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# ESSAYS ON FISCAL POLICY, INCOME INEQUALITY, AND ECONOMIC ACTIVITY

ENSAIOS EM POLÍTICA FISCAL, DESIGUALDADE DE RENDA E ATIVIDADE ECONÔMICA

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# Essays on Fiscal Policy, Income Inequality, and Economic Activity

Tese apresentada ao Programa de Pós-Graduação em Economia do Departamento de Economia da Faculdade de Economia, Administração, Contabilidade e Atuária da Universidade de São Paulo, como requisito parcial para a obtenção do título de Doutor em Ciências.

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*"It is a capital mistake to theorize before one has data. Insensibly one begins to twist facts to suit theories, instead of theories to suit facts."*
(Sir Arthur Conan Doyle, Sherlock Holmes, A Scandal in Bohemia, 1891.)

*"Austerity doesn't work for the REBLL alliance either, but the fact that we are still being told that it does show us one thing: facts never disconfirm a good ideology, which is why austerity remains a very dangerous idea."*
(Mark Blyth; Austerity: The History of a Dangerous Idea, 2013.)

*"Austerity is a morality play pressed into the service of legitimizing cynical wealth transfers from the have-nots to the haves during times of crisis, in which debtors are sinners who must be made to pay for their misdeeds."*
(Yanis Varoufakis; Adults in the Room: My Battle with Europe's Deep Establishment, 2017.)

**Resumo**

Esta tese de doutorado contribuiu para a literatura empírica sobre política fiscal, desigualdade de renda, e atividade econômica. O Capítulo 1 utilizou a base de dados narrativa de David e Leigh (2018) para estimar os efeitos dinâmicos das consolidações fiscais sobre a distribuição de renda a partir do método de projeções locais (Jordà 2005) para nove economias sul-americanas no período 1991-2017. Os resultados baseline sugerem que enquanto os ajustes fiscais baseados em gastos elevaram o índice de Gini com significância estatística em 2,48% no médio prazo, os baseados em tributos não mostraram efeitos estatisticamente significantes sobre a desigualdade de renda. A magnitude deste efeito foi maior do que na maioria dos estudos anteriores realizados para países da OCDE. No Capítulo 2, recorremos a documentos sobre política orçamentária para decompor a base de dados narrativa de David e Leigh (2018) para 14 economias da América Latina e Caribe entre 1989 e 2016 em ajustes baseados em tributos diretos e indiretos . No Capítulo 3, baseando-se nessa decomposição e na base de dados de Alesina et al. (2017) para países da OCDE, estimamos os impactos da austeridade baseada na elevação de tributos diretos e indiretos sobre a distribuição de renda e a atividade econômica para economias da ALC e OCDE, a partir do método de projeções locais (Jordà 2005). Para a amostra da ALC, os ajustes fiscais baseados em cortes de despesas apresentaram resultados mais adversos para a atividade econômica do que os efeitos dos choques baseados em tributos, e os episódios baseados em tributos diretos não geraram impactos significantes sobre o PIB. Em relação aos efeitos dos ajustes via tributos indiretos, as evidências foram semelhantes para ambas regiões, com queda no PIB. Em relação aos impactos sobre a distribuição de renda, enquanto ajustes baseados em tributos (gastos) reduziram (aumentaram) a desigualdade para a amostra da ALC, elas não geraram impactos sobre o índice de Gini da renda disponível para as economias da OCDE. Diferentemente, consolidações fiscais baseadas em tributos indiretos deterioraram a distribuição de renda somente para a amostra da OCDE. Considerando as questões distributivas e de atividade econômica, enquanto os episódios de austeridade baseados em cortes de despesas apresentaram piores resultados para ALC, os choques de política fiscais via tributos diretos não geraram impactos com significância estatística sobre o PIB e reduziram a desigualdade.

**Palavras-chave:** Desigualdade de renda; Atividade econômica; Ajustes fiscais; Tributos diretos; Tributos indiretos; Abordagem narrativa; Método de projeções locais.

**Abstract**

This doctoral dissertation contributed to the empirical literature on fiscal policy, income inequality, and economic activity. Chapter 1 is based on David and Leigh's (2018) narrative dataset and estimated the dynamic effects of fiscal consolidations on income inequality from Jordá's (2005) local projections method for nine South American economies in the 1991-2017 period. Baseline results suggested that while spending-based fiscal consolidations significantly increase the Gini index by 2.48% in the medium run, tax-based fiscal consolidations did not show statistically significant effects on income inequality. The magnitude of this effect was higher than in most of the previous studies carried out for OECD countries. In Chapter 2, we relied on budget policy documents to decompose David and Leigh's (2018) narrative database for 14 Latin American and Caribbean economies between 1989 and 2016 into adjustments based on direct and indirect taxes. In Chapter 3, based on this decomposition and Alesina et al.'s (2017) dataset for OECD countries and using the Local Projections method (Jordà 2005), we estimated austerity impacts based on direct and indirect taxes on income inequality and economic activity for LAC and OCDE economies. We compared these results with those of spending-based and tax-based fiscal policy shocks. For the LAC sample, fiscal adjustments based on expenditure cuts were more adverse to economic activity than the effects of tax-based policy shocks, and direct tax-based episodes did not generate significant impacts on GDP. Regarding indirect tax-based effects, results were similar for both regions, generating a drop in GDP. When it comes to the impacts on income distribution, while direct tax-based (spending-based) fiscal consolidations decreased (increased) inequality for the LAC sample, they did not generate significant impacts on the Gini index for disposable income for OECD economies. Differently, indirect tax-based fiscal consolidations deteriorated income distribution only for the OECD sample. Considering distributional and economic activity issues, while episodes of austerity based on expenditure cuts presented the worst results for LAC, direct tax-based fiscal policy shocks did not generate statistically significant impacts on GDP and reduced inequality.

**Keywords:** Income inequality; Economic activity; Fiscal consolidations; Direct taxes; Indirect taxes; Narrative approach; Local Projections method.

