

TAX CHANGES, BUDGETARY EFFECT, AND ECONOMIC GROWTH**Dayson Pereira Bezerra de Almeida****Abstract**

Fiscal policy decisions – in particular, those related to tax policy – have real impact on private sector activity. A central result from studies on taxation is that taxes affect behaviour and result in distortions on the choices of companies, workers and investors; thus, a country's tax system - and, therefore, variations in that system - reflects on the nation's economic growth. In Brazil, changes in tax legislation bringing about revenue losses at federal level must obey the fiscal neutrality rule, assuring compensation equivalent to the estimated decrease in revenue. Consequently, it becomes mandatory measure the corresponding revenue loss, so that the task of scorekeeping gains special contours in the fiscal control framework which aims to promote the balance of public accounts. This paper demonstrates that the static technique of estimating budgetary effects, coupled to the legal design that requires prompt compensation of the effects on revenue, discourages the production of tax rules seeking to promote efficiency and economic growth. The result was reached using a general equilibrium model stylized and calibrated for the Brazilian economy, by simulating permanent shocks on the average tax rates on consumption, labour, and capital income. Comparing the different methodologies, we concluded that the static scoring overestimate revenue losses in face of tax cuts, in parallel to results produced from dynamic estimations. The latter, in turn, allow to capture and differentiate – according to the tax base – the positive effects stemming from cuts in the tax burden on capital stock, labour supply, consumption and aggregate investment, ultimately identifying higher long-term economic growth. Dynamic scoring offers clarity about the extra-fiscal consequences on the economy that may yield from changes in the tax system, and provides a more accurate measurement of the normative change's budgetary effect, qualifying the debate and the political decisions in the country.

Keywords: Taxation. Growth. Budgetary effect. Dynamic scoring.

1. INTRODUCTION

As it is well known, long run economic growth depends on technological advances, labour supply, and total factors productivity (MAUSKOPF and REIFSCHNEIDER, 1997). Furthermore, a central result from studies on taxation is that “taxes affect behaviour and distort the choices of companies, workers and investors” (U.S.A., 2004, p. 117). These behavioural responses of economic agents ultimately alter the drivers of growth, so that taxation becomes paramount within a nation's growth policy framework.

The specific channels that make up the tax policy transmission mechanism vary according to the design and incidence of each tax under analysis. In general, economic theory and empirical research converge by finding that excessive tax burden is harmful to economic growth – notably, taxation on companies, pointed out as the most detrimental among the alternatives for tax collection (JOHANSSON *et al*, 2008).

Nevertheless, the need for fundraising to meet the level of public expenditure is a fact of reality. Considering the requirement to provide the government's financing and solvency, the Brazilian regulatory system imposes restrictions on the approval of tax changes prone to reduce public revenues: it demands calculations on the potential revenue loss and guarantees that the proposal will remain fiscally neutral during the first three years from its implementation.

In this sense, the theme of scorekeeping emerges with the premises and methodologies inherent to the process, and the repercussions that the estimation results may bring on the very fate of the proposal under discussion: depending on the methodological choice, the number obtained at the end may or may not be within the range of State's budgetary possibilities. Therefore, the budgetary effect of tax changes can guide and even constrain the political decision-making process.

The literature points out two techniques used to build the estimates: the static and dynamic scoring. The first one assumes that the agents' behaviour will not be affected by the regulatory change; the method is criticized on the grounds of lack of realism and, besides, it retains a bias that makes it difficult the approval of measures aimed to reduce the tax burden. Dynamic scoring, in turn, offer “estimates of the effect of tax changes on jobs, wages, investment, federal revenue, and the overall size of the economy” (HODGE, 201, p. 1), but are subject to various uncertainties and difficulties, including the limited time window imposed by

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national legislation for calculating - and neutralizing - the fiscal effects of the regulatory change, what reduces the practical importance of such method, since the effects it intends to capture occur primarily in the long run.

This essay sought to shed light on the subject by proposing comparisons between the different methods to verify the validity of the theoretical arguments found in the literature. For that purpose, a general equilibrium model stylized and calibrated to the Brazilian economy was adopted. More specifically, following Chacón (2016), the strategy involved simulating permanent shocks on average tax rates over consumption, labour, and capital income, examining the results thus obtained.

From the simulations undertaken, we conclude that, in fact, static scoring overestimate revenue losses in face of tax cuts, which may jeopardize legislative measures to reduce the tax burden. Furthermore, the current design of fiscal control system favours a short-term view on the effects of regulatory changes, by disregarding longer-term developments on the economic environment, which could be captured by the dynamic technique. In this sense, the paper stresses the importance of discussing tax impact estimates, underlining that methodological and regulatory choices bring consequences to the decision-making process in the country.

The paper is divided in six chapters, in addition to this introduction: the second one clarifies the connections between taxation and economic growth, indicating empirical evidence that confirms theoretical predictions about the intricacies in such relationship; chapter 3 addresses the role of the tax system considering the need to guarantee the solvency of the State, and points out the normative mechanisms in force related to fiscal control; chapter 4 introduces the methodologies for calculating budgetary effects of tax changes, identifying strengths, weaknesses and challenges related to the dynamic scoring method; the fifth details the model used to carry out the research; the sixth chapter presents the results and final remarks.

2. TAXATION AND ECONOMIC GROWTH

The design of a country's tax system considers different needs and purposes to be satisfied. Fjeldstad (2013), in a non-exhaustive list, exemplifies the requirements that should guide its inception:

- a) raise revenue collection to finance social and infrastructure expenditures;
- b) frame taxes that favour efficiency, growth and equity;
- c) reduce tax exemptions, increasing the tax base and reducing corruption and evasion;
- d) lower the tax burden on the poorest;
- e) design taxes robust to the profit shifting strategies in a global economy;
- f) pay attention to incentives, aiming to improve the system's governance.

Tax systems are then used to promote various objectives, and to address economic and social issues as well (OECD, 2008). Hence, the understanding of what should be the tax system's main task is variant according to the perspective one wishes to adopt. According to Martinez-Vazquez and Bird (2014, p. 5):

Central to the economic approach, for example, is the concern that taxes may be inefficiently distorting the allocation of resources, thus retarding growth. A politically more salient argument in many countries may simply be that the existing tax systems may not raise sufficient revenue to permit the level of public expenditure on infrastructure and social services needed to promote growth and development.

However, underlying the apparent divergences is the unanimous recognition that taxation is an essential component in a nation's growth policy.

Myles (2000, p. 1) offers a lesson that allows us to better see how taxation and growth are related:

Economic growth is the basis of increased prosperity. Investment in new capital (both human and physical), the implementation of new production techniques and the introduction of new products are the fundamentals of the growth process. Through its effect on the return to investment or the expected profitability of research and development, taxation can affect what choices are made and, ultimately, the rate of growth.

The OECD adds (2008, p. 5):

taxes also affect the decisions of households to save, supply labour and invest in human capital, the decisions of firms to produce, create jobs, invest and innovate, as well as the choice of savings channels and assets by investors. What matters for these decisions is not only the level of taxes but also the way in which different tax instruments are designed and combined to generate revenues (...). The effects of tax levels and tax structures on agents' economic behaviour are likely to be reflected in overall living standards.

In this sense, changes in taxation (either in rates or in the structure of the tax system itself), can change the level or the growth rate of the country's national product (MYLES, 2000).

Tax systems thus impact GDP by shifting its determinants, such as productivity and workforce utilization level (OECD, 2008).

2.1. Theory and empirical evidence

From a theoretical perspective, the specific channels that characterize the tax policy transmission mechanism vary according to the design and incidence of each tax under analysis.

An increase in the marginal rate of personal income tax, for instance, reduces labour supply both in its intensive (quantity of hours worked) and extensive (decision to seek a job) margins, and induces less accumulation of human capital, not to mention the option for more pleasant occupations, although less productive or worse remunerated; the existence of exempt or deductible items causes a change in the form of compensation for work and the preference for the consumption of deductibles, respectively (FELDSTEIN, 2006).

Turning to the case of capital income taxation, “any tax or combination of taxes that reduces the net of tax return to savers causes an efficiency loss by distorting the level of retirement consumption that results from any given saving rate” (FELDSTEIN, 2006, p. 13).

High rates imposed on income from investments reduce the capital accumulation rate and, therefore, economic growth itself; lower growth, in turn, impairs the future standards of living in a society and reduces the potential base for public revenues. In fact, several distortions can arise from the structure of capital taxation:

the allocation of capital between corporate and noncorporate forms of business, the decision of companies to pay dividends or to retain earnings, the mix of debt and equity finance, the realization of capital gains, and the location of businesses in the US and abroad. The tax structure affects each of these decisions (FELDSTEIN, 2006, p. 14).

