

# On the Implementation of the Brazilian Tax Reform.

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## **Abstract**

In spite of a general agreement over the distortion imposed by the current Brazilian tax system, attempts to reform it during the last decade have faced several restrictions to its implementation. Two of these restrictions were particular binding: a) fiscal adjustment restriction (public sector debt cannot increase), b) fiscal federalist restriction (revenues from individual states and municipalities cannot decrease). This paper focuses on a specific reform that overcomes in principle the fiscal federalist restriction. Using Auerbach and Kotlikoff (1987) model calibrated for the Brazilian economy, I analyze the short and long run macroeconomic effects of this reform subject to the fiscal adjustment restriction. Finally, I look at the redistributive effects of this reform among generations as a way to infer about public opinion's reaction to the reform. The reform consists basically of replacing indirect taxes on corporate revenues, which I show to be equivalent to a symmetric tax on labor and capital income, by a new federal VAT. The reform presented positive macroeconomic effects both in the short and long run. Despite a substantial increase in the average VAT rate in the first years after the reform, a majority of cohorts experienced an increase in their lifetime welfare, being potentially in favour of the reform.

**Keywords:** tax reform, fiscal federalism, computable general equilibrium, Brazil

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## I. Introduction

It is a widely recognized fact that the Brazilian tax system became increasingly distortionary during the last thirty years. This process of deterioration was accelerated after the modifications imposed in the tax system implemented with the 1988 Constitution. The indirect tax system, which comprises a multitude of federal, state and local taxes on corporate sales and financial transactions, was particularly affected.

Ideas on how to reduce the distortions imposed by the Brazilian indirect tax system have been abundant and the subject of a continuous debate among organized groups in the private and public sector. Some of these ideas have been formalized in several comprehensive tax reform proposals submitted and discussed within the Brazilian National Congress. None of these proposals was successfully implemented, despite the positive welfare and economic effects revealed in computer simulations and the strong political organization and power of their supporters.

Understanding why a comprehensive reform of the Brazilian tax system was not approved is the first objective of this paper.

By briefly reviewing the political process behind the Brazilian tax reform in the last ten years, it is possible to recognize two major restrictions different tax reform proposals have always faced: (i) a fiscal federalist restriction, which basically states that revenues from individual states and municipalities cannot substantially decrease, and (ii) a fiscal adjustment restriction, which consists of the imposition that the debt of the consolidated public sector (direct administration of the federal, state and local governments plus state enterprises and autarchies) cannot increase.

The need to control the overall level of debt by increasing tax revenues, while diverting part of those revenues to pay for the debt service under a limited margin to reduce public expenditures as well as to reduce tax revenues available for states and municipalities, characterizes the *fiscal stress* condition the Brazilian public sector has been experiencing specially in the last six years of President Cardoso's mandate.

The second objective of this paper is to evaluate the macroeconomic and redistributive effects of a reform capable of overcoming the fiscal stress conditions. My strategy was to limit the search to tax reform proposals already debated inside the Brazilian Congress which at the same time did not change revenue-sharing agreements as well as the intergovernmental assignment of important subnational taxes. In doing that I set aside the fiscal federalist restriction focusing on the ability of the reform in respecting the fiscal adjustment constraint.

The tax reform proposed consists basically of replacing the so-called cumulative taxes, which are federal indirect business taxes on corporate sales by a new federal VAT whose revenues are not shared either with states or with municipalities. Since taxes on corporate sales can be shown to be equivalent to a symmetric tax on labor and capital income, this reform can also be interpreted as a partial switch to a consumption tax system.

The macroeconomic and redistributive effects of this proposed tax reform are simulated with the help of Auerbach and Kotlikoff (1987) overlapping generation (OLG) dynamic computable general equilibrium (CGE) model and algorithm.

Analyses of the implementability of the Brazilian tax reform proposals have already been conducted by Werneck (2000). Werneck defines a system of equations relating tax

revenues available to each government level in Brazil as a function of the size of their assigned statutory bases and their respective tax rates along with parameters measuring each government level productivity in the collection of such taxes. This model is used to simulate the effects of the 1997 tax reform proposal submitted to Congress by the Executive branch of the Federal Government on the level and allocation of revenues among different government spheres.<sup>1</sup>

This paper extends Werneck (2000) by using the more structural approach developed in dynamic CGE models to look at the effects of tax reform subject to the fiscal stress conditions described above. It also attempts to measure public opinion's reaction to the reform through the computation of the *remaining lifetime utility* concept introduced in Auerbach and Kotlikoff (1987).

The remainder of this paper is organized as follows. Next section presents a general background on the Brazilian tax reform, identifying the sources of distortion in the Brazilian tax system along with the main obstacles different proposals faced towards their implementation. Section III provides a general description of the methodology required to perform the simulation of our proposed tax reform. Section IV presents the simulation results. Main conclusions are summarized in section V. Tables and figures used to illustrate the analysis are grouped in an Appendix at the end of this manuscript.

## **II. A Background on the Brazilian Tax Reform.**

The current Brazilian tax system was implemented in the 1988 Constitutional reform inheriting its basic features regarding the assignment of tax bases and tax revenues among government levels from the previous 1967 Constitution.<sup>2</sup> While there has been isolated and repeated changes in specific aspects of the legislation that regulates the Brazilian tax code throughout this entire period, both the nature of tax reform proposals as well as the obstacles to their implementation owe most of their origins to each of these constitutional changes.

Figure 1 gives you a general idea of the Brazilian tax system by contrasting the evolution of the tax burden after the 1967 and 1988 constitutional reforms with the participation of indirect taxes in the total burden. Indirect taxes comprising business taxes on corporate sales and value-added accounted for the majority of the burden right after the 1967 reform.

The period that followed the implementation of the 1967 tax system until the implementation of the 1988 tax system was marked by a decline in the participation of indirect taxes accompanied by a stable tax burden around 25% of GDP. The period following the 1988 constitutional reform, on the other hand, brought a substantial increase in the participation of indirect taxes. That happened along with a more volatile but clearly increasing total tax burden, which more recently has reached historically high levels above 30% of GDP.

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<sup>1</sup> Werneck is interested in finding combinations of tax rate and tax base size parameters capable of leaving revenues of different government levels unaltered. He is particularly interested in exploring the trade-off between the broadness of the tax base and the size of the tax rate required by the new tax system in order to comply with the fiscal stress restrictions.

<sup>2</sup> As it is going to be clear some of the less comprehensive legislative changes also presented important economic effects. However, even those changes were reactions to the 1967 and 1988 Constitutional reforms.

It is behind this trend of an increasing participation of indirect taxes in the total tax burden coupled with an increasing trend for the tax burden itself that lies most of the dissatisfaction with the current tax system.

Before we go over the major political facts behind the debate let's look in more detail the changes and repercussions brought by both tax reforms.

#### **A. The Brazilian Tax System: Changes and Effects.**

Tables 1 and 2 summarize the Brazilian Tax System with respect to the assignment of tax bases and tax revenues among levels of government. They also present the basic changes introduced with the 1988 Constitution.

The system of direct and declaratory taxes on income and property was basically identical to the 1967 Constitution. Taxes on personal and corporate income were assigned to the central government. Property tax bases were assigned both to central (rural property) and local governments (urban property).

On the other hand, the system of indirect taxation was substantially improved in the 1967 Constitution with the introduction of two different value-added taxes (VATs): one assigned to the central government over manufactured products (IPI) and another at the state level (ICM) whose base was revenues from sales of non-manufactured goods and services. There were still a number of sales taxes on selective goods such as tobacco, electric energy, alcoholic beverages and petrol derivatives along with a tax on sales of financial assets assigned to the central level. Nevertheless, the introduction of the IPI and ICM represented an historical change from an indirect tax system based on *cumulative taxes* whose distortionary effects in terms of cascading tax incidence and disincentives to the productive sector are well recognized in the public finance literature.