# List of Figures

# List of Tables

# Contents

# INTRODUCTION

Given the Great Financial Crisis' impacts on the public finances of several economies, OECD (2011) recommended implementing consolidation programs to ensure the sustainability of public debt and future growth paths. However, the fiscal adjustments seem to have negatively affected economic activity and increased these countries' debt-GDP ratio (De Long and Summers 2012; Fatás and Summers 2018). Consequently, the international economic debate began to discuss the socioeconomic implications of applying these measures in a scenario of low growth and high levels of inequality (Summers 2014; Eichengreen 2019). Given the importance of this debate, a growing empirical literature has delved into estimating the macroeconomic effects of austerity packages in developed and developing economies using different methodologies and, in some cases, considering the composition of fiscal adjustments.

On the methodological front, the econometric literature employed VAR estimations utilizing the Cyclically Adjusted Primary Balance strategy to identify the fiscal shocks, Local Projections method (Jordà 2005) based on narrative datasets that contained specific historical episodes of fiscal consolidations, among other approaches (Blanchard and Perotti 2002; Alesina and Ardagna 2010; Romer and Romer 2010; Alesina, Favero and Giavazzi 2019; Gechert, Horn and Paetz 2019; Gechert, Paetz and Villanueva 2021; Carrière-Swallow, David and Leigh 2021).

On the composition of the fiscal adjustments, tax-based fiscal consolidations presented worse results for the economic activity in OECD economies (Guajardo, Leigh, and Pescatori 2014; Alesina et al. 2017). However, would these results also apply to Latin American and Caribbean nations? Carrière-Swallow, David, and Leigh (2021) showed that spending-based measures were more contractionary for LAC countries than tax-based ones. However, bands were not statistically distinguishable in the short run (after two years). Nevertheless, considering the medium-term effects, would the difference between the impacts of fiscal adjustments based on tax increases and expenditure cuts remain without statistical significance?

Moreover, given the different implications of direct and indirect taxes on inequality, it is also necessary to carry out this decomposition to analyze the consequences of fiscal adjustments on economic activity for emerging and advanced countries. What would be the results obtained by Guajardo, Leigh, and Pescatori (2014) and Alesina et al. (2017) for tax-based fiscal consolidations if this decomposition had been carried out?

Spending-based fiscal consolidation presented deleterious distributional effects in OECD

countries (Woo et al. 2013; Furceri, Jalles, and Loungani 2016; Klein and Winkler 2018; Heimberger 2020). Understanding the impacts of fiscal consolidations on income inequality is essential, especially in a region with extreme income inequality. What are the consequences of spending and tax-based fiscal adjustments on income inequality for LAC economies?

Considering these questions, this doctoral dissertation intended to contribute to the field of research briefly described above. Based on a narrative dataset constructed by David and Leigh (2018) for annual fiscal consolidation shocks, Chapter 1 estimates the dynamic effects of fiscal consolidation episodes on income inequality based on Jordá's (2005) local projections method for nine South American economies in the 1991-2017 period. By decomposing fiscal shocks, baseline results suggest that spending-based fiscal consolidations significantly increase the Gini index. In contrast, tax-based fiscal consolidations did not show statistically significant effects on income inequality. The Gini index for disposable income rose 2.48% in eight years after a spending-based fiscal adjustment of 1% of GDP. The magnitude of this effect was higher than in most of the previous studies carried out for OECD countries. Our main finding for the impact of spending-based fiscal consolidation on inequality in the medium run was robust when using alternative control variables, lag structures, country samples, and the Cyclically Adjusted Primary Balance (CAPB) strategy for identifying the fiscal shocks.

Chapter 2 extended David and Leigh (2008)'s database by decomposing tax-based fiscal consolidations for 14 Latin American and Caribbean economies from 1989 to 2016 into direct and indirect tax-based episodes. Our approach was implemented through a careful assessment of David and Leigh's (2018) paper, IMF Staff Country Reports, budget documents, and other papers related to public finances in the countries of our sample.[1]

Chapter 3 used the extended database constructed in Chapter 2 as well as Alesina et al. (2017)'s dataset for OECD countries to estimate the impact of direct- and indirect-tax-based austerity on income distribution and economic activity for LAC and OCDE economies using the Local Projections method (Jordà 2005) and comparing these results with those of spending-based and tax-based fiscal policy shocks. For the LAC sample, spending-based fiscal adjustments were found to be more adverse to economic activity than tax-based fiscal contractions,[2] reducing GDP by 1.15% in the short run and 2.81% in the medium run. Direct tax-based episodes did not generate statistically significant impacts

[1] Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Jamaica, Mexico, Paraguay, Peru, and Uruguay.

[2] Findings on economic activity for spending- and tax-based fiscal adjustments were statistically distinguishable considering one standard error bands around the coefficients.

on GDP. Regarding indirect tax-based effects, the results were similar for both regions.[3] When it comes to the impacts on income distribution, direct tax-based (spending-based) fiscal consolidations decreased (increased) inequality by 1.66% (1.11%) in the medium run for the LAC sample, but did not generate statistically significant impacts on the Gini index for OECD economies. On the other hand, indirect tax-based fiscal consolidations deteriorated income inequality only for the OECD sample, increasing the Gini index for disposable income by 1.04% in year 8.

In this way, this dissertation contributed to the literature on austerity by bringing new evidence and providing further details on existing data related to this topic. Given that research in this field has concrete implications for the formulation of the fiscal policy of different countries, the literature must present the possible results of different compositions of tax policy. Intending to enable future work to estimate the consequences of tax-based fiscal consolidations with more detail, we provided the first narrative dataset that decomposed these episodes into direct- and indirect tax-based for Latin American and Caribbean economies, as well as Alesina et al. (2017) did for OECD countries.

Moreover, as studies of the impacts of fiscal adjustments on income inequality were previously limited to developed countries, Chapter 1 contributed to this topic by orienting the discussion to the Global South, presenting evidence for economies in South America, and estimating that the distributional impacts of spending cuts are worse than tax increases during austerity episodes.

Finally, this work intended to address other questions unanswered in the literature so far. Recent research has already found that austerity is contractionary but showed that the impacts of tax-based adjustments were more adverse than those based on spending on economic activity (Guajardo, Leigh, and Pescatori 2014; Alesina, Favero, and Giavassi 2019). Aiming to qualify this evidence, we moved forward to understand whether the composition of the tax package mattered and checked whether this result remained in our estimates. For both samples, LAC and OECD, the results indicated that indirect taxes are more harmful to the economy. Furthermore, unlike the evidence presented for rich countries, expenditure cuts were worse for economic activity when compared to increases in taxes for the LAC sample. In contrast, fiscal adjustments based on direct taxes did not show adverse results to GDP and reduced income inequality.

