and equivalent variation (in %)**  
**Long term scenario with fixed tax rates**

Households	Baseline data Optimal expenditure (in millions of US dollars)	Railroad transportation	Electricity		Fuel				Gas	Tele- communica tions	Water and sewerage	
			Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 3	Scenario 4			Scenario 1	Scenario 2
1st decile	382.96	-0.10	-0.45	-0.33	0.21	0.20	0.19	0.17	0.03	-0.75	0.16	-0.17
2nd decile	590.03	-0.10	-0.47	-0.33	0.11	0.37	0.34	0.02	0.04	-0.33	0.07	-0.12
3rd decile	768.46	-0.11	-0.55	-0.37	0.04	0.45	0.41	-0.04	0.05	-0.13	0.03	-0.12
4th decile	926.60	-0.09	-0.47	-0.33	0.09	0.35	0.32	0.03	0.02	0.17	0.00	-0.07
5th decile	1,111.56	-0.09	-0.49	-0.34	0.03	0.43	0.39	-0.06	0.03	0.16	-0.04	-0.04
6th decile	1,321.69	-0.09	-0.48	-0.33	-0.03	0.47	0.43	-0.05	0.04	0.33	-0.05	-0.05
7th decile	1,588.33	-0.09	-0.50	-0.34	-0.10	0.49	0.44	-0.02	0.07	0.27	-0.08	-0.05
8th decile	1,853.14	-0.11	-0.52	-0.38	-0.08	0.54	0.49	0.02	0.06	0.22	-0.10	-0.03
9th decile	2,496.17	-0.10	-0.46	-0.34	-0.16	0.59	0.54	-0.15	0.06	0.24	-0.13	0.02
10th decile	4,182.19	-0.11	-0.47	-0.34	-0.19	0.51	0.46	-0.12	0.06	0.12	-0.15	0.07
<b>TOTAL</b>	<b>15,221.12</b>	<b>-0.10</b>	<b>-0.48</b>	<b>-0.34</b>	<b>-0.08</b>	<b>0.49</b>	<b>0.45</b>	<b>-0.06</b>	<b>0.05</b>	<b>0.14</b>	<b>-0.08</b>	<b>-0.01</b>

**Table A13 – Income distribution**  
**Long term scenario with fixed tax rates - percentage change relative to the initial  
equilibrium**

Households	Baseline data (in millions of US dollars)	Railroad transportation	Electricity		Fuel				Gas	Tele- communi cations	Water and sewerage	
			Scenario 1	Scenario 2	Scenario 1	Scenario 2	Scenario 3	Scenario 4			Scenario 1	Scenario 2
1st decile	386.67	-0.02	-0.33	-0.18	-0.18	0.42	0.38	-0.42	0.07	0.57	-0.04	-0.03
2nd decile	598.28	-0.02	-0.36	-0.18	-0.2	0.46	0.42	-0.51	0.08	0.7	-0.04	-0.04
3rd decile	779.89	-0.02	-0.39	-0.20	-0.2	0.54	0.49	-0.58	0.09	0.8	-0.04	-0.07
4th decile	944.65	-0.02	-0.40	-0.20	-0.23	0.50	0.45	-0.62	0.09	0.87	-0.04	-0.04
5th decile	1,145.49	-0.02	-0.40	-0.20	-0.24	0.50	0.45	-0.64	0.09	0.9	-0.04	-0.03
6th decile	1,375.95	-0.02	-0.43	-0.21	-0.24	0.54	0.49	-0.67	0.09	0.95	-0.04	-0.04
7th decile	1,649.45	-0.02	-0.45	-0.22	-0.24	0.60	0.54	-0.69	0.10	0.98	-0.04	-0.07
8th decile	2,035.79	-0.03	-0.46	-0.24	-0.25	0.59	0.53	-0.61	0.10	0.84	-0.05	-0.05
9th decile	2,734.49	-0.03	-0.45	-0.23	-0.27	0.53	0.48	-0.65	0.09	0.9	-0.05	-0.01
10th decile	5,150.78	-0.03	-0.46	-0.22	-0.31	0.45	0.41	-0.7	0.09	1.00	-0.06	0.05
<b>TOTAL</b>	<b>16,801.46</b>	<b>-0.02</b>	<b>-0.44</b>	<b>-0.22</b>	<b>-0.26</b>	<b>0.51</b>	<b>0.46</b>	<b>-0.65</b>	<b>0.09</b>	<b>0.91</b>	<b>-0.05</b>	<b>-0.01</b>