New distortions were imposed again in the indirect tax system during the seventies with the creation of two different cumulative taxes: two over corporate revenues (COFINS, PIS/PASEP). All these taxes were assigned to the central level and had most of their revenue proceeds earmarked to finance social expenditures, being referred to as *social contributions*.<sup>3</sup> If numerically large, cumulative indirect taxes at least did not present at that time a high burden relatively to the federal and state VATs as illustrated in Figure 2.

The new tax system implemented in 1988 did little to revert this situation, being, in fact, directly responsible to an increase in the number and burden of cumulative indirect taxes. Even though, it increased the base of the state VAT (ICM) by extending it to the set of selective goods previously assigned at the federal level (now ICMS), it failed to incorporate to its base the value-added by the services whose revenues were taxed at the municipal level (ISS). It also failed to shift the taxation principle of the VATs from one based on the origin, where the producer of the good or service was responsible for the tax payment to one based on the destination, where responsibility for tax payments were shifted to consumers. The later principle was considered superior to the former given its

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<sup>3</sup> The revenues and destinations of social contributions were part of the Central Government Social Security Budget. They were mainly used to finance federal health and social assistance programs (e.g unemployment insurance). While payment of retirement benefits were part of the Social Security Budget, they were financed by a separate tax on corporate payroll not being financed by the described social contributions.

ability to exempt exported goods and services from taxes thus compromising its competitiveness in external markets. The former proved to induce tax competition among states whose economic effects are still unclear.

The lobbying of municipalities at the time of the 1988 Constitutional Assembly prevented the state VAT to have its tax base increased further by incorporating also the base of the municipal tax on services (ISS). This lobby went further by managing to have a new tax on final sales of gasoline and other petrol derivatives assigned to local governments. Demands from segments of the civil society for the universalization of labor and other social security benefits to rural workers as well as to self-employed workers in the informal sector made unfeasible any debate about shifting the social contributions tax structure away from corporate revenues leading to an increase in their tax rates.<sup>4</sup>

Another important change in the Brazilian tax system promoted by the 1988 Constitution in terms of its long-lasting distortionary effects occurred in its revenue sharing system. Without changing the essence of the revenue sharing system originated in 1967, the 1988 reform substantially increased the share of tax revenue raised by the central government that had to be transferred to state and municipalities. It also increased the transfers of state tax revenues to municipalities. The bulk of federal transfers to state and municipalities levels had their proceeds from a fund that retained 14.5% of the revenues on VATs and income taxes in 1967. This amount was raised to 21.5% in 1988 (almost 30% if you include transfers from regional funds with the same sources). The share of the state VAT transferred to municipalities, as shown in Table 2, has also increased from 20% to 25% after 1988.

The decentralization of tax revenues, which had begun with the redemocratization period a few years before, was celebrated as one of the high points of a longer process of devolution of political and fiscal power to state and municipalities. It came, however, in a period of increasing inflationary pressures. Eliminating and controlling inflation would demand a strong fiscal adjustment from the overall public sector and especially from the central government that was liable for most of the public debt.

With the pressure of fiscal adjustment on one side and little space to cut the recently created social security mandated benefits as well as to fully explore its value-added and income taxes on the other, the central government had to rely on the taxation of non-shared tax bases in order to increase revenues. That was done by increasing *social contribution* tax rates in conjunction with the creation of new taxes on sales. Both measures promoted a substantial increase in the burden of cumulative indirect taxes vis a vis VATs. CSLL, a social contribution on profits and CPMF another contribution, whose base was banking transactions, were two of the taxes created after 1988.

Figure 2 illustrates this point by contrasting evolution of the federal VAT burden vis a vis the burden of the remaining cumulative indirect taxes. After 1988 we can simultaneously observe a steady decrease in the participation of the federal VAT (IPI) in the overall tax burden followed by a substantial increase in the tax burden of the remaining cumulative indirect taxes (Finsocial/COFINS, PIS/PASEP, IPMF/CPMF, ISS and IOF).

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<sup>4</sup> In fact the 1988 Constitution institutionalized the social security financing structure by stating that it was the duty of both employers and employees to fund the system.

## B. The Tax Reform Process during the 90's.<sup>5</sup>

The inability of the 1988 Constitution in eliminating the observed distortions in the Brazilian tax system led to the elaboration of several tax reform proposals just a few years after its promulgation.

In the beginning of 1992, under President Collor's mandate, a special committee to study tax reform was created at the Executive branch of the federal government. This commission, referred to as CERF, came up still in that year with an extensive proposal, which involved changes not only in the indirect tax system but also on the income tax system.

However, the political instability generated by President Collor's impeachment process prevented this proposal to be further negotiated in Congress. The weak political base of President's Franco along with the acceleration of the inflationary process stalled the debate on tax reform for the next two years.

The debate on tax reform gained new momentum in 1995 after the implementation of the Real Plan and already under President Cardoso's mandate. A new tax reform proposal named as the Constitutional Amendment Proposal number 175 (PEC175) was elaborated by the Executive branch of the federal government and submitted to Congress in August. At least eight different proposals designed by different non-governmental groups were also submitted to Congress. A special committee at Congress' Lower House was created to appreciate these different proposals.

Having recognized the system of indirect taxation as the main source of inefficiencies in the Brazilian tax system, PEC 175 proposal was focused on improving the current VAT system without departing from the dual VAT system originated in the 1967 reform, where both the federal and state governments were granted autonomy to administer their own VATs. It also avoided any major changes in the intergovernmental revenue sharing system established in 1988. The state VAT on goods and services would have their base narrowed by the elimination of export and investment goods. The federal VAT on manufactured goods (IPI) was set to be extinguished being replaced by a new federal VAT whose base would be the same of the modified state VAT. Federal and state governments would have autonomy to set their own tax rates and to collect their revenues. The proposal left the Brazilian Senate to decide whether the VAT should be taxed according to the destination principle. It also left open the future of the municipal tax on services (ISS) and the remaining federal *social contributions*, all cumulative taxes.

The Executive's strategy at that time seemed to be successful given that activities in the Special Committee promptly converged to the appreciation of the PEC 175 proposal. In 1996, the Special Committee elaborated two initial reports favoring the PEC 175 general framework, but amending it to include other changes in the indirect tax system bypassed in the original proposal.

According to those reports, both the federal (IPI) and state (ICMS) VAT along with COFINS, PIS-PASEP and ISS would be terminated and replaced by a unique VAT and a unique retail sales tax, referred to by its Portuguese acronym: IVV. Taxation over this unified value-added base would be assigned independently both to state and federal governments with each level setting their own tax rate. The VAT should be collected

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<sup>5</sup> A more detailed account of the political process involving the Brazilian tax reform is found in Lemgruber (2000). Dain (1995) describes in more depth earlier proposals submitted by non-governmental groups.

under the destination principle and should have a unique tax rate across different states. The IVV would be assigned to municipalities to compensate for the loss of revenues coming from the elimination of the ISS. The federal programs originally funded by the COFINS and PIS-PASEP would now be funded by the federally administered portion of the new VAT.

The Executive, in particular the Ministry of Finance, in realizing that the amended version of its original proposal could compromise the increasing tax effort required by its fiscal adjustment plan in the post-hyperinflation years, having initially lost interest on the tax reform debate, ended up presenting in 1997, a new tax reform proposal.<sup>6</sup> The basic difference in this new proposal was to “federalize” the VAT by giving the central government the exclusivity over its assignment. Under this new proposal the state VAT (ICMS) along with COFINS, PIS-PASEP and ISS would be terminated and replaced by a unique VAT whose tax rates and revenue collection would be assigned to the federal government and whose revenues were to be shared between all three government levels according with a new revenue sharing system. The federal VAT (IPI) would be replaced by a new federal excise tax on selective goods. States would be granted autonomy to a retail sales tax on goods and municipalities, a retail tax on services.