This evidence provides concrete implications for the formulation of economic policies in

[3]For LAC, indirect tax-based fiscal adjustments of 1% of GDP generated a 1.80% drop in GDP in year 0 and a 4.69% cumulative drop in year 7. For the OECD sample, consolidations based on indirect taxes decreased the GDP by 1.47% in the short run and 5.08% in the medium run. These results presented statistical significance.

these regions, especially for Latin America and the Caribbean, considering the recent agenda of tax reforms, adaptation to fiscal rules, and, in a broader scenario, discussion about the size of the State, questioning the ideological dogmas that establish that a reduction in budgetary capacity through spending cuts could have positive medium-term effects on economic activity.

# 1 EFFECTS OF FISCAL CONSOLIDATION ON INCOME INEQUALITY: NARRATIVE EVIDENCE FROM SOUTH AMERICA

## 1.1 Introduction

Based on the narrative dataset constructed by David and Leigh (2018) for estimating the macroeconomic effects of fiscal shocks in Latin America, this Chapter aims to measure the impacts of spending-based and tax-based fiscal consolidations on inequality using Jordá's (2005) local projections method.[4] Due to the scarcity of annual data for Gini indexes in several Latin American economies, we limited the sample to nine countries in South America (Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, and Uruguay) in the period from 1991 to 2017.

Our findings provide strong evidence of the positive impact of spending-based fiscal consolidations on income inequality for these nine countries in the medium run. The baseline results show that a reduction in government expenditures of 1% of GDP generates a 2.48% increase in the Gini index for disposable income. This general finding is robust under alternative specifications that include utilizing different control variables, lag length structures, country samples, and the Cyclically Adjusted Primary Balance (CAPB) strategy for identifying the fiscal shocks. When it comes to tax-based fiscal consolidation episodes, our evidence is not robust to a change in the country sample. Although our baseline results do not show a statistically significant impact of tax-based fiscal consolidation episodes on inequality, this effect turns positive when we exclude Bolivia from the sample.

These outcomes are presented in a context that the world emerges from the Covid-19 economic crisis with higher public debt levels, and countries in the Global South seem more likely to engage in a new round of fiscal consolidation packages amid strong market pressure. Known as the most unequal region in the world (IMF 2014), Latin America has suffered a relatively strong impact of the pandemic on health, social and economic fronts (OECD 2020) after a decade of low growth and rising inequality. The potential implementation of new austerity measures in the upcoming years raises major concerns over the impact of these policies on poverty and inequality levels in a context of high social vulnerability.

[4]This Chapter was published in a peer-reviewed journal. See Cardoso D, Carvalho L (2023) Effects of fiscal consolidation on income inequality: narrative evidence from South America. Empirical Economics 64(3): 1177-1218. https://doi.org/10.1007/s00181-022-02279-5.

Fiscal austerity can potentially contribute to a rise in income inequality through different mechanisms. One indirect channel is that wage disparities may increase as wages at the bottom respond more intensely to economic recessions caused by fiscal consolidation. Another indirect effect involves a change in income composition: households at the top of the distribution earn a relevant share of their income from the capital, while poor households receive wages or informal job earnings. As economic recessions tend to weaken the bargaining power of workers and, accordingly, reduce the share of wages in the functional distribution of income, fiscal adjustments tend to disfavor families at the bottom of the distribution. Regarding the direct impacts of fiscal policy on income inequality, results may depend on the type of adjustment measures. While cuts in social transfers, for instance, tend to disfavor individuals at the bottom of the distribution, increases in tax rates on capital income, wealth, or inheritance may reduce income inequality by decreasing the share of national income that goes to the top of the distribution.

Since the end of the commodity price boom of the 2000s and the political shift away from the so-called Pink Tide governments in South American countries (Loureiro 2018), the implementation of austerity measures (see Table 1.1) has been accompanied by a reversal in previously declining levels of income inequality in the region. In 2015 for Brazil, the Gini index for income reached its lowest level in the 21st century, 0.519, and rose to 0.538 in 2018, according to World Bank estimates. Other South American economies have experienced a similar trajectory (see Figures 1.8, 1.9, and 1.10 in the Appendix).

Especially after the Global Financial Crisis, a growing empirical literature has delved into estimating the effects of fiscal shocks on economic growth and public debt in developed and developing countries, with varying results depending on the adopted methodology, the composition of the fiscal adjustment, and the macroeconomic context. On the methodological front, the econometric literature has two main groups: studies using cyclically adjusted fiscal variables in VAR estimations (Blanchard and Perotti 2002; Alesina and Ardagna 2010); investigations based on the construction of narrative datasets containing specific historical episodes of fiscal shocks (Romer and Romer 2010; Alesina, Favero and Giavazzi 2019; Carrière-Swallow, David and Leigh 2021; Gechert, Horn and Paetz 2019; Gechert, Paetz and Villanueva 2021). Using either one of these empirical approaches, a smaller group of authors have researched the impact of fiscal shocks on income inequality.

The evidence, so far, suggests that spending-based and tax-based adjustments have contributed to a rise in income disparity (Ball et al. 2013; Agnello and Sousa 2014; Schategger and Weder 2014; Furceri, Jalles and Loungani 2016; Klein and Winkler 2019; Heimberger 2020).

However, these studies have only considered OECD countries. Our motivation to focus on Latin American economies has been twofold. First, the existing empirical findings on the effect of fiscal consolidation episodes on GDP in advanced economies already differ from the recent evidence for Latin America: in OECD countries (Alesina, Favero, and Giavazzi 2019), tax-based episodes are more contractionary, while spending-based seem to have a more negative effect on GDP in Latin America (Carrière-Swallow, David and Leigh 2021). Second, the distributive effects of fiscal policy in Latin America are weaker than in OECD countries (Goñi, López, and Servén, 2011). In contrast to the OECD progressive tax systems that rely heavily on personal income taxes and social contributions (see Tables 1.7 and 1.8 in the Appendix), the tax structure in Latin America is neutral or even regressive due to the high burden of indirect taxes (ECLAC, 2021).