As a matter of fact, tax differentiation between companies, economic sectors and different types of assets influences the capital allocation, so that investment can occur where there is greater tax favouring – what is not necessarily the efficient choice, exacerbating the capital misallocation. The existence of financial expenses deducting mechanisms encourages the use of debt instruments, to the detriment of open market financing, which makes companies more vulnerable to business cycles. (FELDSTEIN, 2006).

In the same token, as the decision to materialize profits is essentially voluntary, taxation on capital gains may postpone the selling of assets, increasing the allocative inefficiency:

Statistical studies based on individual tax return data also show that individuals are deterred from selling stock and realizing gains and that the effect is larger when capital gains taxes

are higher. An individual investor's decision not to sell appreciated property reduces the funds available for new and growing businesses. It also causes the investor to have a riskier portfolio than he would otherwise want because he has retained more of the appreciated stock (FELDSTEIN, 2006, p. 20).

According to Johansson et al (2008), property taxes – charged in a year basis, on asset transfers or on financial transactions – differ in effectiveness terms and in what distortions they impose on market functioning:

a) at large, recurrent taxes on property are less inefficient; if their rates are kept at very low levels, though, they can encourage land underutilization and, therefore, encourage supply scarcity of real state in certain areas. Besides, the tax exemption given to certain assets, such as pension funds, interferes with the formation of the individual's portfolios.

b) on the other hand, taxation on financial transactions is highly distortive, since it discourages the undertaking of operations aimed to promoting a better asset allocation.

c) taxes charged on property transfers, e.g., those incurred on inheritance, are comparatively more efficient, since part of the transferred patrimony was voluntarily accumulated throughout life as an insurance against the uncertainty of death time – hence, the tax would not cause a relevant change in the agent's behaviour.

Regarding to taxation on consumption, there is neutrality in relation to the savings rate:

Since consumption taxes apply the same tax rate on current and future consumption (provided that tax rates are constant over time) they do not influence the rate of return on savings and individual's savings choices as income taxes do (JOHANSSON *et al*, 2008, p. 18).

It should be noted, however, that consumption taxes can temporarily affect the labour supply by reducing real wage purchasing power – such a phenomenon would occur especially in the short run, considering that at least a share of the tax would be transferred to wages and other labour costs (Johansson et al, 2008).

In addition to the conclusions above, offered by theoretical research which investigates how taxation can affect the economy, there is also empirical evidence from studies that quantify the magnitude of such an effect. Myles (2000) clarifies that the emergence of the endogenous growth theory enabled the development of models that made the growth-generating process explicit, allowing to measure the effects of taxation on the agents' decision-making and, consequently, on economic growth itself. In the author's words, “explicit modelling of the individual decisions that contribute to growth allows the analysis of tax incidence and the prediction of growth effects” (MYLES, 2000, p. 141).

In this spirit, to investigate the relationship between taxation and growth, Lucas (1990) used an endogenous growth model whit investment in human capital: the author concluded that

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zeroing the capital tax rate brings an increase superior to 30% in capital stock, in addition to a 6% boost in consumption and 5.5% in welfare.

King and Rebelo (1990), using a Cobb-Douglas-type production function, extended Lucas's research (1990) to an open economy, obtaining the following result: an increase in taxes on capital and labour, from 20% to 30%, reduces the growth rate by 1.52 pp.

Starting from a model that incorporates investment in human capital and spending on research and development as drivers of growth, Einarson and Marquis (1997) concluded that a 10% decrease in the tax rate on labour income increases the growth rate by 0.28 pp.

Engen and Skinner (1996) calculated the effect of aggregate taxation on labour supply, investment, and productivity: the results indicate that a 5% cut in marginal rates, and a 2.5% cut in average rates of all taxes would increase the growth rate at 0.22 pp. per year.

Nickell (2004) states that a 10% increase in the tax wedge (difference between the cost of labour and the worker's net wages) reduces the level of employment of the working age population by up to 3%. The OECD (2005) estimates that a symmetrical move – a 10% drop in the fiscal wedge – would increase the employment rate by 3.7 pp. on average.

Johansson et al (2008) present yet the following findings:

1. a 5% drop in the marginal rate of personal income tax (admitting an average tax of 14.3% and a marginal tax of 26.3%), could spur an increase of 1% of GDP per capita in the long run;

2. simulations that contemplate a 5% reduction in taxation on corporate profits (from 35% to 30%) indicate that there would be a 1.9% increase in the capital investment rate in the long run;

3. reducing corporate tax increases total factor productivity: average TFP growth rate in high-profit sectors would be 0.4 pp. higher before a 5% cut at the tax burden on firms.

Looking at the tax system's structure as a whole, the authors summarize:

Corporate taxes are found to be most harmful for growth, followed by personal income taxes, and then consumption taxes. Recurrent taxes on immovable property appear to have the least impact. A revenue neutral growth-oriented tax reform would, therefore, be to shift part of the revenue base from income taxes to less distortive taxes such as recurrent taxes on immovable property or consumption (JOHANSSON *et al*, 2008, p. 2).

To investigate the dynamic effects of tax burden's changes on GDP, Blanchard and Perotti (1999) devised a structural model of autoregressive vectors (SVAR) and concluded that tax shocks have a negative result on economic product. Specifically, increasing a monetary unit

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in taxes reduces all components of GDP in the private sector: consumption is reduced by 0.35 units after 5 quarters; the investment falls 0.36 units just after the shock.

The literature review thus far exposed authorizes the following conclusion:

How much a country taxes, what it taxes, how it determines its tax policy, the extent to which the level and structure of taxation are related to spending policy, how taxes are administered, and how well both policy and administration adjust to the ever-changing environment all countries now face in this globalizing world – such matters are not simply esoteric issues best left to public finance specialists. On the contrary, as historians are increasingly recognizing, they are the “sinews of power” in the important sense of being critical links between what a country may wish to achieve through its political institutions and what is actually achievable and achieved (MARTINEZ-VAZQUEZ *et al.*, 2014, p. 1).

For these reasons, it is important to bear in mind the efficiency costs imposed by taxation (FELDSTEIN, 2006), and “investigating how tax structures could best be designed to promote economic growth is a key issue for tax policy making” (Johansson et al, 2008, p. 5).

3. TAX CHANGES AND FISCAL BALANCE

Alongside the considerations in the previous section, it is evident that “tax systems are primarily aimed at financing public expenditures” (JOHANSSON et al, 2008, p. 5). Such a relationship, by the way, may be rigorously expressed through the government's budget constraint, which allows the conclusion that revenue is an essential component in guaranteeing fiscal policy sustainability of over time (WALSH, 2010):

$$g_t + r_{t-1}b_{t-1} = t_t + (b_t - b_{t-1}) + s_t$$

where g_t represents government expenditure on goods, services and transfers, $r_{t-1}b_{t-1}$ indicates the payment of real interest on the debt stock (b_{t-1}), t_t denotes tax revenue, the expression in parentheses ($b_t - b_{t-1}$) is the variation in the debt stock, that is, new issuances of bonds, and s_t , the revenue from seigniorage.

The tax system is thus conceived having as a background the need to promote State financing and solvency. It is only natural, therefore, that changes in this very system got to be made in accordance to this premise. In this context, in the Brazilian case, a set of restrictions imposed by fiscal rules was conceived to ensure the permanent balance between public revenues and expenses. The guidelines imposed by two relevant legal acts that integrate the normative fiscal control system are briefly detailed below: The Fiscal Responsibility Act (LRF, to use the Portuguese acronym) and the Budget Guidelines Law (LDO).

3.1. Fiscal Responsibility Act

The Supplementary Law 101/2000, or Fiscal Responsibility Act (LRF), attempting avoid risks to public accounts balance, provides that “the institution, estimation and effective collection of all taxes under the member’s constitutional jurisdiction are essential requirements for fiscal management” (BRAZIL, 2000, art. 11). The law also establishes limits and conditions concerning to tax expenditures¹:

Art. 14. The granting or expansion of a tax benefit which results in tax expenditure must be accompanied by an estimate of the financial and budgetary effect from the starting year to the two years following, comply with the Budgetary Guidelines Law provisions, and at least one of the following conditions:

I - demonstration by the proponent that the waiver was considered in the annual budget revenue estimation, as provided by art. 12², and that it will not affect the fiscal targets settled for in the Budget Guidelines Law annex;

II - be accompanied by compensation measures, in the aforementioned period, through the increase in revenue, either from raise in tax rates, tax base expansion, increase or creation of new taxes or contributions (BRAZIL, 2000).