This new governmental proposal faced strong objections from subnational elected officials, what led the Executive in October 1999 to modify it by first introducing a more generous revenue-sharing schemes with the states and by finally assigning to them the excise tax on selective goods originally granted to the federal government.

Meanwhile, appreciation of the amended PEC 175 moved slowly through the Special Committee being finally approved by their members in December of 1999. The Special Committee proposal was openly rejected by the Ministry of Finance, which at the time was overwhelmed by an even stricter adjustment program signed with the IMF after the Brazilian devaluation earlier that year.

A new committee, involving members of Special Committee, members of the Executive and representatives of State Governments, was formed in order to find conciliation between the two different proposals. The models proposed by the Executive and the Legislative’s Special Committee were very different and basically no consensus was reached. The result was the elaboration of a new Constitutional Amendment proposed by the Special Committee Rapporteur, the congressman in charge of drafting the Committee legislation, in March 2000.<sup>7</sup> This proposal was very close to the proposal already voted and approved by the Special Committee. The only difference, as summarized in Werneck (2000), “... was that the loss in revenues stemming from the elimination of all turnover and cascading taxes, would be recouped by a new loosely defined “non-cumulative” taxes on goods and services.” This new tax would be assigned to the federal level, as a way to circumvent Executive official’s uncertainty regarding revenue losses in the transition to the new tax system. The Rapporteur proposal, however, never got to be voted in the Special Committee, which kept backing its previously voted proposal.

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<sup>6</sup> It is worth mentioning that before that happened a new legislation exempting export goods from being taxed under the state VAT (*Lei Complementar 47/96*, also know as *Lei Kandir*), which was at the core of PEC 175, had already been approved by the Brazilian Congress.

<sup>7</sup> This new proposal became to be known as *Emenda Aglutinativa*.

The next step in the Brazilian legislative process would have been the appreciation and voting of the Special Committee's approved constitutional amendment at the Brazilian Lower House floor. That did not happen, however, due to the continued opposition to the Special Committee's proposal coming from the Ministry of Finance, which announced that a new tax reform proposal was under way.

In August 2000, the Executive has issued a more limited tax reform trying to implement individual points in the previous proposals instead of the more comprehensive tax reform approved in Special Committee. Under the new proposal the idea of a federal VAT was abandoned. A state administered VAT with a uniform tax across the states set by the federal government was defended instead. Elimination of the federal social contributions along with other cumulative and cascading taxes was left aside. This new Executive proposal was repudiated in the Brazilian Lower House by all party leaders to whom it failed to consider the main tax reform issues already debated by that institution.

Tax reform is currently on a new deadlock. The Ministry of Finance continues to advocate a more limited tax reform. On the top of that, scandals involving government leaderships in Congress, the energy crisis as well as the proximity to the end of President Cardoso's mandate has pushed the issue of tax reform towards the bottom of the current legislative agenda.

### **C. Identifying and overcoming obstacles to tax reform implementation.**

Table 3 contrasts the six tax reform proposals, described above, which have assumed center stage in the Brazilian tax reform debate since 1995.

A valuable lesson can be drawn from the political process described above which is the centrality of federal and subnational government positions to this process. Federal and state government interests dominated the tax reform debate to the extent of becoming de facto restrictions to their implementation.

The Federal government position in the debate, strongly defended by the Ministry of Finance, consisted of the imposition that the proposed tax reform could not compromise even in the short-run the tax effort required by the overall public sector in order to eliminate structural public deficits and stabilize the net debt of the public sector. Complying with this *fiscal adjustment restriction* was recognized as an important fundament to the sustainability of the stabilization program implemented in 1994 (Real Plan).

The second position defended by subnational elected officials and defined as the *fiscal federalist restriction* consisted of the imposition that the tax reform could not compromise neither the disposable revenues available to states and municipalities nor the enhanced tax autonomy those members of the federation acquired after the 1988 tax reform. The same process of political and fiscal decentralization that shifted to states and municipalities the responsibility over the provision of important goods and services also shifted to state and local residents the power to control the quality of those services through the electoral system. State and municipal elected officials, zealous of their political careers, started opposing any fundamental change in the system of intergovernmental transfers or in the assignment of tax bases that would put in risk their flow of disposable revenues. The Special Committee at the Brazilian Lower House turned

out to be particularly sensitive to those demands as the proposals emerging from this body seemed to suggest.

The fiscal adjustment restriction was particularly binding to the elimination of the federal *social contributions*, due to the uncertainty to whether the new federal taxes would be able to match the revenue-raising ability and administrative efficiency of the current system. It became even critical as the reliance of the federal government on those revenue sources continuously increased in the last decade, as it was already illustrated in Figure 2. COFINS and PIS-PASEP, two of the most important federal social contributions accounted for almost 10% of total tax burden between 1994 and 1998 as shown in Table 4.

The fiscal federalist restriction, on the other hand, was crucial to the debate over the assignment of the VAT among different government levels, the principle to be used in its collection and the rules regarding the vertical and horizontal distribution of its revenues. Behind this debate was also the uncertainty about the level of revenues available to different states and municipalities after the reform. The state VAT (ICMS), an object of reform in all the proposed reforms, has been consistently the most important source of revenue for states in the last thirty years amount to more than 20% of all revenue collected (see Table 4).

The inability to reform the Brazilian tax system in the past ten years, despite an almost consensual recognition of the distortions imposed on the private sector, is a reflex of the wide array of interests affected by different proposals. In trying to deal simultaneously with the elimination of cumulative taxes and with the complete redesign of the consumption tax system is not surprising that the several tax reform proposals discussed in the past ten years have been facing so many obstacles to their implementation.

A more recent trend in the debate about tax reform seems to be recognizing the shortcomings of a comprehensive reform and the option for dealing with isolated points of the reform in stages.

The analysis in this paper represents an initial attempt to explore this venue by analyzing the effects of replacing the cumulative taxes assigned to the federal level (COFINS, PIS-PASEP, CPMF and IOF) by a new federal VAT whose proceeds are not shared with subnational governments.

The idea of replacing cumulative taxes on corporate revenues by a federal VAT has been part of the 1997 and 1999 tax reform proposals defended by the Executive. It has also been present in the proposal approved by the Legislative Special Committee. Its omission both from the non-voted Rapporteur's proposal and from the latest proposal presented by the Executive exemplifies the increase role of the fiscal adjustment restriction to the advance of the Brazilian indirect tax system.

This reform will not modify the current dual VAT system. Neither will it touch in the 1988 intergovernmental revenue-sharing agreements. Therefore, the amount of disposable revenues to subnational governments will not be altered.

With the fiscal federalist restriction not being binding, the implementation of this proposal will depend on whether there are still positive macroeconomic and welfare gains from this reform even after the imposition of a fiscal adjustment restriction. The rest of the paper quantifies this analysis using a dynamic CGE model calibrated for the Brazilian economy.

### **III. Methodology**

In order to compute the macroeconomic and distributive effects of a given tax reform, one needs a model that captures in several parameters the features considered essential to the analysis. This model should present an equilibrium reflecting the optimal decisions of the several agents present in this model subject to their individual constraints and the tax parameters that summarize the Brazilian tax system. Once a model is chosen, simulating the effects of a given tax reform is thus reduced to (a) choosing values for the parameters of the model so that it may generate an initial equilibrium that matches a set of macroeconomic variables (a process also known in the CGE literature as calibration), (b) translating the proposed tax reform into changes in the tax parameters presented in the model, (c) calculating the new equilibrium arising under the new tax parameters with the help of a computational algorithm.