The rest of this Chapter is structured as follows. Section 1.2 describes our dataset and methodology in the context of the existing empirical literature on the effects of fiscal austerity. Section 1.3 presents and discusses our baseline results. Section 1.4 tests the robustness of our findings based on alternative specifications, lag structures, samples, and identification strategies. Section 1.5 concludes.

## 1.2 Data and Methodology

### 1.2.1 Identification of fiscal shocks: statistical vs. narrative approach

In the 1990s and early 2000s, the growing empirical literature on the macroeconomic effects of fiscal policy shocks employed the so-called statistical or Cyclically-Adjusted Primary Balance approach (CAPB) (McDermott and Wescott, 1996; Lambertini and Tavares, 2005; Alesina and Ardagna, 2010). In short, the CAPB adjusts the budget balance to account for the effects of the business cycle on government revenues and expenditures. For instance, this method would avoid identifying a regular cyclical fall in government revenues as a fiscal expansion episode. As a result, when observed GDP is lower (higher) than potential, the fiscal balance would be adjusted upward (downward).

However, this approach has been questioned since the beginning of the 2010s. Devries et al. (2011) suggested endogeneity problems in the cyclical adjustment method due to the intrinsic correlation between such measures and economic fluctuations. In addition, even if fluctuations in the CAPB could accurately reflect discretionary changes in fiscal policy, the intrinsic motivation for these movements may be related to a response to cyclical

fluctuations.[5] In this case, causality would run from the economic cycle to fiscal policy. For instance, governments may cut spending when the economy overheats. In addition, unemployment insurance and other categories of social benefits will respond to the economic cycle, linking recessions to an increase in these types of spending.

Based on the case of Finland in the 2000s, which implemented a fiscal consolidation not captured by the CAPB in a context of strong economic growth and a boom in asset prices, Ball et al. (2013) argue that this approach ignores the motivations behind fiscal actions.[6] Additionally, Agnello and Sousa (2014, 2016) criticize the arbitrary nature of the statistical smoothing technique used to neutralize the impact of the economic cycle on fiscal indicators and the unrealistic assumption of a constant elasticity of budgetary components relative to economic activity.

Other authors developed similar criticisms to the statistical approach and utilized alternative methods to identify fiscal shocks (Woo et al. 2013; Schaltegger and Wedder 2014; Furceri, Jalles, and Loungani 2016, 2018; Jalles 2017; Klein and Winkler 2019; Heimberger 2020). In particular, based on the work of Devries et al. (2011), inspired by Romer and Romer (2010), the narrative approach arguably reduces the recognized endogeneity problems in the CAPB method by focusing on specific historical episodes of fiscal consolidation. These episodes are identified from the actions and intentions of policymakers as described in official documents such as the IMF's Recent Economic Development and Staff reports, the OECD Economic Surveys, and other historical records. To avoid the endogeneity problem, only policy actions that explicitly intend to reduce the budget deficit and respond to past economic conditions - not prospective ones - are included in the database.[7]

This procedure intends to eliminate endogenous responses of fiscal policy to economic fluctuations, capture the decision components of policymakers primarily related to the reduction of the budget deficit, and exclude other political, economic, and institutional factors that may motivate fiscal consolidations. As the effect of the fiscal consolidation on the budget balance is recorded in the year that the adjustment occurs, the announced policy measures that end up not being implemented are not included in the database.

[5] Cyclical adjustment methods fail to remove the impact of high fluctuations in economic activity and asset prices from fiscal data, generating changes in the CAPB not necessarily linked to fiscal policy. For instance, a boom in the stock market raises the CAPB through tax revenues generated by capital gains. A commodity price boom can stimulate private investment and raises cyclically adjusted government revenues (David and Leigh 2018).

[6] If a fiscal adjustment is itself a response to pressures generated by strong domestic demand, then it does not make sense to estimate the effects of fiscal policy through this approach.

[7] Therefore, the fiscal shocks identified from this strategy should not result from other economic fluctuations.

Finally, this strategy also facilitates decomposing fiscal adjustments into spending-based or tax-based episodes, allowing for a more refined understanding of the different impacts of austerity.

It is worth mentioning that Devries et al.'s (2011) approach also has some disadvantages. Jordà and Taylor (2016) suggested that the strategy depends on the subjective judgment of those who build the database and may not eliminate the endogeneity problem. Escolano et al. (2014) express concern over utilizing many different sources with potentially incompatible methodologies to obtain estimates of the budgetary impact of fiscal policy actions.

While we have chosen to adopt a narrative approach in our baseline estimations, we have also tested the CAPB conventional approach as a robustness check. As it comes out, our main findings – namely that spending-based fiscal consolidations significantly raise income inequality in the medium run – are similar when using narrative and statistical approaches (see section 4.3).

### 1.2.2 Database

The narrative dataset constructed by David and Leigh (2018) includes fiscal consolidation episodes for 14 Latin American economies between 1989 and 2016. The authors examine the intentions and actions of policymakers as described in contemporaneous policy documents and identify measures motivated primarily by deficit reduction and long-term fiscal health objectives. Such fiscal actions do not respond to developments that affect the economic activity in the short run and, therefore, we use them as exogenous shocks in the estimation of the impacts of fiscal adjustments.

Historical sources examined by the authors include reports by multilateral institutions, such as IMF Staff Reports and the OECD Economic Surveys, budget documents[8], as well as reports by Central Banks. In some cases, they supplemented these sources with information from Working Papers or other research documents.

David and Leigh (2018) have not considered some observed shocks in these countries between 1989 and 2016 because they are potentially endogenous to the business cycle. For instance, if consolidation is motivated primarily by restraining domestic demand or in response to an economic contraction, they included its occurrence in the paper but did not include it in the database.[9] To deal with potential measurement errors related to the

[8]Such as the Informe de Finanzas Publicas from Chile and Paraguay, Marco Fiscal de Mediano Plazo from Colombia, Criterios Generales de Política Económica from Mexico, and Marco Macroeconomico Multianual from Peru.

[9]"An increase in the VAT rate by 3 percentage points with an estimated revenue yield of 2 percent of

projected budgetary impact of the shocks, David and Leigh (2018) utilized other documents and retrospective descriptions of fiscal actions to adjust the dataset and consider announced measures not fully implemented.