One can see thus that the act of granting a tax benefit, when implies a potential reduction in public revenues, or an increase in the taxpayer’s economic net worth (OLIVEIRA, 2013), must explicit its financial and budgetary effect. Once the waived quantum is delimited, it is necessary to guarantee the fiscal neutrality within the three-year period, either through the incorporation of decreases in the Annual Budget Law revenue projections, or via the institution of compensatory measures, according to items I and II replicated above.

The constraints regulating the elaboration of the tax expenditure act are therefore aligned to the ideal of fiscal responsibility, so that the LRF represents an important instrument aimed to preserving the intertemporal balance of public accounts.

Nevertheless, as Saint-Helena recalls:

The LRF regulates only the waiver of tax revenues, and does not deal with benefits concerning other public revenues, such as those arising from equity, real estate, securities or dividends, not to mention the capital revenues, such as credit operations or assets sale. This gap was filled by the LDOs that also regulate waivers of financial, credit or equity revenues (2009, p. 196).

¹ The tax expenditure includes amnesty, remission, subsidy, presumed credit, granting of particular exemptions, changes in tax rate and tax base involving itemized reduction of taxes or contributions, and other benefits amounting to privileged treatment (LRF, art. 12, § 1º).

² Art. 12. The revenue estimation shall observe technical and legal norms, consider the effects from changes in legislation, price index movements, economic growth or any other relevant factor, and must be accompanied by a statement of its trajectory in the last three years, a projection for the following two years, and the methodology and assumptions adopted.

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The rules settled by the Budgetary Guidelines Law regarding to legislative changes that cause a drop in public revenues are outlined in the following subsection.

3.2. Budgetary Guidelines Law

The Budgetary Guidelines Laws have traditionally included a chapter designed to regulate the process of changes in legislation considering the financial and budgetary adequacy exam. According to Almeida (2018):

In a nutshell, the compatibility and adequacy examination intends to reconcile the ordinary and budgetary legislative processes, in order to gauge the budget law's ability to absorb the impacts stemming from the legislator's political will - hence the importance of knowing, beforehand, the fiscal impact of the bill under discussion.

Particularly, in accordance with the Law 13.707/2018 (LDO-2019):

Art. 114. Bills and their amendments, according to art. 59 of the Constitution, which directly or indirectly import or authorize a decrease in revenue or an increase in Union expenditure, shall be accompanied by estimates of these effects for the year in which they come into force and the two subsequent years, detailing the respective statement of calculation and corresponding compensation for purposes of budgetary and financial adequacy, and compatibility with the constitutional and legal provisions governing the matter.

(...)

Art. 116. The bill shall not be approved, and the executive act that institutes or modifies public revenue shall not be adopted but when accompanied by the duly justified corresponding demonstration of the estimated effect on public revenues (emphasis added) (BRAZIL, 2018).

From the provisions above, one can see a partial replication of LRF prescriptions in relation to the need of present estimates of financial and budgetary impacts, demonstrate the origin of the resources and to comply with fiscal neutrality; however, the LDO clearly enlarges the scope of provisions, since it establishes that every and all reduction in public revenue – not just the decreases resulting from tax waivers – must obey the rule's dictates.

The Budget Guidelines Laws thus reinforce yearly the concern with the balance between revenues and expenditures, even expanding the scope of control mechanisms established by the LRF.

3.3. Affinities and blanks in the regulatory system

As noted, LRF and LDO materialize concerns to preserve the public revenues aggregate or, at least, the amount of the gap between revenues and expenditures at each financial year. Nevertheless, despite what has been discussed in previous sections, both rules, when

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establishing mandatory requirements which govern the process of changing rules that impact the State's revenue, do not address issues regarding the tax system efficiency and its repercussions on the economic environment.

The prominence given to fiscal matters by the legislation is totally apprehensible, especially if one recalls that the LRF was conceived on a background of persistent financial imbalances at subnational levels, with recurring fiscal deficits, increasing stock of public debt and high refinancing costs, alongside exchange rate vulnerabilities which undermined macroeconomic stability (LOUREIRO and ABRUCIO, 2004). The law was in charge of

build commitment in favour of a fiscal regime able to ensure the intertemporal equilibrium of public accounts, understood as a collective good, interesting to the whole Brazilian society, as a necessary condition for price stability consolidation and the resume of sustainable development (BRAZIL, 1999).

Hence, governed by the provisions of those laws, changes in the reference tax system must remain faithful to the fiscal balance mandate. It is thus essential to know beforehand the financial effect of the proposed changes. When its inherent reflections and peculiarities are fully considered the task of scorekeeping gains special contours – this topic will be discussed in the next section.

Before proceeding, however, it is worth to mention another common ground observed between LRF and LDO: the provisions discussed above are mainly directed to the National Congress. That is a relevant distinctive feature, since laws usually “regulate the relations between people, the powers and duties of the State and of the government, individual and collective rights, in short, (...) they discipline life in society in general ”(PACHECO, 2013, p. 11). In general, therefore, legislative activity is concerned with the production of rules aimed at regulating the State’s administrative activity, the interactions between government and individuals or between people in community; on the other hand, the commandments inaugurated by LRF and LDO impose limits on the very law making process and, in this sense, consider the National Congress a relevant player and truthful upholder of the control mechanisms’ effectiveness under discussion.

4. STATIC AND DYNAMIC SCORING

The previous sections presented the potential effects of taxation on the country's economic growth and the normative system concern as to ensure that tax changes do not deviate from the principle of fiscal balance. In this section, the technical and conceptual differences

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between static and dynamic scoring are discussed, and it is argued that the scorekeeping process should take into account the aspect of tax efficiency, reconciling economic growth and fiscal responsibility.

4.1. The many purposes of scorekeeping

Under the current legislation, the scoring of budgetary and financial effects provides the fiscal control required by the public accounts sustainability – it is necessary to quantify the budgetary effect of the proposed change and thus delimit the extent of the respective neutralizing measure, in order to not disturb the fiscal path previously established.

It should be noted, however, that the set of rules which accommodates the need for scorekeeping gives this task not only a formal or instrumental role: the obligation to present impact estimates is a hard restriction on legislative making process, given that failure to comply with the requirement is detrimental to the bill approval in parliament, pursuant to art. 116 of the LDO 2019.

Additionally, with the recent promulgation of Constitutional Amendment n. 95/2016³, the provisions set forth by the LRF and the LDO reached constitutional status, in respect to the need of presenting the budgetary effects when the initiative has repercussions on the federal budget: “Art. 113. Any bill intending to create or modify mandatory outlays or tax expenditures shall be accompanied by an estimate of its financial and budgetary effect” (BRAZIL, 2016).

Fiscal impact estimates, therefore, “play a key role in implementing statutory budgetary controls” (D’AMICO and LASH, 2015, p. 1), such as those pertaining to tax changes with repercussions on public revenue. In this sense, the budgetary effect of proposed legislation can guide and even constrain the political decision-making process:

These budget rules have placed revenue and outlay estimates at the center of the political process. Rather than influencing legislation indirectly through the information they provide, the estimates now determine directly whether individual pieces of legislation can be enacted (AUERBACH, 1996, p. 146).

The informational value that impact estimates add to public (and political) debate is, hence, another point to highlight. According to Fichtner and McLaughlin (2015, p. 10):

more complete information about the impact of congressional actions will inform voters and allow members of Congress to better understand how congressional actions affect

³ The Constitutional Amendment 95, of December 15, 2016 (EC 95), added to the Transitional Provisions Constitutional Act (ADCT) articles 106 to 114, instituting the New Fiscal Regime pertaining to the Union's Fiscal and Social Security Budgets, to be in force during twenty fiscal years (from 2017 to 2036).

constituents (...). Without a legislative impact accounting (...) a greater number of ill-advised or misconceived policies may be adopted with harmful consequences, resulting not only in lost economic output but also erosion of public trust in government to do its business efficiently and equitably.

As D'Amico and Lash (2015) underline, the existence of figures on the fiscal cost of proposed legislation allows for a qualified debate on its merits, clarifying the measure's budgetary effects.

For all these reasons, estimates of financial and budgetary effects qualify the legislative production, as "important congressional decisions cannot be made in the absence of complete and proper information on how various policy decisions – legislative and regulatory – will affect the economy and the (...) budget position" (FICHTNER and McLAUGHIN, 2015, p. 10). The obligation to submit estimates is also relevant in promoting the State's fiscal balance.