This section aims to provide the reader not familiarized with CGE analysis, a general description of the methodology; illustrating steps (a), (b) described above for our CGE analysis of the Brazilian tax reform. Lledo (2001) goes in detail over each of these steps and may be provided upon request to the interested reader. Next section concludes the CGE analysis with a summary of the simulation results.

#### **A- CGE models**

General equilibrium models have been designed by economists to analyze the effects of changes in fiscal policy among different sectors and individuals. This analysis dates back to Harberger (1962) two sector-two factor models. Their immediate advantage over multisectoral input-output (Leontief) models resides in the fact that both prices and input factor proportions are also endogenously derived being a function of the tax system. Because of that, general equilibrium models are capable to capture not only first-order (income) effects but also second-order (substitution) effects of the tax reform. Analytical expressions summarizing the effects of tax changes can become quite complicated as the number of taxes in the model increases, becoming unfeasible to analyze non-infinitesimal tax changes. That led to the use of numerical methods to simulate the general equilibrium effects of tax reform. Early computable general equilibrium models were basically static but the need to analyze the effects of fiscal policy on savings and growth led to the development of dynamic models.

Dynamic CGE models, by incorporating time, allowed the analysis of both short and long-run effects of tax reform, which for some reforms proved to contrast sharply. Tax reforms delivering positive long-run growth sometimes presented substantial negative effects in the first years of the transition. This is of particular relevancy when analyzing the implementability of a given proposal in a political environment which forces the policymaker to give much more weight to the short and medium-run effects of any given policy.

Given their methodological advantages, in the last two decades an extensive variety of dynamic CGE models have been designed to simulate the dynamic effects of tax reform and, in particular, its effect on growth in the U.S economy. CGE models that abstract from individual heterogeneity with respect to their wealth or income endowments have revealed the positive welfare and growth effects of switching to a more

consumption-based tax system (Lucas (1990), King and Rebelo (1990), Jones, Manuelli and Rossi (1993), Stokey and Rebelo (1995), Cassou and Lansing (1996)).

The incorporation of individual heterogeneity in CGE models has often times disputed the results obtained in representative agent models (Krussel, Quadrini and Rios-Rull (1996)) and, in general, made explicit that while there may be positive growth effects from eliminating income taxes they are not appropriated by all individuals (Auerbach and Kotlikoff (1987) and Auerbach et al (2001)). Dynamic CGE models with heterogeneous individuals by identifying the potential winners and losers of a given tax reform represent a very important tool for the analysis of its implementability.

The dynamic and heterogeneous structure of Auerbach and Kotlikoff (1987) CGE model whose computational algorithm, hereafter referred to as the A-K model, has been made readily available by the authors led me to choose this model in my CGE analysis of the Brazilian tax reform. A general description of this model follows below.

## **B-The A-K Model and its Computational Algorithm**

The A-K model is a dynamic CGE model with an overlapping generation structure where all agents live for 55 periods, i.e., at any point in time the economy is populated by 55 different cohorts. The idea is to mimic how fiscal policy affects the decisions made by a group of individuals along their life-cycle. Each individual is assumed to join the labor force at age 0 and to die at age 55.

Individuals are identical with respect to tastes and endowments within each cohort. Heterogeneity arises only between different cohorts and corresponds to differences in earning abilities or in human capital levels. Population growth is positive at an exogenous rate. Individuals derive utility from present and future consumption and leisure, and leisure is subject to a lifetime balanced budget constraint, which requires the present value of her lifetime consumption to be smaller or equal to her after tax lifetime income.

The model has a single production sector. Output is produced by identical competitive firms using a neoclassical, constant-returns-to-scale production technology. Capital is assumed to be homogeneous and non-depreciating, while labor differs only in its efficiency. Capital is owned by individuals and supplied every period to firms along with labor.

The government collects tax revenues and issues debt which is used to finance government purchases of goods and services and interest payments on the inherited stock of debt. Revenue is raised with the imposition of proportional taxes on consumption, labor and capital income. There is also an independent social security system which collects a payroll tax in order to finance retirement pensions under a pay-as-you-go system.

The equilibrium in this model is of the rational expectation variety, which in the absence of uncertainty implies perfect foresight.

Households choose lifetime sequences of consumption, leisure and savings given their beliefs of current and future wages, interest rates and tax rates. Given their beliefs on the same variables, firms choose in each period their optimal levels of capital and labor. Government's projected path of tax schedules must satisfy its intertemporal budget constraint. Given the behavior of each sector above, markets for labor and capital must

clear when ex-ante price beliefs are exactly the same to the ex-post-observed equilibrium price sequences.

The equilibrium path is obtained numerically with a Gauss-Seidel algorithm. A brief sketch is presented below. See Auerbach and Kotlikoff (1987) for a detailed analysis.

The calculation of the equilibrium path, given a particular parameterization, can be divided in two stages: (i) solving for the steady-state of the economy before the fiscal reform; (ii) solving for the transition path and final steady-state to which the economy converges after the fiscal reform.

In both cases the calculation starts with a guess for certain key variables and then iterates on these variables until a convergence criteria is reached. Whereas in (i) the algorithm consists of choosing an equilibrium allocation, in (ii) the algorithm chooses an equilibrium time path of allocations. The algorithm for (i) is just a special case of (ii), which is described in more detail below.

Aggregate variables of the model are solved with a forward-looking algorithm that iterates on the capital stock and labor supply over the entire transition path. An initial guess is made for the time-paths of these variables, as well as for the shadow wages, shadow tax rates and endogenous average and marginal tax rates. For an initial guess of the time-path of these variables, the model calculates the corresponding factor prices and forward-looking consumption, asset and leisure choices for each current and future cohort. Shadow wages and shadow taxes are calculated to ensure that the time endowment and the tax constraints discussed above are satisfied.

Households' labor supply and assets are then aggregated by age at each period of time. This aggregation generates a new guess for the time path of the capital stock and labor supply. The tax rate, which is endogenous for the particular simulation, is updated to meet the revenue-neutrality requirement.

The algorithm then iterates until the capital stock and labor supply time-paths each converge. After 150 years the algorithm constrains all prices, tax rates and allocations to be constant.

Despite their methodological appeal, one should be careful when transplanting the A-K model, to analyze the Brazilian tax reform. The A-K model looks at the government as a unitary entity abstracting from intergovernmental effects of the reform on the fiscal capacity of individual government units. Given that it was designed to simulate changes in the U.S income tax system, whose tax revenues are not shared among government levels, tax reform exercises did not present any impact on the allocation of tax revenues across different government levels and thus any fiscal federalist conflict based on loss of fiscal capacity by members of the federation.

As it became clear in the previous section, the reform of the Brazilian tax system does not evolve around its income taxes. Reforms are mostly centered on its system of indirect taxes, in particular its sales taxes. Indirect taxes in Brazil are assigned to different government levels and, even those assigned exclusively to a given level, are submitted to revenue-sharing schemes. Therefore, reforming the indirect tax system can potentially affect the distribution of disposable revenues among different government levels and, hence, its fiscal federalist restriction.

As a way to overcome this limitation in the A-K model in this issue and at the same time start dealing with the implementation restrictions, my strategy was to limit the

search for tax reform proposals to the set that did not change revenue-sharing agreements as well as the intergovernmental assignment of important subnational taxes.