Our database combines David and Leigh's (2018) narrative dataset with data on inequality. Because income inequality indicators rely on national sources, such as household sampling surveys or household budget surveys, there are difficulties in making international comparisons. In light of these difficulties, the literature that focuses on the distributional impacts of fiscal shocks converges on the use of the Standardized World Income Inequality Database (SWIID), which provides information on the Gini index for market income and disposable income for a sample of 196 countries from 1960 to 2018 (Solt, 2019). Based primarily on the Luxembourg Income Study (LIS) data, this dataset utilizes a Bayesian approach to standardize observations obtained from different sources.[10] Woo et al. (2013) considered SWIID the best available database when considering both coverage and quality of the data.

Among the authors who estimated the impacts of fiscal consolidations on income inequality (Agnello and Sousa 2012, 2014, 2016; Ball et al. 2013; Woo et al. 2013; Schaltegger and Weder 2014; Furceri, Jalles, and Loungani 2016; Furceri et al. 2018; Klein and Winkler 2019; Heimberger 2020), only Agnello and Sousa (2016) employed a different database due to their focus on European regional inequality.

Based on the (low) availability of data for the Gini index for disposable income and fiscal shocks, we were able to construct a panel with nine countries (Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, and Uruguay) for the period between

GDP was implemented in Argentina in 1995 with the objective of reducing the fiscal deficit in the context of a loss of confidence in debt markets. In line with Gunter et al. (2017), we consider that this episode was primarily motivated by responding to a fall in confidence and a large capital outflows. Therefore, we do not record it as fiscal consolidation motivated primarily by deficit-reduction and medium-term fiscal sustainability considerations" (David and Leigh 2018: 8).“An adjustment program aimed at reducing very high inflation with 1.5 percent GDP in tax measures and 2.5 percent of GDP in expenditure cuts was implemented in Brazil in 1990. This episode was determined to be related to cyclical conditions and was not included in the database. According to the 1991 Recent Economic Developments report (SM 91/201) page 26: “In 1990 tax revenue of the Central Administration (excluding earmarked social taxes) increased by 1.5 percentage points of GDP as a result of measures implemented in March". Same report page 30 states that: “Expenditure (excluding outlays shifted to the expanded Social Security Budget) declined by 10.5 percentage points of GDP in 1990 (see Table 1.5); most of the decline (8 percentage points) reflected the effect of negative real interest payments on domestic debt and the remainder resulted from cutbacks in current and capital transfers to public enterprises and a number of measures related to the administrative reform". The 1993 Recent Economic Developments report (SM 93/125) sheds light on the motivation of the adjustment program on page 4: “Upon assuming office in March 1990 the new Administration introduced an economic program (the Collor I Plan) that aimed at bringing about a sharp drop in inflation, which had reached 72 percent per month in February" (David and Leigh 2018: 12).

[10]Such as the OECD Income Distribution Database, the Socio-Economic Database for Latin America and the Caribbean (CEDLAS), Eurostat, World Bank PovcalNet, and others.

1991 and 2017. We present information and descriptive statistics related to annual fiscal consolidation shocks included in our panel in Tables 1.1 and 1.2.

Table 1.1: Annual fiscal consolidation shocks between 1991 and 2016, year of implementation

| **Country** | **Spending-based fiscal consolidations** | **Spending-based fiscal expansions** | **Tax-based fiscal consolidations** | **Tax-based fiscal expansions** |
|---|---|---|---|---|
| Argentina | | | 1996, 1997 | |
| Bolivia | | | 1995, 2004, 2005 | |
| Brazil | 2015 | | 2015 | |
| Chile | 2003 | 2008 | 1991, 2004, 2014, 2015, 2016 | |
| Colombia | 2000, 2015, 2016 | | 2003, 2011, 2012 | |
| Ecuador | 1993 | | 1993, 2000 | |
| Paraguay | 2001, 2016 | | 2001, 2003, 2004, 2014 | 2005, 2006 |
| Peru | | | 1992, 2002, 2003, 2012 | 2011 |
| Uruguay | 1995, 2000, 2002, 2003, 2015 | | 1995, 1996, 2002, 2003 | 2004, 2005 |

Source: Based on David and Leigh (2018).

Table 1.2: Annual fiscal shocks between 1991 and 2016 with descriptive statistics

| | **Number of annual shocks** | **Average size (% do GDP)** | **Min size (% GDP)** | **Max size (% GDP)** |
|---|---|---|---|---|
| **Consolidation** | 35 | 0.95 | 0.1 | 4.1 |
| Tax-based | 29 | 0.8 | 0.1 | 4.1 |
| Spending-based | 13 | 0.75 | 0.2 | 1.7 |
| **Expansion** | 6 | -0.6 | -0.38 | -0.9 |
| Tax-based | 5 | -0.62 | -0.38 | -0.9 |
| Spending-based | 1 | -0.5 | -0.5 | -0.5 |

Source: Based on David and Leigh (2018).

A detailed description of fiscal shocks is available in Table 1.9 in the Appendix, which sets out the countries, years, implemented measures, and estimated budgetary impact for each observation. We show the relationship between fiscal shocks and the Gini index for the nine countries of the sample in Figures 1.8, 1.9, and 1.10 in the Appendix.

### 1.2.3 Econometric strategy

Regarding econometric methods to estimate the distributive impacts of fiscal adjustments, one can distinguish between (i) static models, such as Seemingly Unrelated Regressions

(SUR) or panel data with fixed effects estimators; and (ii) dynamic models, such as Autoregressive Distributed Lag (ARDL), or Panel Vector Autoregressive (PVAR), or Local Projections (LP) method (Jordà 2005) to estimate Impulse Response Functions (IRFs). This section shows how the literature has evolved over the past few years to widespread use of Jordà's (2005) method.

In order to estimate contemporaneous impacts of fiscal consolidations on income inequality, several authors applied static models. While Agnello and Sousa (2012, 2014) employed Seemingly Unrelated Regressions (SUR) as a baseline model, Jalles (2017) and Woo et al. (2013) utilized SUR as a complement to their main strategies. This method consists of estimating two regressions – one for the Gini index for disposable income and another for the Gini index for market income (the errors of these equations are considered correlated). If the unobserved determinants of these two indexes are correlated, the SUR estimator is an efficient and plausible strategy.