The subject, being at the service of such noble ends, deserves careful scrutiny; after all, the magnitude of the estimated impact may even determine the very fate of proposals under examination in Congress. As Mitchell points out (2002, p. 1):

the choice of how to estimate revenues has important implications. In the short term, better revenue estimating methods would make it easier to implement tax rate reductions. In the long term, shifting to a simple and fair tax code would be expedited if revenue estimators were allowed to consider the beneficial impact of tax reform on economic performance.

Depending on the methodology adopted to prepare the estimates, the number obtained at the end may or may not be within the range of the State's budgetary possibilities. This discussion is introduced in the following subtopic.

4.2. Scorekeeping technique: in favour of dynamic scoring

The already discussed provisions from the LRF and the LDO mandate that the estimates of financial and budgetary impact be accompanied by the premises and statement of calculation used for their preparation.

The literature identifies two techniques used to build the estimates: the static and dynamic scoring processes.

As Bozio explains, static, mechanical, or conventional estimates capture the simplest budgetary effects of a given policy change, which arise before any behavioural response from the involved agents: "if a tax rate doubles, revenue doubles (...); its defining feature is that all behaviour is assumed to be unaffected by the policy" (BOZIO, 2009, p. 6).

Therefore, the static scoring of proposed changes to tax laws is undertaken " under the implicit assumption that such changes have no measurable impact on output, prices, interest rates, or income" (MAUSKOPF and REIFSCHNEIDER, 1997, p. 631). In other words, "the path of gross domestic product remains the same when the government changes taxes" (MANKIW, 2018, p. 1).

It is worth noting that the Brazilian Federal Revenue – the entity in charge of preparing the statements of tax expenditures in the country – declares that the measurement of tax waivers is elaborated under the "loss of collection" method, which is nothing more than a conventional impact estimate (BRAZIL, 2019). In fact, this systematic

simulates a normal taxation on the volume of exempt operations that actually took place, or is expected in the future, keeping all else equal. By definition, it does not take into account changes in taxpayers' behaviour (BRAZIL, 2019) (emphasis added).

The simplicity in the calculations gives static scoring a high degree of transparency. On the other hand, a drawback inherent to such a method is that it is based in assumptions "patently false" (MANKIW, 2018, p. 1). To exemplify:

in some contexts, the very idea of no change in behaviour is incoherent. If households experience a tax cut, the increase in their real disposable income must, by definition, be either spent or saved. To assume that both spending and saving are unchanged is not merely implausible, it is nonsensical (BOZIO, 2009, p. 5).

In fact, as we have seen earlier, theoretical, and empirical economic research largely corroborates the close relationship between taxation and economic growth. It is only natural that the task of estimating the budgetary effect of tax changes takes into account this indisputable fact.

Furthermore, it is very important to know in advance which measure among the possible alternatives for reducing the tax burden will cause the least loss of revenue and/or the greatest benefit to economic growth. Static estimates are not able to provide such information, so decisions based on the methodology risk choosing policies with an excessive impact on revenue, increasing the fiscal imbalance (HODGE, 2015).

Lastly, as suggested by Mitchell (2002), Auerbach (2005), Feldstein (2008) and D'Amico and Lash (2015), static scoring overestimate the tax revenue which would be obtained by raising taxes (by disregarding the negative repercussions that more taxes inflict to economic activity and, then, to tax collection) and, also, the eventual loss of revenue resulting from tax cuts (as it neglects the stimulus to economic growth, with positive consequences on revenue). For that reasons, the methodology is criticized for having a bias that makes it difficult the approval of measures to reduce the tax burden.

In order to overcome the drawbacks arising from the static technique, the dynamic method to calculate the budgetary effect (dynamic scoring) “provides an estimate of the effect of tax changes on jobs, wages, investment, federal revenue, and the overall size of the economy” (HODGE, 201, p. 1). To do so, dynamic scoring takes

full account of all the economic effects of policies when estimating their budgetary effects. Taxes and government spending have multifaceted economic effects. Individuals may respond by changing their behaviour in innumerable ways: whether they work and how hard, when they leave education, what they buy, how much they save and in what form, how much risk they take (...). These responses can themselves have further economic effects, by changing supply, demand and market prices for goods and services. (...). All of these affect the government’s revenue and outgoings, so the full chain of consequences will determine the actual cost of tax and spending proposals (BOZIO, 2009, p. 3).

Hence, in the previous example, if the taxpayer spends the increase in disposable income, the government will levy tax on consumption; if the extra income destination is savings, there may be an increase in tax collection on income from interests on financial investments (BOZIO, 2009). Such increases in public revenue will offset, partially at least, the initial loss of revenue caused by the tax reduction.

Arguing for the adoption of dynamic scoring, Mauskopf and Reifschneider (1997) reason that impact estimates should ideally be based on the best projections about macroeconomic conditions; if changes in fiscal policy have predictable and measurable effects on prices, output and income, these effects need to be considered by those involved in the policy design. D’Amico and Lash echo the point (2015, p. 24-25):

Dynamic scoring provides the most information about what impacts a particular piece of legislation will have—and more information is normally a necessary condition for coming to the most accurate conclusion. (...) this argument bleeds into the fields of governmental efficiency, accountability, and legitimacy. Legislators should “have the best available information at the fingertips” as they make decisions that affect their constituents.

Besides the informational gains, dynamic scoring has the advantage of gathering support from actors across the political spectrum: those favouring the reduction in the size of government find in it a useful tool to demonstrate the adverse effects of a tax increase, as well as the benefits from the reduction of rates; on the other hand, advocates of greater state intervention use dynamic estimates to show dividends from employment support measures and stimulus packages to help the economy recover during crises (D’AMICO and LASH, 2015).

Dynamic scoring values the importance of considering the overall reaction of the economy to changes in tax laws, better explaining the costs and benefits of the proposed change. Of course, the task of measuring second-order effects and macroeconomic impacts of legislative changes is far from trivial, and, as explained by D’Amico and Lash (2015, p. 24), the “exact

magnitude of these effects is sensitive to a number of different modelling assumptions”. The subsection below addresses the difficulties associated to the method.

4.3. Dynamic scoring: features and challenges

As taught by Gravelle (2007), Feldstein (2008), and D'Amico and Lash (2015), dynamic scoring embodies the feedback of the normative change on macroeconomic conditions and, therefore, on the government's fiscal stance, so the nature (and magnitude) of the measured effects can be compartmentalized into three different perspectives:

1. short-run or Keynesian effects which allow for demand stimulus – and, therefore, spurs on the product – via cost reduction from tax cuts. They are temporary and derive from encouraging the use of workforce and other resources underemployed. This shock on demand could occur even in a tax-neutral reform, provided that there was a change in the distribution of the tax burden, reducing the taxation on low-income individuals, who have a higher marginal propensity to consume;

2. the government borrowing and deficit effect, which may result from the crowding out on private investments in face of a tax reduction financed through an increase in public debt. In this scenario, a deficit increase raises the fiscal cost of the proposed legislation: interests on the new debt causes a direct increase in public expenditure; deficits inhibit investment and reduce the economy's capital stock, damaging GDP in the long run and the potential level of tax revenue; deficits also increase the risk perception on government bonds, which demands higher interest rates, raising the costs to service the debt (GRAVELLE, 2007);

3. long-run or supply side effects, which result from changes in the labour supply, savings, and investment, in response to tax changes. In general, they are long lasting, have greater magnitude and require more time to materialize when compared to demand shocks (BOZIO, 2009).

Gravelle (2014, p. 5) recalls that “These different effects may not be precisely separated (for instance, deficits increase interest rates which can cause a change in savings that is a supply side effect)”. However, one can try to isolate each of the effects by running a sensitivity analysis to test the robustness of the results from the adopted model.

In addition, such effects will be measured differently as different assumptions are incorporated in modelling the macroeconomic environment. Consider the short-run effects: “the

effectiveness – and implications for revenue – of fiscal stimulus policies (...) will be very different in a recession from in a boom”(BOZIO, 2009, p. 12), so that the inflation level and the state of the economy are important in the process of estimating the budgetary effect. This means that the same proposed legislation can bring different effects, depending on when the bill is proposed. More than that: if the economic environment experiences significant changes between the bill proposal and its approval, the scoring prepared at the beginning of the process will be less precise due to the use of an outdated scenario.