Another implication of the Brazilian tax reform for the adopted methodology is that the statutory incidence of such taxes is basically over the corporate sector, whose tax structure is usually simplistically reproduced in such models. This point is particularly relevant in the translation of the proposed tax reform into changes in the tax parameters presented in the model. It is thus particularly important that the assumptions regarding the incidence of corporate taxes required in order to simulate the tax reform be made explicitly. This is the object of the following subsection

### **C- Parametrization of the tax system**

In order for the model through its computational algorithm presented in the previous section to generate a numerical equilibrium, we need to specify values for its fiscal, demographic, technology and preference parameters. Such parameters, whenever possible, were estimated using Brazilian data.

Lledo (2001) discusses in more detail the imputation of values for different parameters in the model along with the calibration of its initial steady-state. Here, I will limit myself to present the parameterization of the tax system. The time-constrained reader can jump this section and go straight to Table 6, which contrasts the simulated variables in the initial steady state with those observed in real Brazilian economy.

The A-K model presented above, albeit rich in several dimensions, does not include a corporate tax structure. Only household taxes on consumption, labor and capital are allowed in the model. Therefore, before calibrating the model, one needs to “convert” corporate tax rates into household tax rates on consumption, labor or capital income.

I have used a set of proportional tax rates on consumption, capital and labor income along with an average payroll tax to approximate the average burden between 1994 and 1998 of the Brazilian (federal, state and local) tax and social security system. Table 4 organizes the distribution of the tax burden by statutory base. The calculation of each of the average tax rates presented below is based on this being summarized on Table 5.

The overall burden on consumption was computed by dividing the average between 1994 and 1998 of all tax revenues from all value-added and excises taxes charged at the federal, state and local level over the same period of time.<sup>8</sup> The result was an average consumption tax rate ( $\tau_c$ ) of 15.7%.

An average tax rate on labor income taxation was computed in two stages. In the first stage an average tax on corporate payroll was computed by dividing the 1994-98 average tax revenue from all federal taxes and social contributions on corporate payroll not used to finance retirement pensions in the social security system by aggregate corporate payroll during the same period.<sup>9</sup> The resulting average tax rate was 7%. In the second stage, we used the formula derived in the Appendix to convert corporate payroll

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<sup>8</sup> Implicitly on this computation was the equivalence between VAT and a tax on the consumption of final goods, a standard result in the literature. VATs: IPI, ICMS. Excise taxes: II.

<sup>9</sup> Corporate payroll taxes: FGTS, Salário educação (SED), others.

taxes into household wage income taxes leading to an average tax on labor income of 7.6%.

The social security payroll tax used to finance retirement pensions of the social security system was computed by dividing the 1994-1998 average revenue from this contribution (Social Security retirement on Table 5) by the total wage earnings received by employed (aggregate corporate payroll) and self-employed workers. The tax base for the social security payroll tax differs from the base from other payroll taxes by the inclusion of aggregate earnings from self-employed workers over which social security taxes also incides. The resulting tax rate ( $\tau_s$ ) is 10.8%.

An average tax rate on capital income was calculated by dividing the 1994-98 average revenues from the federal IRPJ and CSLL, only taxes on corporate profits, by aggregate corporate profits. On its turn, aggregate profits were computed by subtracting the total depreciation from the aggregate gross operational surplus. The result was a 9.2% average tax rate on capital income.

The total burden on income is finally computed with the calculation of a tax rate on overall income. This tax rate tries to capture the burden of taxes whose effective base is neither labor nor capital income but some combination of both. We have included in this group federal personal income taxes (IRPF); federal, state and local taxes on residential and commercial property (IPTU, ITR) and state taxes on automobile property (IPVA). We have also included in this group taxes on corporate revenues (COFINS, PIS/PASEP, IOF, CPMF) which, as shown in the Appendix, are equivalent to a symmetric tax on labor and capital income.<sup>10</sup>

The average tax on overall household income was obtained after dividing the average revenues between 1994 and 1998 from all taxes above by the after tax net domestic income, defined as the remuneration of employed and self-employed workers (wages) plus gross operational surplus (gross profits) minus total depreciation. The result is an average tax on overall income equal to 10.5 % leading to effective average tax rate on labor ( $\tau_l$ ) and capital ( $\tau_k$ ) equal to 18.1% and 19.7%, respectively.

#### **D- Tax Reform Experiment**

Having presented the CGE model, explained its computational algorithm and calibrated its initial equilibrium, we are left with the task of translating the proposed tax reform into changes in the tax parameters presented in the model.

In Lledo (2001), it is shown that taxes on corporate revenues are equivalent to a symmetric tax on capital and labor income. Thus, the tax reform experiment can be redefined under the A-K model as the partial elimination of taxes on income and their replacement by an additional tax over the consumption of individuals. The total burden on taxable income, as shown in Table 5, generated an average tax rate of 10.5% between 1994 and 1998. Only the burden of taxes on corporate revenue represented 5.8% during the same period.

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<sup>10</sup> IOF and CPMF statutory base is financial transactions. We have assumed, however, that the majority of such transactions are conducted by firms, leading us to consider those taxes equivalent to taxes on corporate revenues.

Therefore, eliminating federal taxes on corporate revenue would ultimately correspond to a decrease in the average income tax rate from 10.5% to 4.7%, which is the value obtained after 5.8% from corporate revenues were discarded.

The timing of this experiment is as follows. Assume the economy rests in a steady state at the initial period and the government runs a balanced budget. A group of policymakers want to implement the tax reform described above in a once and for all basis in the following year. They face the restriction that the overall level of the public sector debt cannot increase beyond its steady-state level. They face the additional restriction that the level of government expenditures cannot decrease, being fixed at its initial steady-state value. These two restrictions define the fiscal stress condition presented in Section 2 and, when combined, they imply that the overall level tax revenues raised by the public sector has to be set equal to the total revenues raised in the initial steady-state.

#### **IV- Simulation Results.**

The tax reform experiment will be evaluated under two different criterions. The first is how the economy responds in terms of macroeconomic performance. Final steady states and transition path values of aggregate allocations such as saving rates, national income and physical capital along with wages and interest rates will be analyzed. This first criterion deals with the question of which experiments present the best growth performance in between steady states. The second criterion looks at how different generations will have their lifetime utility levels affected by the proposed fiscal experiment. The question of interest here is who are the winners and who are the losers after the reform.

This is a legitimate question to be asked in any democratic economy where the policymaker is interested in evaluating public opinion's reaction to the reform as a way to infer the political gains she or her elected superior would obtain from the reform. An answer to this question may also provide important information to assess whether a fiscally responsible reform is also political feasible.

Subsection A and B deal separately with the macroeconomic performance and welfare effects of the proposed tax reform. Some sensitivity analysis is conducted in subsection C in order to check the robustness of the reform to changes in preference parameters.

##### **A. Macroeconomic Effects.**

The reform resulted in an increase the savings rate followed by an increase in the stock of physical capital, an increase in the supply of labor and an increase in output throughout the transition between steady-states.

Table 7 summarizes the impact of the tax reform on GDP components, fiscal variables, production factors quantities and prices along the transition between steady-states. It presents the evolution in each of this variable in the 150 periods that separates the initial and the final steady state. The evolution in each variable is measured relative to the value observed in the initial steady state. Most of the impact of the reform was concentrated in the first years of the transition as illustrated in Figure 3

A partial switch to a consumption tax system generates significantly more long run capital formation than a combined income and consumption tax system. The savings rate

(S/Y) presents a substantial increase of 40% in the first year. It decreases afterwards but still presents a long run increase of 8%. The consumption rate (C/Y) decreases in the first year by 3%, slowly increasing in the first ten years to finally reach a long-run level 2% larger than in the initial steady-state. The average consumption tax rate (ACT) jumped by 60% in the first years, slowly decreasing in the remaining years to a value still 30% higher in comparison to the initial steady state. After a slight decrease of 1% in the first year, the capital-labor ratio (K/L) steadily increase in the remaining years to a level more than 15% higher after 50 years. The growth in the capital-labor ratio was followed by a continuous increase in wages and a decrease in interest rates.