Several authors applied static models to estimate the contemporaneous impacts of fiscal consolidations on income inequality. While Agnello and Sousa (2012, 2014) employed Seemingly Unrelated Regressions (SUR) as a baseline model, Jalles (2017) and Woo et al. (2013) utilized SUR as a complement to their main strategies. Other authors applied panel data models with fixed effects as their baseline strategy (Woo et al. 2013; Schaltegger and Wedder 2014). This method allows us to account for unobservable factors that do not vary over time for each sample unit or do not vary between countries for each temporal unit. However, as distributional impacts of fiscal consolidation tend to change over time, static approaches may not be sufficient.

Among available alternatives utilized to capture the dynamic effects of fiscal consolidations, one possibility is to apply IRFs from Panel Vector Autoregressive models (PVAR), but this method has several weaknesses. Jalles (2017) observed that the intrinsic characteristics of the PVAR models, such as the endogeneity of relevant regressors generating narrowness, would imply an accurate ordering of each regressor to estimate the system, although economic theory rarely provides this information.[11] In addition, while a VAR model represents a linear global approach to the actual data-generating process, it is optimally designed to project one period ahead. The shift of all measurement errors or misspecifications of the model over time hinders the interpretation of IRFs. Thus, the PVAR traditional approach may suffer from identification problems and length limitations (Heimberger 2020).

[11] Choleski decomposition is often used as a solution to this issue, although it has no value to provide structural information to a VAR.

Utilizing Autoregressive Distributed Lag (ARDL) is suggested by several authors in order to account for dynamic effects (Ball et al. 2013; Furceri, Jalles, and Loungani 2016; Jalles 2017; Furceri et al. 2018; Heimberger 2020). However, as stated by these authors, the IRFs derived from this approach tend to be sensitive to the number of lags in the model, which generates potential instability in the face of slight changes. Furthermore, when the dependent variable is highly persistent, which is the case of the Gini index, then the significance of long-lasting effects can be simply driven by the use of one-type-of-shock models, i.e., the response of the dependent variable will be the same over time, regardless of the presence of shocks in the system.

The literature has recently converged towards utilizing the Local Projections approach to address these issues on the estimation of IRFs (Ball et al. 2013; Furceri, Jalles, and Loungani 2016; Jalles 2017; Furceri et al. 2018; Klein and Winkler 2019; Heimberger 2020). Jordà (2005) derived the local projections from sequential regressions of the endogenous variable shifted several steps ahead, similarly to direct forecasts in several stages. Therefore, these projections are "local" to each forecast horizon and more accurate than projections derived from PVARs (Klein and Winkler 2019). Different from ARDL models, the method of Jordà (2005) does not use lags of the dependent variable to derive the IRFs (Ball et al. 2013; Jalles 2017), allowing to estimate the confidence intervals of these impulse responses directly from the standard errors of the coefficients, without the need for Monte Carlo simulations (Furceri, Jalles, and Loungani 2016; Heimberger 2020).

In other words, the estimation of VARs is based on the sample and represents a global linear approximation that can be optimally designed for a period ahead even when misspecified. However, an impulse response is a function of predictions in increasingly distant horizons, which causes the aggravation of the specification errors over time. In contrast, the Local Projections method relies on sequential regressions of the dependent variable shifted to horizons ahead, thus generating consistent estimates of the impulse response coefficients. The Local Projections may be estimated from usual techniques, such as Ordinary Least Squares (OLS), and are robust to specification errors.[12]

Hence, as in several other studies on the same topic (see Table 1.3), we have adopted Jordà's (2005) Local Projections method in our baseline estimations.

[12]Accordingly, the impulse responses calculation for a time series vector based on Local Projections does not require an identical specification for the Data Generating Process (DGP). Thus, this method is appropriate when the DGP is unknown.

Table 1.3: Summary of econometrics studies on the effects of fiscal policy

| **Authors** | **Gini Database** | **Identification of Fiscal Shocks** | **Sample (Years)** | **Econometric Method** |
|---|---|---|---|---|
| Agnello and Sousa (2012) | SWIID | CAPB | 18 OECD economies (1970 - 2010) | SUR |
| Ball et al. (2013) | SWIID | Narrative approach | 17 OECD economies (1978 - 2009) | IRFs from LPs |
| Woo et al. (2013) | SWIID | Narrative approach | 17 OECD economies (1978 - 2009) | FEE, SUR |
| Agnello and Sousa (2014) | SWIID | Narrative approach | 18 OECD economies (1978 - 2009) | SUR |
| Schaltegger and Weder (2014) | SWIID | Narrative approach | 17 OECD economies (1978 - 2009) | FEE |
| Guajardo, Leigh and Pescatori (2014) | | Narrative shocks / CAPB | 17 OECD economies (1978 – 2009) | 2SLS / Panel VAR |
| Agnello et al. (2016) | ERD | Narrative approach | 13 European countries (1980 - 2008) | FEE |
| Furceri, Jalles and Lougani (2016) | SWIID | Narrative approach | 17 OECD economies (1978 - 2009) | IRFs from LPs |
| Jalles (2017) | Milanovic (2014) | CAPB | 28 emerging economies (1980 – 2014) | SUR / IRFs from LPs |
| Furceri et al. (2018) | SWIID | Forecast errors in goverment spending[a] | 103 emerging economies (1990 – 2015) | IRFs from LPs |
| Klein and Winkler (2019) | SWIID | Narrative approach | 17 OECD economies (1980 – 2011) | IRFs from LPs |
| Heimberger (2020) | SWIID | Narrative approach[b] | 17 OECD economies (1978 - 2013) | IRFs from LPs |
| Carrière-Swallow, David and Leigh (2021) | | Narrative approach | 14 Latin American and Caribbean (LAC) economies (1989 – 2016) | IRFs from LPs |

Note:
CAPB: Cyclically-Adjusted Primary Balance approach.
SWIID: Standardized World Income Inequality Database.
ERD: European Regional Database.
IRFs from LPs: Impulse Response Functions from Local Projections (Jordà 2005).
SUR: Seemingly Unrelated Regressions model.
FEE: Panel data with Fixed Effects Estimator.
a: Auerbach and Gorodnichenko (2013).
b: Based on Devries et al. (2011) and Alesina et al. (2015) databases.