It is also necessary to consider how the other policymakers will react, at different levels of government or jurisdictions; the monetary authority decision before the regulatory innovation is particularly important. As Gravelle (2014, p. 16) explains:

the magnitude and even existence of a stimulus effect depends on assumptions about the behaviour of the country's central bank, the Federal Reserve System. The Federal Reserve can take measures to offset a fiscal stimulus with a monetary contraction or a fiscal contraction with a monetary expansion to keep output constant. They can also fully accommodate the change by keeping interest rates constant and strengthening the stimulus or contraction, or they can do anything in between. If, however, the Federal Reserve has a fixed objective for output, fiscal policy would simply be one more factor to counteract in their policies and a tax cut or tax increase would not affect output.

Feldstein (2008, p. 3) concludes: “The possible fiscal stimulus effect of a tax change must be considered on a case by case basis to assess the likely reaction of the Federal Reserve to the proposed change in tax rates or tax rules”.

When it comes to the deficit effect, it is paramount to define how – and how soon – the budget loss from a tax cut will be offset. The estimated outcome of a reduction in revenue financed through an increase in the tax base, or even by an equivalent reduction in public outlays, will be different from that in which the calculation assumed an increase in the government deficit as a result of the change. Gravelle (2007, p. 3) clarifies the point:

a tax cut bill may be considered to be financed by a deficit (in which case it would have a stimulus effect), by a spending offset (in which case it would probably have a slightly contractionary effect), or by an offsetting tax increase. Any analysis that includes a stimulus effect is making an implicit judgment about whether the tax cut would be financed by borrowing.

Lastly, long-run effects are strongly dependent on the model parameters. As previously explained, the permanent economic changes resulting from tax changes stem from the agents' behavioural response to labour supply and savings, as well as the possibility of substitution between labour and capital. Such responses, in turn, vary according to the net wages after taxes, the rate of return on capital, and the elasticities of savings, labour supply, and substitution between factors (GRAVELLE, 2007). One can anticipate, therefore, that the

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magnitude chosen for the elasticities in the model calibration has significant role in defining the budgetary effect calculated by the dynamic scoring methodology.

Bozio (2009) points out other sources of uncertainty related to dynamic scoring:

a) degree of economic openness: general equilibrium macroeconomic implications are affected by a context marked by high mobility of goods, people and capital; prices determined in a global market may be little affected by domestic policies in relatively small countries, with limited relevance to global trade;

b) expectations: the ability of economic agents to anticipate future developments resulting from regulatory changes is critical in determining their behaviour and, therefore, the effects on tax collection;

c) fiscal multiplier: the magnitude and direction of the fiscal multiplier in an economy are decisive for predicting the fiscal impact of tax measures in the short term.

The difficulties should not, however, hinder the methodological advance towards the adoption of dynamic scoring. In fact, one should not reject the entire theoretical and empirical body in favour of the method due its complexity. As Auerbach (2005, p. 423) asserts, "Economic analysis and modelling have also advanced, with growing evidence of the importance of taxpayer responses to government policy changes and the development of a new generation of sophisticated economic models capable of gauging the magnitudes of these responses". Furthermore, Williams, (2015, p. 1) notes that there is "uncertainty surrounding even the static effect of a proposal". Thus, the additional costs imposed by the dynamic methodology are justifiable "if the resulting dynamic estimates were orders of magnitude or directionally different from conventional scores" (D'AMICO and LASH, 2015, p. 35).

A viable approach that, to a certain extent, tries to reconcile the usefulness of the information produced and the inherent challenges, is that dynamic scoring would only be required in emblematic cases, as in United States of America: the Rules of the House of Representatives states that estimates presented to Congress by the Congressional Budget Office (CBO) should, "to the extent practicable, incorporate the budgetary effects of changes in economic output, employment, capital stock, and other macroeconomic variables", due to the legislative change under examination (USA, 2015, p. 28); preparing such estimates is required whenever the budgetary effect in a financial year, measured by the static method, is equal to or greater than 0.25% of the projected GDP for that year.

There is, though, a more concrete obstacle that tends to diminish the practical importance of the dynamic methodology for estimating the impact of tax changes: the small time window imposed by the legislation to calculate – and compensate – the budgetary effects of the normative change.

It should be remembered that, according to art. 14 of the LRF, the budgetary and financial impact estimate must be presented in relation to the financial year in which the measure will come into force, as well as for the following two years. The same art. 14, inc. II, furthermore, determines that compensation measures aimed at maintaining fiscal neutrality are mandatory, and the product of such measures must also be materialized in the same period. The provisions, then, impose a rigidity in the case of tax expenditures, i.e., the estimates cannot consider any stimulus arising from the deficit effect, given the obligation to preserve the fiscal goal. It would remain thus possible to consider short and long-run effects.

In this situation – a tax change neutral from a fiscal standpoint – “the effects on short term demand (...) should be negligible” (GRAVELLE, 2007, p. 3), and it is not appropriate consider them in face of permanent changes in tax policy (GRAVELLE, 2014).

The focus, therefore, falls on the long-run or supply side effects on the economy. We already mentioned that long-run effects stem from changes in labour supply, savings, and productivity of economic factors. The aggregate supply sluggish response reflects, then, the difficulty of modifying these vectors. Mauskopf and Reifschneider (1997, p. 631) further clarify:

For example, changes in government support for education and research can probably alter the rate of technological progress, but only very slowly given product gestation lags. Similarly, while government policies can influence the capital stock through infrastructure spending, tax investment incentives (...), the nature of capital accumulation ensures that this process is slow. Based on standard estimates of the aggregate production function, an increase in potential GDP of one percent would require a three percent increase in the capital stock. To raise the capital stock three percent in one year would require a thirty percent increase in the level of investment—an increase that would be hard for policy to achieve, given the time it takes to develop new investment plans and to produce and install new buildings and machinery. Finally, while it is theoretically possible to alter aggregate labour force participation quickly through changes in the after tax return to working, habit persistence, adjustment costs, and institutional rigidities make it likely that such effects would manifest themselves over a prolonged period of time.

Along the same lines:

individual economic subjects adapt to the changed conditions (...). The adaptation to the new economic environment usually happens in a smooth way, and is characteristic by a certain time interval during which the adaptation takes place. Due to this, it is evident that the influence, or the impact of income taxes can be lagging (MACEK, 2014, p. 321).

Thus, we are left to the problem of time window mismatch between the horizon in which the economic effects will be observed and the initial three-year period that guides the proposed legislation's financial and budgetary adequacy and compatibility exam.

The current fiscal control system ends up favouring a short-term view on the consequences of regulatory changes, by disregarding longer-term developments on the economic environment, which could be measured by the dynamic scoring methodology. Indeed, legislators are led to decide under a rule that ignores the permanent macroeconomic consequences of the initiative and focuses on possible immediate effects of the measure. The legislative process keeps then a bias that discourages the production of tax rules aimed at promoting efficiency and economic growth – or, looking at the other side of the coin, that encourages legislation detrimental to development.

Legislation designed to promote long-term improvements in the general state of the economy “will not be viewed favourably by conventional scoring, and therefore will receive a great deal of opposition for its budgetary effects” (D'AMICO and LASH, 2015, p. 26). However, as recalled by Mankiw (2018, p. 1), “Yet congressional budgeting usually looks only five or 10 years ahead. (...) we have to think about how policy affects the next generation, not just the next election”.

In this context, this paper seeks to offer a contribution in order to explain the potential disparity between the figures derived from the scorekeeping process, according to the chosen technique, and the natural consequences resulting from such discrepancies. To do this, we have used a dynamic stochastic general equilibrium model (DSGE), stylized and calibrated for the Brazilian economy; the details are presented in the next section.

5. MODEL

Once we have overcome the conceptual exposition on methodological differences between static and dynamic scoring, uncertainties and challenges; after pointing out the limitations that the normative fiscal control system imposes on the tax impact estimation process, this section is dedicated to detailing the model adopted to undertake simulations that allow quantifying the differences on the results achieved, offering evidence that the chosen method surely has reflects on the elaboration and approval process of the tax rule.

First, it is useful to present the Gravelle's (2014) framework, which presents four categories of economic models that can be used in the task of preparing dynamic estimates of budgetary effect:

1. short-term models, also referred to as IS-LM models, typically used to predict the magnitude of the stimulus on aggregate demand in the short run; they do not incorporate financing or long-run effects;

2. neoclassical growth models (or Solow models): assume full employment and do not incorporate short-run effects, although they may predict reflexes resulting from changes in the public deficit and in the determinants of aggregate supply, in the long run;

3. intertemporal growth models, in which individuals allocate leisure and consumption over time, and changes in labour supply and savings are the drivers of changes in the economy's aggregate supply; they only capture supply-side effects, since they also assume full employment and, in addition, fiscal neutrality (at present value) of the policy change under analysis;

4. hybrid models, which combine short-term stimulus with growth models (for example, an association between an IS-LM model and a Solow model); they allow for unemployment via wage rigidity.