In order to understand these results we need to look at the income and substitution effects derived from this proposed reform.

The revenue-neutrality of the tax reform basically implies that the total amount of resources the tax system extracts from the private sector after the reform is identical to the level extracted before the reform. Therefore, the income effects arising from the proposed reform are the result of distribution between groups and not of an overall change in private sector resources. The reform, however, by altering the pattern of incidence of the tax system, changes the amount of resources extracted from different groups in the private sector. Recall from the previous section that heterogeneity in the private sector is limited in the model by age.

Older generations, being closer to the end of their lifetime, present in this model a higher marginal propensity to consume and therefore, cannot escape from the new consumption tax by delaying consumption to future years. Based on this argument, the older is the generation, the closer is the lump-sum nature of the new consumption tax and the more negative will be its income effect.

Younger generations, on the other hand, present a lower marginal propensity to consume (a higher marginal propensity to save). Although, younger generations still have to pay the same amount in taxes over their lifetime they had to pay before the reform, the bulk of the payment can be postponed to the end of her lifetime when marginal propensity to consume increases. Under positive interest rates, the result is a reduction in the present value of lifetime tax payments and an increase in their lifetime income.

But the income effect described above is not the only force driving the increase in aggregate income, savings and capital promoted by the reform. The positive income effect to the young and future cohorts is compounded by a positive substitution effect of higher after tax interest and wage rates resulting from the reduction of labor and capital income taxes and above all by a declining consumption tax rate. As a result of that the reform induced those individuals to procrastinate their consumption even further in order to take advantage of future lower after tax prices.

The path for aggregate consumption is less clear. In the initial periods of the transition, where a larger percentage of the consumption should come from older generations born before the reform and whose lifetime income decreases after it. Aggregate consumption should decrease as a result of that. As times goes by, generations who were young at the time of the reform start to increase their participation in the aggregate consumption. Given the positive income effects they will consume more than they would have consumed had the tax reform not been implemented. The result would be an increasing consumption.

The average consumption tax rate should increase in order to balance the budget as it was explained before. The increase should be particularly accentuated in the first periods of the transition when aggregate consumption decreases. As aggregate consumption starts to increase again, the required tax rate should start to decrease.

Under the fiscal adjustment condition tax revenues and government expenditures are set constant along the transition. The average tax burden (tax revenues over GDP) and the primary surplus (tax revenues minus government expenditures) will start decreasing as soon as GDP starts increasing.

The path of interest and wage rates will depend on the path of capital-labor ratio emerging after the reform. If the growth in capital is larger than the increase in labor supply, the ratio should increase. Given the decreasing return nature of the technology, the increase in the capital-labor ratio would imply a decrease in interest rate and an increase in wages.

The results presented above seem to indicate that the expected long-run positive growth effects of switching to a consumption-based system commonly obtained in the literature are replicated for the Brazilian economy. The imposition of the additional fiscal stress condition does not compromise the long-run results. Neither it imposes short-run costs in terms of a substantial decrease in individual savings, consumption, employment or income for the first years of the transition.

## **B. Welfare Effects.**

Replacing taxes on corporate revenues by an additional tax on consumption seems to be implementable even under fiscal stress. It remains to be analyzed whether the same reform would be able to be implemented in a society where public opinion is valued by the policymaker.

Public opinion reactions to the tax reform could be inferred by the number of individuals expecting a lifetime welfare improvement after the reform. Lifetime welfare expected changes (LTWEC) from a fiscal reform are measured as the fraction of the remaining full lifetime labor endowment required under the original tax regime to produce each cohort's realized level of utility under alternative tax regimes. It is basically an equivalent variation measure of lifetime changes in welfare. A number higher than one means that the cohort in case will need more than the total amount of her full lifetime endowment to produce the level of utility after the reform. This implies that the respective individual would expect to experience a welfare gain if the proposed tax reform is implemented in an once and for all basis, thus being in favour of the reform.

From the previous discussion of the macroeconomic effects, it should be clear that the tax reform imposes a redistribution of lifetime wealth from older to younger cohorts living at the time the reform is proposed. The exact number of older (younger) generations experiencing welfare losses (gains) with the reform, however, can only be determined after the tax reform is simulated.

This information is summarized in Figure 4. The horizontal axis orders individuals according to the number of years born before the reform. It ranges from  $-54$ , (individuals born 54 years before the reform and with one more year of life left after it) to  $0$  (individuals born at the year the reform is proposed). The left hands side vertical axis

measures changes in lifetime wealth experienced by each individual. Points combining individual age and her respective change in welfare are linked by the line in the model. The cumulative distribution function of the population represented by bars in the same figure is measured on the right hand side vertical axis.<sup>11</sup>

It is clear from this figure that generations born at least 31 years before the reform will present a decrease in their remaining full lifetime income after the reform (LTWEC is smaller than 1), a group that corresponds to little more than 30% of the living population. The remaining 70% of the population are composed of individuals from generations born at most 31 years before the reform, who, on the other hand, will experience an increase in their full lifetime income. Therefore, based on the LTWEC measure the proposed reform would receive the approval of 70% of the population.

Whether the high popularity of the reform will imply its implementation in a representative democracy is a much more complicated issue. Factors such as the correspondence between demographical and political representation in the legislature, the size of majority required to approve the reform and the strategic voting behavior of congressional representatives, just to name a few will have to be considered.

Consider a simple political mechanism to aggregate preferences where the proposed tax reform is voted by all living individuals under the expectation that the reform once implemented will last for the remaining of their life.<sup>12</sup> Political and demographical representation is identical in this case. A referendum would be the closest real life political process to the one proposed above. Under this political mechanism, there is a one to one correspondence between the popularity of the reform and its implementation likelihood. The larger is the number of individuals experiencing welfare improvements for their remaining lifetime, the larger the approval rate for the reform and the larger the number of votes this reform would receive. Under this simple political mechanism our proposed tax reform would be implemented under majority rule (50% +1 votes) and even under supermajority requirements of up to 3/5 of the votes.

## **VI- Conclusions**

The political process behind the Brazilian tax reform in the last ten years reveals two major restrictions different tax reform proposals have always faced: (i) a fiscal federalist restriction, which basically states that revenues from individual states and municipalities cannot substantially decrease, and (ii) a fiscal adjustment restriction, which consists of the imposition that the debt of the consolidated public sector (direct administration of the federal, state and local governments plus state enterprises and autarchies) cannot increase.

This paper focused on a specific reform that could potentially overcome the fiscal stress restrictions central to the implementation of more fundamental reforms in the Brazilian indirect tax system. The reform consisted basically of replacing the indirect taxes on corporate revenues, which are shown to be equivalent to a symmetric tax on labor and capital income, by a new federal VAT whose revenues are not shared either with states or with municipalities.

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<sup>11</sup> Recall that population growth is approximately 2% meaning that each cohort has 2% more individuals than the previous one.

<sup>12</sup> This assumption is essential to make the individual voting decision compatible with the LTWEC.

Replacing federal taxes on corporate revenues by this new federal contribution under a balanced budget brought a positive long-run income growth. This improved macroeconomic performance did not involve any substantial short-run decrease in income, the supply of labor, capital accumulation, increase in interest rates, decrease in wages, macroeconomic indicators usually considered by the private sector when evaluating the implementability of any tax reform.