Our regressions are estimated from Ordinary Least Squares (OLS) on a panel with fixed effects for countries and time, along with Driscoll-Kraay standard errors to account for heteroscedasticity, serial and spatial autocorrelation. Thus, the OLS estimators are consistent and unbiased. For each period $h$, we estimated the following equation:

$$y_{i,t+h} - y_{i,t} = \sum_{k=0}^{2} \beta_k^h X_{i,t-k} + \sum_{j=0}^{1} \delta_j^h \Delta y_{i,t-j} + \rho^h Z_{i,t} + \alpha_i^h + \gamma_t^h + \varepsilon_{i,t+h}. \quad (1)$$

Where $h = 1, \ldots, 8$, such as in studies for OECD countries; $y$ denotes the Gini index for disposable income, in log; $\Delta y$ is the change in the Gini index for disposable income, in log, including two lags of this measure in the baseline specification; $X$ is the measure of fiscal consolidation, as a percentage of GDP; $Z$ is a vector of additional control variables used in robustness checks that deal with potentially omitted variables, including one lag of the real GDP growth rate, one lag of the change in real GDP per capita, one lag in the change in the unemployment rate, and one lag in the change in trade openness as measured by the sum of exports and imports relative to GDP. The equation also includes time (${\gamma^h}_t$) and country (${\alpha^h}_i$) fixed effects.

Note that ${\beta_0}^h$ corresponds to the cumulative response of income inequality to the fiscal shock in a given horizon, i.e., the estimated multiplier. We addressed reverse causality by estimating the distributional effect in periods after a consolidation shock (Ball et al. 2013) and constructed IRFs by plotting the estimated ${\beta_0}^h$ for $h = 1, \ldots, 8$, with confidence intervals (see Figure 1.1). Bands around the IRFs are associated with the standard deviations from the estimated coefficients ${\beta_0}^h$.

Table 1.4 shows the information on the explanatory variables of the model. The model specification is related to the previous studies that applied Jordá's (2005) method for the same purpose (Ball et al. 2013; Furceri, Jalles, and Loungani 2016; Furceri et al. 2018; Klein and Winckler 2019; Heimberger 2020).

Table 1.4: Our explanatory variables

| **Variable** | **Description** | **Source** |
|---|---|---|
| Change in the income inequality measure | First difference of the log of the Gini index for disposable income. | SWIID 8.2. |
| Fiscal consolidation measure | Fiscal shock measures (total, or spending-based, or tax-based, as a % of GDP) for 9 South American countries between 1989 and 2016. | David and Leigh (2018). |
| Real GDP growth rate[a] | First difference of the log of real GDP | WDI – World Bank. |
| Change in real GDP per capita[b] | First difference of the log of real GDP per capita | WDI – World Bank. |
| Change in unemployment rate | First difference of the unemployment rate | International Labour Organization – ILOStat database. |
| Change in trade openness | First difference of the following relation: Exports of goods and services (% of GDP) + Imports of goods and services (% of GDP). | WDI – World Bank. |

Note:
a: Real GDP is denominated in US dollars in 2010 prices.
b: Real GDP per capita is denominated in US dollars in 2010 prices.

We implemented unit root tests to verify the stationarity of the model variables in baseline estimations and robustness checks. Note that fiscal variables assume a value equal to zero in the absence of consolidation shocks. Tables 1.10, 1.11, and 1.12 in the Appendix present the results of the Levin-Lin-Chu[13] (LLC) tests.

## 1.3 Baseline results

By following the econometric strategy outlined in section 2.3, we estimated the distributional effects of an annual fiscal consolidation shock. In Figure 1.1, we obtained IRFs based on local projections by plotting the consolidation coefficients ${\beta_0}^h$ for each future time $h$, and utilized one standard error bands associated with them, allowing for comparability with previous studies (Ball et al. 2013; Furceri, Jalles and Loungani 2016; Heimberger 2020). Grey areas in the IRF plots indicate the confidence intervals.

Therefore, IRFs show the estimated response of income inequality as measured by the Gini index to an annual fiscal consolidation shock of 1% of GDP. The local projection is

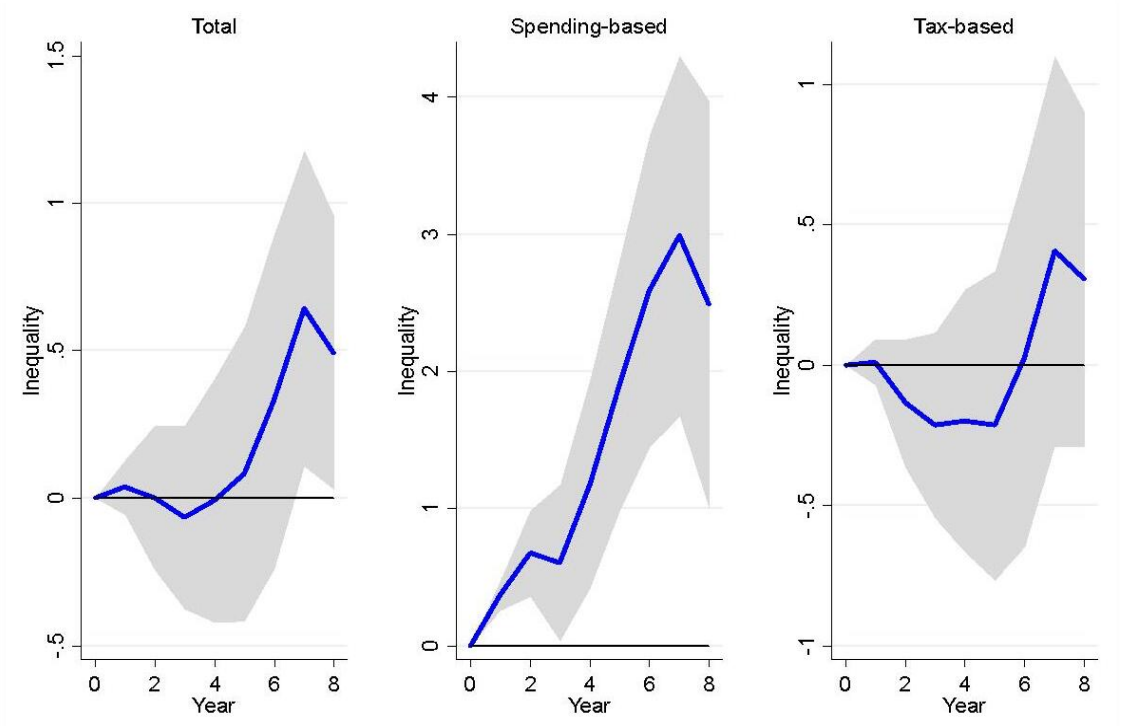
[13]It has an alternative hypothesis of stationarity. This test is suggested when "(n/t) $\rightarrow$ 0" along with balanced panels, which is the case in our study.

carried out from year zero to year eight, with the first impact of the shock appearing in the first year.