From that menu, considering the objectives of this paper, an intertemporal growth model was adopted. Specifically, according to Chacón (2016), a closed economy DSGE model was used – assuming, then, the absence of international flows of capital and also equilibrium between supply and demand in the short and long terms, with prices adjusting to such circumstances. The choice for such a model is justified by the adherence of the tool to the experiment conducted, since DSGE models allow simulations and subsequent analysis of the policy change effects, based on the behavioural reactions of economic agents with rational expectations. The building blocks that compose the model are explained in the following subsections.

5.1. Households

In the model economy, each family – illustrated by a representative agent – maximizes its utility (U) by choosing sequences of consumption (C_t) and leisure ($1 - L_t$), according to the following functional form:

$$U(C_t, 1 - L_t) = \gamma \log C_t + (1 - \gamma) \log(1 - L_t) \quad (1)$$

in which the parameter γ ($0 < \gamma < 1$) indicates the share of private consumption out of total income. The budget constraint is given by

$$(1 + \tau_t^c)C_t + S_t = (1 - \tau_t^l)W_tL_t + (1 - \tau_t^k)R_tK_t + G_t \quad (2)$$

where τ_t^c, τ_t^l e τ_t^k represent taxes on consumption, labour income and capital income, respectively, with rates assumed constant, which can be interpreted as average marginal rates; S_t is equivalent to savings, W_t is the wage, L_t the share of time dedicated to work, R_t the rate of return on capital and K_t the private stock of that capital; finally, G_t are government transfers received by households.

The stock of capital evolves according to the following law of motion:

$$K_{t+1} = (1 - \delta)K_t + I_t \quad (3)$$

δ denotes capital depreciation rate – considered deductible in this tax system – and by I_t is gross investment during the period.

Therefore, from the household maximization problem, subject to the budget constraint shown in (2), we obtain the first order conditions with respect to consumption, labour, and capital:

$$\frac{\partial \mathcal{L}}{\partial C_t} : \gamma \frac{1}{C_t} : - \lambda_t(1 - \tau_t^c) = 0 \quad (4)$$

$$\frac{\partial \mathcal{L}}{\partial L_t} : - (1 - \gamma) \frac{1}{1 - L_t} : - \lambda_t(1 - \tau_t^l)W_t = 0 \quad (5)$$

$$\frac{\partial \mathcal{L}}{\partial K_t} : \beta^t \lambda_t [(1 - \tau_t^k)(R_t - \delta) + 1] - \lambda_{t+1} \beta^{t-1} = 0 \quad (6)$$

β is the consumer discount rate and $\beta^t \lambda_t$, the Lagrange multiplier associated to the budget constraint in period t .

5.2. Firms

Firms rent capital and employ labour to maximize profit each period, taking the prices of the productive factors as given. The Cobb-Douglas type production function, with constant returns to scale, denotes the total product of the economy in period t :

$$Y_t = A_t K_t^\alpha L_t^{1-\alpha} \quad (7)$$

where A_t is a measure of total factor productivity, and $0 < \alpha < 1$, the share of capital in production.

The firm's maximization problem is

$$\max_{(K_t, L_t)} \Pi_t = A_t K_t^\alpha L_t^{1-\alpha} - R_t K_t - W_t L_t \quad (8)$$

with the following first order conditions:

$$\frac{\partial \Pi_t}{\partial K_t} : R_t - \alpha A_t K_t^{\alpha-1} L_t^{1-\alpha} = 0 \quad (9)$$

$$\frac{\partial \Pi_t}{\partial L_t} : W_t - (1 - \alpha) A_t K_t^\alpha L_t^{-\alpha} = 0 \quad (10)$$

5.3. Government

The government finances itself through the collection of taxes on consumption, labour income and capital income; out of simplicity, public revenues return to the economy as an exogenous sequence of lump-sum (G_t) transfers; it is also assumed that the government budget is balanced in each period, following the dynamics below:

$$\tau_t^c C_t + \tau_t^l W_t L_t + \tau_t^k (R_t - \delta_k) K_t = G_t \quad (11)$$

5.4. Equilibrium

By using the equilibrium conditions for firms and households, we have that:

$$\frac{(1+\tau_t^c)C_t}{(1+\tau_{t-1}^c)C_{t-1}} = \beta [(1 - \tau^k)(\alpha A_t K_t^{\alpha-1} L_t^{1-\alpha} - \delta) + 1] \quad (12)$$

$$\frac{c_t}{1-L_t} = \frac{\gamma}{(1-\gamma)} \frac{(1-\tau_t^l)}{(1+\tau_t^c)} (1 - \alpha) A_t K_t^\alpha L_t^{-\alpha} \quad (13)$$

Finally, the economy's aggregate resource constraint must be satisfied:

$$C_t + I_t = Y_t \quad (14)$$

5.5. Calibration

The set of structural parameters was calibrated according to previous studies applied to the Brazilian economy, when available. The intertemporal discount factor (β) came from Areosa and Coelho (2015); the depreciation rate (δ), the technological parameter (α) and the consumption preference parameter (γ) were obtained from Chacón (2016); finally, the tax rates on consumption, labour income and capital income are average effective rates calculated by Almeida et al (2017) – regarding this point, the tax burden derived from such rates after the

simulations was equivalent to 38.4% of GDP, compared to the 32.4% actually observed in 2017 (BRAZIL, 2018b). Table 1 below summarizes the data.

Table 1 - Calibration

Parameter	Value
A	0.350
β	0.970
δ	0.060
γ	0.450
τ_c	0.219
τ_l	0.286
τ_k	0.194

Source: Elaborated by the author.

5.6. *Estimating the effects of tax changes*

To illustrate the discrepancy between the results of impact estimates according to the chosen methodology, we simulated permanent shocks, within the framework presented above, on the average rates of taxes on consumption, on labour income and on income capital; in a first exercise, each of these taxes experienced a relative disturbance of 10% in their respective rates, observing then the path of relevant macroeconomic variables; the second simulation started from static estimates calculated at BRL 50 billion for each tax, parameterizing the drop in the average rates to liken the fiscal and economic effects derived from the shock. The next chapter exhibits the results.

6. RESULTS

In this chapter we comment the results from simulations undertaken using the model described in the previous section. The first subsection presents the conclusions reached before a 10% shock in the average rates of each tax. Subsequently, we delve into the comparison between the calculations derived from the different methodologies, in the face of a static impact (loss) estimated at BRL 50 billion.

6.1. 10% cut in average tax rates

The figure at the end of the chapter illustrates the effects of a permanent shock on the average rates of taxes on consumption, capital income and labour income. The economy experiences a transition between the state prior to the change and the new equilibrium: the drops in rates on labour and capital income induce changes in the labour supply and in the savings rate, respectively, which affects the product and the capital stock in the next periods; the disturbance in the level of the capital stock, in turn, changes the rates of return on capital and labour (wages) and causes a new adjustment in the savings rate and in the labour supply – this process is repeated until the economy reaches a new steady state, with a higher GDP⁴.

In respect to the reduction in the tax rate on consumption, there is an increase in the purchasing power of household's disposable income, which is equivalent to an increase in returns on labour; higher levels of labour supply, investment and consumption are observed – thus resulting in a positive impact on the long run economy's product. The percentage changes in the product, once the new equilibrium is achieved, are shown in the table below:

Table 2: Long-run effects on GDP from tax rate reductions

Variable	Consumption (τ^c)	Labour income (τ^l)	Capital income (τ^k)
GDP (Y)	1,25%	2,88%	0,66%

Source: Elaborated by the author.

Regarding the impact on public revenue, parameterizing the results according to Brazilian GDP in 2018, there are significant differences in the value obtained when comparing the static and dynamic scoring techniques, as exhibited in the following table:

⁴ Naturally, one can foresee an inverse movement if tax rates were raised instead: an increase in taxation on labour income, for example, can lead to higher labour costs, causing the substitution between labour and capital, which reduces the latter's marginal productivity; in the long run there is an increase in unemployment and a slowdown in economic growth, together with greater pressure on public spending associated with unemployment policies, deteriorating the State's fiscal position.

Table 3: Static and dynamic effects on public revenue from tax rate reductions

Tax	Static scoring		Dynamic scoring	
	%GDP	BRL billion	%GDP	BRL billion
Consumption (τ^c)	-1,7%	-114,0	-1,2%	-83,5
Labour income (τ^l)	-1,9%	-130,0	-0,8%	-57,5
Capital income (τ^k)	-0,3%	-17,9	-0,1%	-5,6

Source: Elaborated by the author.