This proposed reform has also shown to redistribute income from an old and rich minority to a young and poor majority, a result that would be very likely to be implemented in a referendum where living generations would have equal participation. This should also be a popular result that will certainly be embraced by members of the political class in any democratic regime.

The tax reform proposal simulated in this paper should be seen not as a substitute but as a complement to the more comprehensive tax reform proposals whose main features have already been carefully appreciated by the Brazilian National Congress. As it has been shown, it falls short on eliminating all sources of distortion aimed at by other proposals and, because of that, should be considered just as a first step towards a better tax system. Nonetheless, the macroeconomic and welfare effects revealed in simulations of this proposed reform are positive enough to encourage its immediate appreciation.

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## Appendix: Tables and Figures

**Table 1: Changes in the Tax System after 1988**

Tax Assignments			
Central			
Taxes	Base	Implemented	Changes after 1988
<i>Direct Taxes</i>			
IRPF	Gross Personal Income	1967 Constitution	Basically the same
IRPJ	Corporate Profit	1967 Constitution	Basically the same
ITR	Rural Property	1967 Constitution	Basically the same
IGV	Wealth	1988 Constitution	Created in 1988
CSLL	Corporate Profit	1988 Law	Created in 1988
Salário-Educação (SED)	Corporate Payroll	1975 Law	Basically the same
<i>Indirect Taxes</i>			
IPI	Value-Added from sales of manufactured products	1967 Constitution	Basically the same
IULC/IOBE/IUM/II (sele)	Revenue from sales of selective goods/services	1946 Constitution	Eliminated in 1988
IOF	Revenue from sales or purchase of financial assets	1967 Constitution	Basically the same
PIS/PASEP	Revenue from general corporate sales	1970 Law	Basically the same
Financial	Revenue from general corporate sales	1982 Law	Renamed Cofins in 1991
CPMF	Financial Transactions	1996 Law	Created in 1996
States			
Taxes	Base	Implemented	Changes after 1988
<i>Direct Taxes</i>			
IPVA	Automobile Property	1967 Constitution	Basically the same
ITBI	Real Estate Transactions	1967 Constitution	Just over inheritance
<i>Indirect Taxes</i>			
ICM/ICMS	Value-Added from sales of goods and services	1967 Constitution	Incorporate sele (ICMS)
Municipalities			
Taxes	Base	Implemented	Changes after 1988
<i>Direct Taxes</i>			
IPTU	Urban Real Estate Property	1967 Constitution	Basically the same
ITBI-IV	Real Estate Transactions <i>reservados</i>	1988 Constitution	Created in 1988
<i>Indirect Taxes</i>			
ISS	Revenue from sale of services	1967 Constitution	Basically the same
IVVCL	Revenue from sales of gasoline and others	1988 Constitution	Created in 1988

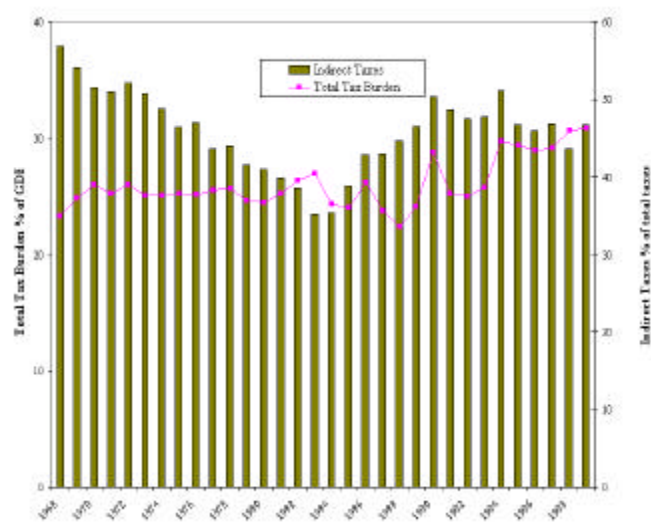
Source: 1967, 1988 Constitution. Secretary of Juridic Affairs.

**Table 2: Changes in the Revenue Sharing System after 1988**

Revenue Sharing System	
1967 Constitution	1988 Constitution
<b>Central to States</b>	
<b>States Participation Fund:</b> 14% of tax revenues from IRPF, IRPJ and IPI	<b>State Participation Fund</b> 21.5% of tax revenues from IRPF, IRPJ, IPI
<b>Special Fund:</b> 2% of tax revenues from IR, IPI	<b>Regional Funds (FNE, FNO, FCO)</b> 3% of tax revenues from IRPF, IRPJ, IPI
<b>Selectives:</b> 50% IUEE, 70% IUM, 40% IULC, 50% II	
<b>Central to Municipalities</b>	
<b>Municipalities Participation Fund</b> 17% of tax revenues from IR and IPI	<b>Municipalities Participation Fund</b> 22.5% of tax revenues from IR and IPI
<b>Selectives:</b> 10% IUEE, 20% IUM, 20% IULC, 20% II	
100% ITR	100% ITR
<b>State to Municipalities</b>	
20% ICM	25% ICMS
50% IPVA	50% IPVA
50% ITBI	

Source: 1967 and 1988 Constitution

**Figure 1: Evolution of the Tax Burden**



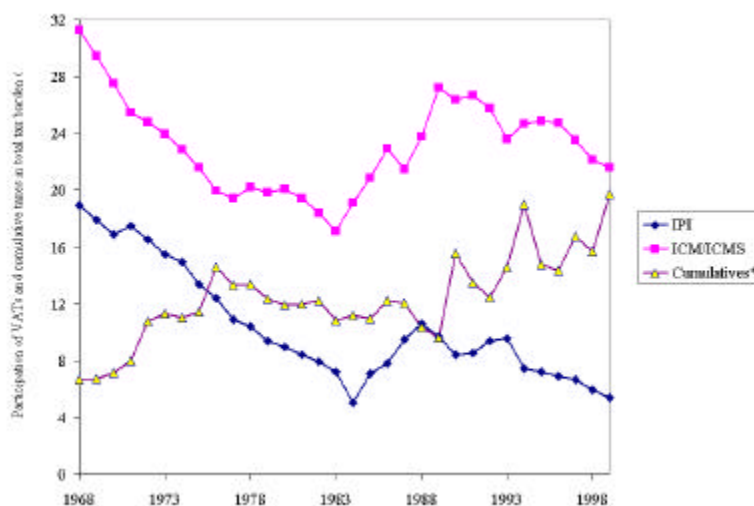
Source: Afonso and Araujo (2000)

**Table 3 : Tax Reform Proposals: Comparison of Main Features**

Proposal	Taxes to be Eliminated	Taxes to be Created
Executive Proposal 08/1995 (PEC 175)	IPLICMS	Dual VAT
Executive Proposal 09/1997	COFINS,PIS/PASEP, IPI, ICMS,ISS	Federal VAT, Federal excise tax on goods,State retail sales tax on goods (IVV-S), Municipal retail sales tax on services (IVV-M)
Executive Proposal 10/1999	COFINS,PIS/PASEP,IPI, ICMS, ISS	Federal VAT,Federal excise tax on goods,State excise tax on goods and services,Municipal retail sales tax on services (IVV)
Special Committee Proposal 12/1999	COFINS,PIS/PASEP,CPMF IPI,ICMS, ISS	Dual VAT (coexisting federal and state VATs;same base; different tax rates) Municipal retail sales tax on services (IVV)
Rapporteur’s Proposal 03/2000	COFINS,PIS/PASEP,CPMF Sal.Ed, IPI,ICMS,ISS	Dual VAT Federal “non-cumulative” excise tax (to replace COFINS,PIS/PASEP,CPMF,Sal Ed, ISS)
Executive Proposal 08/2000	IPI, ICMS, ISS	Federal tax on goods and services,Nationally uniformed state VAT Municipal retail sales tax (IVV)

Source: Lemgruber (2000) and Werneck (2000)

**Figure 2: Evolution of indirect tax system.**



Note : Cumulative taxes = Finsocial/Cofins, PIS/PASEP, IPMF/CPMF, IOF, ISS, Selective taxes.