The table shows that the values from dynamic scoring, in terms of revenue loss, are always lower than those resulting from the conventional or static technique: they are equivalent to 73.3%, 44.2% and 31.6% of the static amount for a decrease of 10 % in taxation on consumption, labour income and capital income, respectively. Such differences uncover the feedback effect resulting from the behavioural response of economic agents, which leads to revenue gains due to a higher GDP – a fact that ends up partially offsetting the loss of revenue initially expected in a *ceteris paribus* scenario. The experiment, therefore, confirms the bias pointed out by the literature (MITCHELL, 2002; AUERBACH, 2005; FELDSTEIN, 2008; D'AMICO and LASH, 2015), in the sense that static estimates overestimate the loss of revenue resulting from tax cuts, making it difficult the approval of measures to reduce the tax burden.

Additionally, as shown in the figure 1 at the end of the chapter, the partial recovery of the revenue trajectory is not completed in the first three periods after the shock, requiring about 30 periods to reach a level close to the stability at the new equilibrium. That is to say: although the revenue loss resulting from the tax cut is partly offset from higher economic growth, this phenomenon does not occur in the short term – which is natural, given that changes in the labour supply, savings and productivity of economic factors occurs only smoothly and the process takes time to be fully completed.

From this evidence, one can clearly perceive the aforementioned problem of mismatch between the time window required for the full realization of the economic effects resulting from the tax change and the initial three-year period that, as required by the current legal system, guides the proposal's exam from the budgetary adequacy and compatibility standpoint. The bias – which arises from the adoption of the static technique in the scorekeeping process – is

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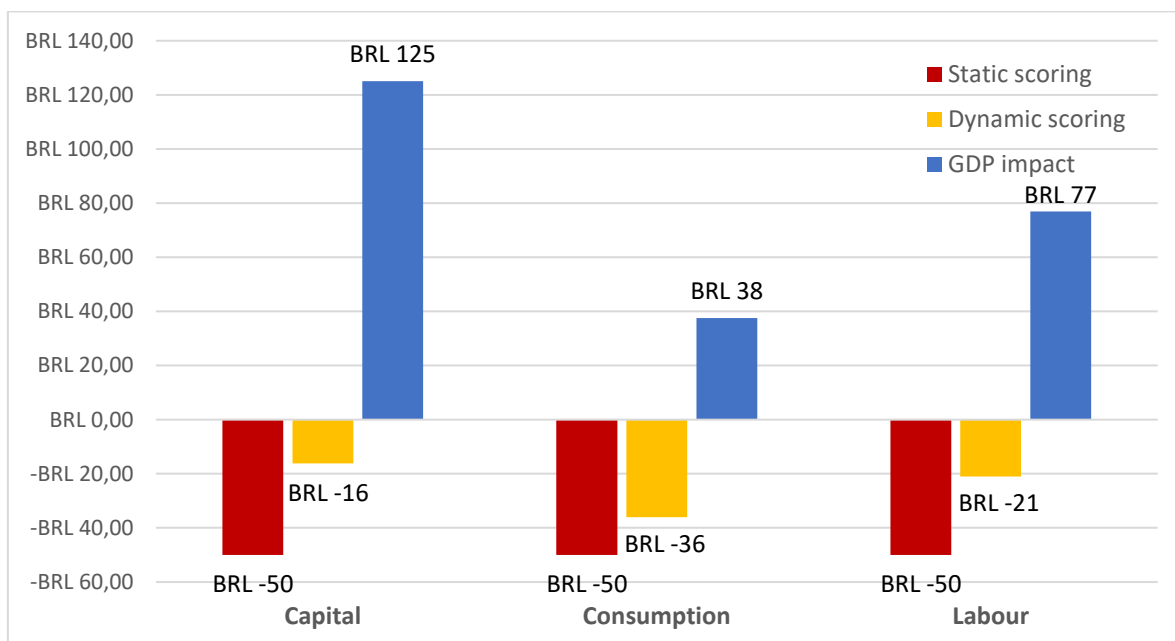
then reinforced by the legal design that imposes myopia on the decision-making process, discouraging the approval of tax rules aimed at promoting efficiency and economic growth.

In view of such findings, and to fully internalize the informational gain derived from the dynamic scoring in the decision-making process, the presentation of longer-term estimates as supplementary information could help to circumvent the normative rigidity of the control system, while ensuring to key players the best available information at their fingertips.

6.2. BRL 50 billion static loss

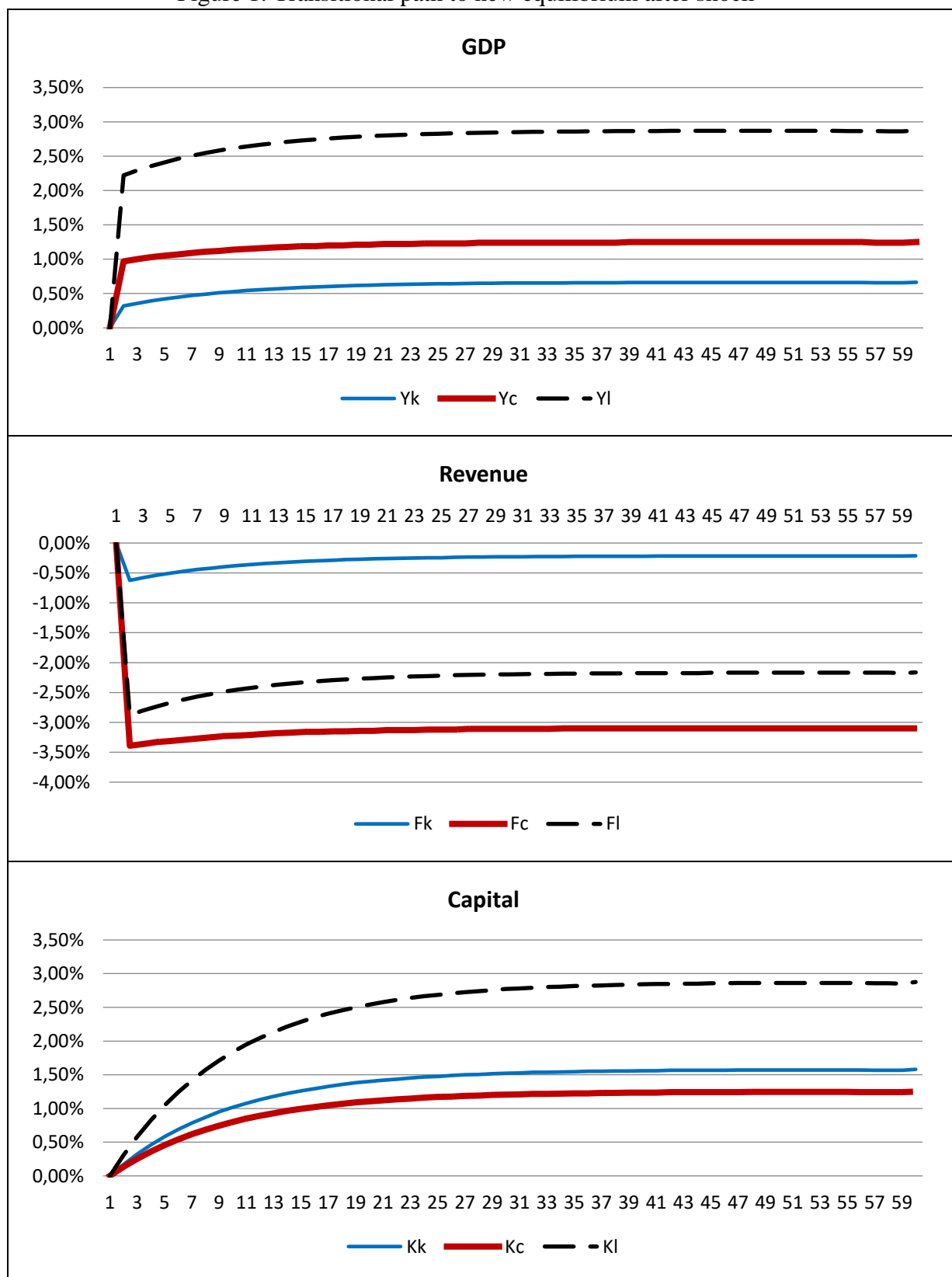
Unlike the procedure adopted in the previous subsection – when an arbitrary cut in the tax rates on consumption, labour income and capital income has been stipulated – the present simulation started from the premise that the revenue loss should be limited to BRL 50 billion (due to fiscal space requirements, for example), calculated according to conventional technique. The reductions in the rates of each tax were then calibrated so that the static result of the calculation attained that amount. According to the static scoring method, the new average tax rates would thus be 20.9% for consumption, 27.5% for labour income and 14% for capital income. With these figures in hand, we carried out a simulation using the general equilibrium model described above, to obtain dynamic estimates derived from tax changes of such magnitudes. The exercise allows the comparison between the fiscal and economic consequences, according to the choice (tax base and scoring technique) to be taken, in addition to highlighting the deficiency of the static scoring in underscore the differences, looking only at the budgetary effect, between the options for tax law changes. Chart 1 illustrates the results:

Chart 1: Impacts on revenue and GDP according to scorekeeping technique and tax base (BRL billion)



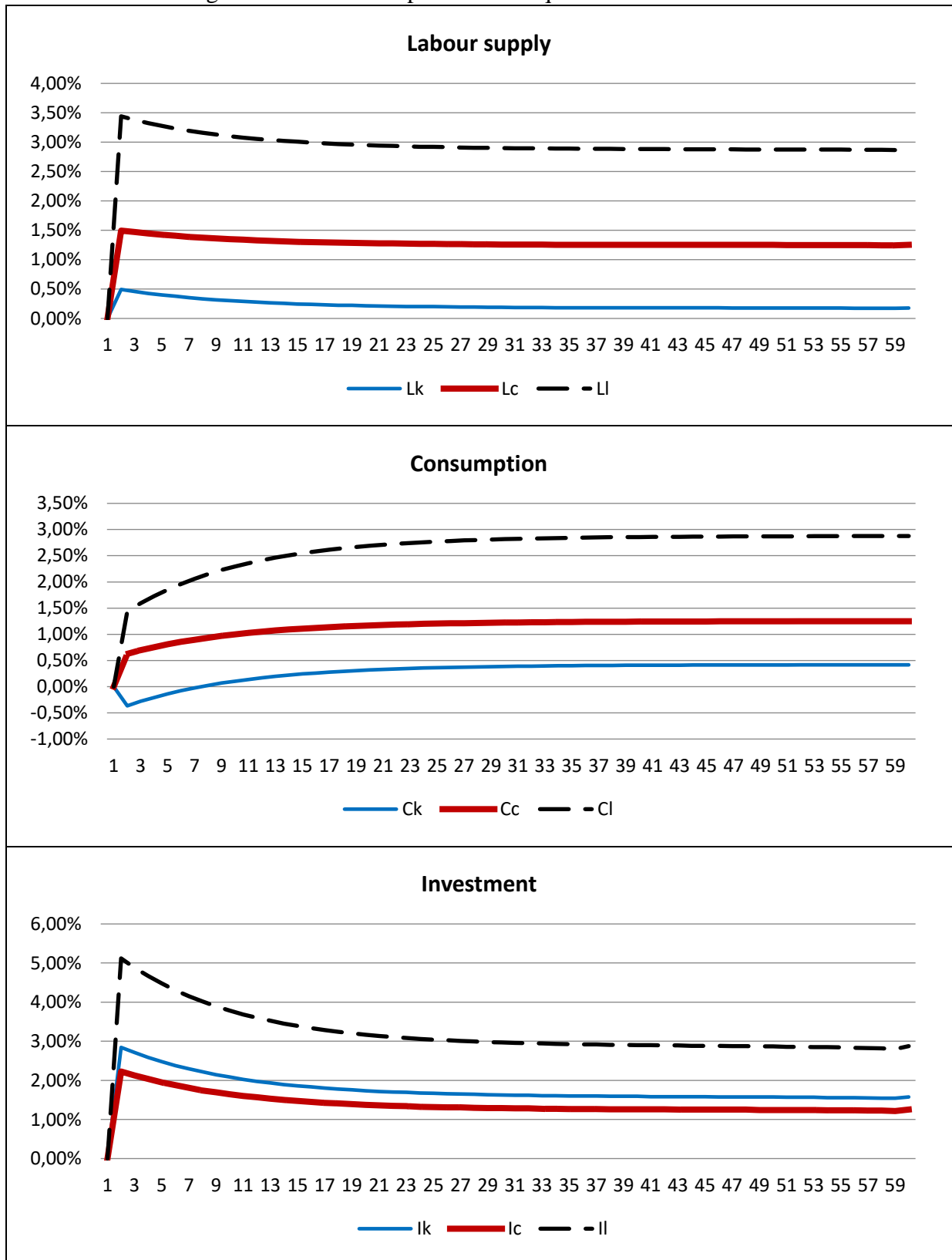
Again, and just as expected, one can see that the dynamic scoring indicates a lower revenue drop in all scenarios. More importantly, we concluded that, starting from the same base, i.e., limiting the revenue losses to BRL 50 billion (disregarding the feedback effect), the tax reduction on capital income brings about the largest gains in terms of economic growth, adding BRL 125 billion (1.81%) to the equilibrium GDP; cuts in tax rates on labour income and consumption raise GDP by BRL 77 billion (1.11%) and BRL 37 billion (0.54%), respectively. The results confirm empirical studies found in the literature, which state that taxation on capital is the most harmful for economic growth, followed by taxes on labour income and, finally, on household consumption (JOHANSON et al, 2008).

Figure 1: Transitional path to new equilibrium after shock



Note: percentage change from the pre-reform steady state; "K, c, l" designate the variables of interest following the shock in the average tax rate on capital income, consumption, and labour income, respectively.

Figure 1: Transitional path to new equilibrium after shock



Note: percentage change from the pre-reform steady state; "K, c, l" designate the variables of interest following the shock in the average tax rate on capital income, consumption, and labour income, respectively.

7. FINAL REMARKS

The tax system is a pivotal component regarding the design, implementation, and achievement of the goals established in a nation's development policy. Bearing this premise – which holds wide acceptance in economic research – in mind, the paper sought to underline the potential gains that the incorporation of dynamic scoring brings to the decision-making process, in the context of tax law changes that bring about public revenue losses.

Specifically, we proposed a comparison between the static and dynamic scoring techniques – both can be adopted when preparing fiscal impact estimates – to highlight possibilities, limits and consequences arising from the chosen method, and then contribute to enhance the fiscal control system in force in the country. To carry out this objective, a stylized and calibrated general equilibrium model to the Brazilian economy was adopted; the tool allowed for simulations, as permanent shocks, on the average tax rates on consumption, labour income and capital income, with subsequent analysis of the trajectory and magnitude of the disturbances caused on macroeconomic variables of interest.

Our results are in line with the conclusions found in literature, indicating that static scoring, by overestimating revenue losses in face of tax cuts, make it difficult the approval of measures aimed at reducing the tax burden, implying a bias on the fiscal control system: the values resulting from dynamic scoring, in terms of loss of revenue, are always lower than those calculated using the conventional method – equivalent to 73.3%, 44.2% and 31.6% of the static amount for a 10% cut in average tax rates on consumption, labour income and capital income, respectively.

Also converging with previous studies, the paper have shown that dynamic scoring allow to capture and differentiate the positive effects that reductions in the tax burden, according to the tax base, causes on capital stock, labour supply, consumption and aggregate investment, which results in higher economic growth in the long run. In effect, calculations derived from this technique (limiting the maximum revenue loss to BRL 50 billion, according to the static approach) indicate that the tax cut on capital income brings the largest gains to economic growth, adding BRL 125 billion (1.81%) to equilibrium GDP; cuts in tax rates on

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labour income and consumption raise GDP by BRL 77 billion (1.11%) and BRL 37 billion (0.54%), respectively.

Despite the aforementioned gains, the research indicated yet that the short time window (three years) imposed by the legislation to estimate and offset the budgetary effects from the tax change causes a mismatch problem between the time horizon required for the full realization of the economic effects which arise from normative innovation, and the time-related paradigm that guides the proposal's budgetary and compatibility adequacy exam. The bias that stems from the use of static scoring in the scorekeeping process ends up, thus, reinforced by the legal design that imposes myopia to the decision-making process, discouraging the edition of tax rules aimed at promoting efficiency and economic growth.

At this moment when the discussion about tax reform once again carves space in the national debate, it is even more relevant to be clear about the non-fiscal consequences that changes in the system can bring to the country's economy; at the same time, the wright measurement of fiscal consequences from legal changes is pivotal to turn the very adjustment feasible, especially in view of the public accounts imbalance experienced during the recent years. In spite the inherent hindrances, dynamic scoring contributes decisively to this noble goal, and for this reason, progress should be made to effectively adopt its practice, qualifying the debate and the political decision in the country.

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