Source : Afonso and Araujo (2000)

**Table 4: Distribution of the Burden by Statutory Base**

Base	% GDP	% Total
<b>1) Indirect Taxes</b>	<b>22.65%</b>	<b>79.12%</b>
a) Value-added/Excise	9.68%	33.83%
ICMS (State)	7.11%	24.83%
IPI (Federal)	1.95%	6.82%
II (Federal)	0.63%	2.18%
b) Cumulative	4.97%	17.38%
b.1) Corporate Revenues	3.67%	12.84%
COFINS (Federal)	2.22%	7.77%
PIS/PASEP (Federal)	0.90%	3.13%
ISS (Local)	0.55%	1.94%
b.2) Financial Transactions	1.30%	4.54%
IOF (Federal)	0.47%	1.66%
CPMF (Federal)	0.63%	2.00%
c) Corporate Payroll (Federal)	7.99%	27.91%
Social Security Retirement	4.81%	16.80%
SED + FGTS + Others	3.18%	11.11%
<b>2) Direct Taxes</b>	<b>5.98%</b>	<b>20.88%</b>
a) Personal Income	1.98%	6.83%
IRPF (Federal)	1.96%	6.83%
b) Corporate Income	2.89%	10.11%
IRPJ (Federal)	2.06%	7.21%
CSLL (Federal)	0.83%	2.90%
c) Property	1.13%	3.95%
IPTU (Local)	0.41%	1.44%
IPVA (Local)	0.38%	1.32%
Others (ITR + ITBI) (Federal)	0.34%	1.18%
<b>3) Total without SS retirement</b>	<b>23.82%</b>	<b>83.20%</b>
<b>4) Total Tax Burden</b>	<b>28.63%</b>	<b>100.00%</b>

Source : IBGE- Department of National Accounts, BNDES – Secretary of Fiscal Affairs

**Table 5: Average Tax Rate Computation**

<b>1) Average tax revenues by incidence base (%GDP)</b>	
1.1) Consumption (VAT +I)	9.7%
1.2) Overall Income (Corp Rev+Fin. Trans.+Pers.income+Property)	8.1%
1.3) Corp Rev +Fin.Transactions	4.4%
1.4) Payroll (Corporate Payroll minus Social Security Retirement)	3.2%
1.5) Social Security Retirement	4.6%
1.6) Capital (CSLL+IRPJ)	2.9%
<b>2) Average tax bases from National Account (% GDP)</b>	
2.1) Household Final Consumption	61.74%
2.2) Gross Operational Profit	41.31%
2.3) Depreciation	9.60%
2.4) Wages	45.29%
2.5) Self-employed remuneration	3.88%
<b>3) Average Tax Rate =1/2)</b>	
Consumption (1.1/2.1)	15.7%
Overall Income (1.2/2.2-2.3+2.4)	10.5%
Corporate Revenue (1.3/2.2-2.3+2.4)	5.6%
Payroll (1.4/2.4)	7.0%
Social Security (1.5/2.4+2.5)	9.8%
Labor income = payroll/ (1-payroll)	7.6%
SS payroll on labor income = payroll/SS/(1-payroll/SS)	10.6%
Capital Income (1.6/2.2-2.3)	9.2%

Notes: Average tax rate equivalence hypothesis – 1)Value added is consumption,2)Property tax base is personal income, 3) Financial transactions is corporate revenue, 4) Corporate Profit is a) capital income, b)personal income, 5) Corporate payroll is labor income, 6) Corporate revenues is personal income

**Table 6: Initial Steady-State**

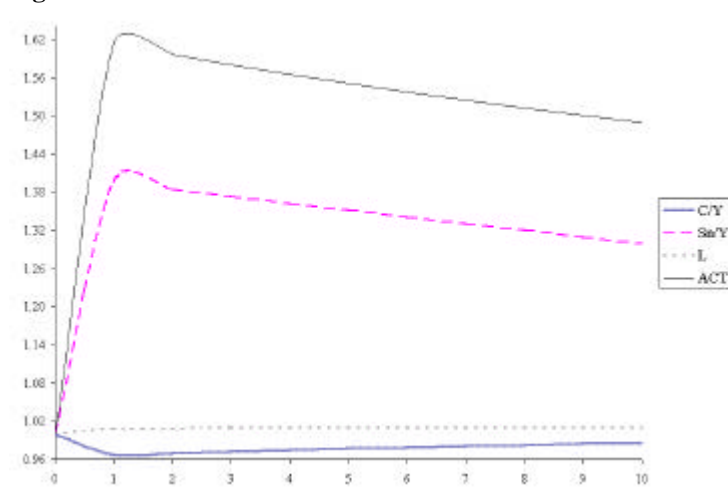
Variables	Brazil	Model
C/Y	62.0%	61%
S/Y-Depr/Y	5.5%	5.2%
K/Y	300.0%	270.4%
T/Y	23.8%	27.5%
Sstax	10.8%	10.2%
G/Y	23.1%	22.6%
rD/Y	4.7%	4.9%
Gss/Y	4.6%	4.5%
D/Y	34.0%	29.7%
r	16.5%	16.6%

Note: Y=GDP, C/Y = consumption rate, S/Y- Depr/Y = net savings rate, K/Y= capital-output ratio, T/Y= Total tax burden (SS not included), SStax = Social Security Tax rate, G/Y=public expenditures rate, rD/Y = public debt service payments, Gss/Y = Social Security benefit rate, D/Y =overall public sector debt rate  
r= interest rates.

**Table 7: Replacing Taxes on Corporate Revenues by an additional consumption tax  
(i) Once and for all at period 1, (ii) Under a balanced budget.**

	0	1	2	3	4	5	6	7	8	9	10	50	150
<b>GDP</b>	1.00	1.00	1.01	1.01	1.02	1.02	1.02	1.03	1.03	1.03	1.03	1.08	1.09
<b>Composition of GDP</b>													
Consumption (%GDP)	1.00	0.97	0.97	0.97	0.97	0.98	0.98	0.98	0.98	0.99	0.99	1.02	1.02
Savings (%GDP)	1.00	1.40	1.38	1.37	1.36	1.35	1.34	1.33	1.32	1.31	1.30	1.10	1.08
<b>Fiscal Variables</b>													
Av. Consumption Tax	1.00	1.61	1.60	1.58	1.56	1.55	1.54	1.52	1.51	1.50	1.49	1.30	1.28
Tax Revenues (% GDP)	1.00	1.00	0.99	0.99	0.98	0.98	0.98	0.97	0.97	0.97	0.96	0.91	0.91
Primary Fiscal Surplus (% GDP)	1.00	1.00	0.99	0.98	0.97	0.97	0.97	0.96	0.95	0.95	0.94	0.86	0.85
<b>Input Quantities and Prices</b>													
Capital (%GDP)	1.00	1.00	1.00	1.00	1.01	1.01	1.01	1.02	1.02	1.02	1.02	1.07	1.08
Labor Supply	1.00	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Wages	1.00	1.00	1.00	1.00	1.01	1.01	1.01	1.02	1.02	1.02	1.02	1.07	1.08
Interest Rates	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.98	0.98	0.98	0.98	0.93	0.93

**Figure 3: Short-Run Macroeconomic Effects.**



**Figure 4: Intergenerational Welfare**