Figure 1.1 suggests that an annual fiscal consolidation shock has long-lasting effects on income inequality. Tables 1.13, 1.14, and 1.15 in the Appendix present more details on the magnitude of this impact, including the coefficients of the lagged dependent variable and their standard deviations. The Gini index for disposable income increases by about 0.037% in the short run, for year 1, after a fiscal consolidation shock of 1% of GDP. In the medium run, for year 8, the increase in inequality reaches almost 0.493%, being statistically significant.

Moreover, results for the baseline model indicate a strong and statistically significant impact of spending-based fiscal consolidations on income distribution. While a spending-based adjustment of 1% of GDP increases income inequality by 0.365% in the short run, it rises by 2.485% in the medium run, with statistical significance. In contrast, the impact of tax-based fiscal consolidations on inequality is smoother, increasing by 0.01% for year 1, and by 0.3% in the accumulated for year 8, and it was not statistically significant.

Figure 1.1: Cumulative Response of Inequality (change in %) to a fiscal consolidation of 1% of GDP – baseline results - IRFs




Note: Grey areas represent one standard error bands around the coefficients.

Table 1.5 shows that spending-based fiscal consolidations in South America have a higher effect on inequality than in 8 out of 10 studies in our literature review.

Table 1.5: Results observed in the empirical literature

| **Authors** | **Consolidation of 1% of GDP or dummy for consolidation episode** | **Spending-based adjustment (1% of GDP or dummy for consolidation episode)** | **Tax-based adjustment (1% of GDP or dummy for consolidation episode)** |
|---|---|---|---|
| Agnello and Sousa (2012) | Reduction of 0.011 in the Gini index. | - | - |
| Ball et al. (2013) | Increase in the Gini index for disposable income: 0.2 ppt., after 2 years; ∼0.9 ppt., after 8 years. | Increase in the Gini index for disposable income: ∼0.9 ppt., after 8 years. | Increase in the Gini index for disposable income: ∼0.9 ppt., after 8 years. |
| Woo et al. (2013) | Increase in the Gini index for disposable income: 0.13 ppt., after 2 years; 0.4 ppt., after 5 years. | Increase in the Gini index for disposable income: 1.5%. With statistical significance. | Negative relationship, but with no statistical significance. |
| Agnello and Sousa (2014) | Increase in the Gini index for disposable income: 0.026. | Increase in the Gini index for disposable income: 0.035. | Increase in the Gini index for disposable income: 0.004. |
| Schaltegger and Weder (2014) | Increase in the Gini index for disposable income: 0.4 ppt. | Increase in the Gini index for disposable income: 0.609 ppt. | Increase in the Gini index for disposable income: 0.28 ppt. |
| Agnello et al. (2016) | Increase in the Gini index: 0.1, after 1 year; 0.3, after 5 years. | Increase in the Gini index: 0.2, after 1 year; 0.5, after 5 years. | Fiscal consolidations seem to be neutral both in the short and medium terms, with no statistical significance. |
| Furceri, Jalles and Lougani (2016) | Increase in the Gini index: 0.2, after 1 year; 0.9, after 8 years. | Increase in the Gini index for disposable income: ∼0.21 ppt., after 1 year; ∼0.77 ppt., after 8 years. With statistical significance. | Increase in the Gini index for disposable income: ∼0.21 ppt. (after 1 year); ∼0.92 ppt. (after 8 years). With statistical significance. |
| Jalles (2017) | Increase in income inequality: 0.65 ppt., after 1 year; 0.8 ppt., after 3 years. | Increase in income inequality: 2.3 ppt., after 1 year; 3.2 ppt., after 4 years. | Decrease in income inequality: -0.8 ppt. (after 1 year); -2.6 ppt. (after 4 years). |
| Furceri et al. (2018) | - | Increase in income inequality: ∼1 ppt., after 5 years. | - |
| Klein and Winkler (2019) | Increase in the Gini index for disposable income: 0.42, after 4 years. | Increase in the Gini index: with high debt after 4 years, 2.9; with low debt after 4 years, 0. | Increase in the Gini index: with high debt after 4 years, 1.5; with low debt after 4 years, 0. |
| Heimberger (2020) | Increase in the Gini index for disposable income: 0.35 ppt., after 3 years; 0.6 ppt., after 5 years. | Increase in the Gini index for disposable income: 0.5 ppt., after 3 years; ∼0.4 ppt., after 8 years. With statistical significance. | Increase in the Gini index for disposable income: 0.2 ppt., after 3 years; ∼0.3 ppt., after 8 years. With statistical significance. |
| This study (baseline)[14] | Increase in the Gini index for disposable income: 0.03% (0.012 ppt.), after 1 year; 0.493% (0.21 ppt.), after 8 years. | Increase in the Gini index for disposable income: 0.365% (0.155 ppt.), after 1 year; 2.48% (1.056 ppt.), after 8 years. With statistical significance. | Increase in the Gini index for disposable income: 0.01% (0.004 ppt.), after 1 year; 0.3% (0.12 ppt.), after 8 years. With no statistical significance. |

## 1.4 Robustness checks

To assess the sensitivity of our baseline results for changes in the estimation, we performed several robustness checks. Besides testing for different country samples, lag structures, and control variables, we employed CAPB to identify fiscal shocks and applied the Local Projections Instrumental Variable approach of Ramey and Zubairy (2018).

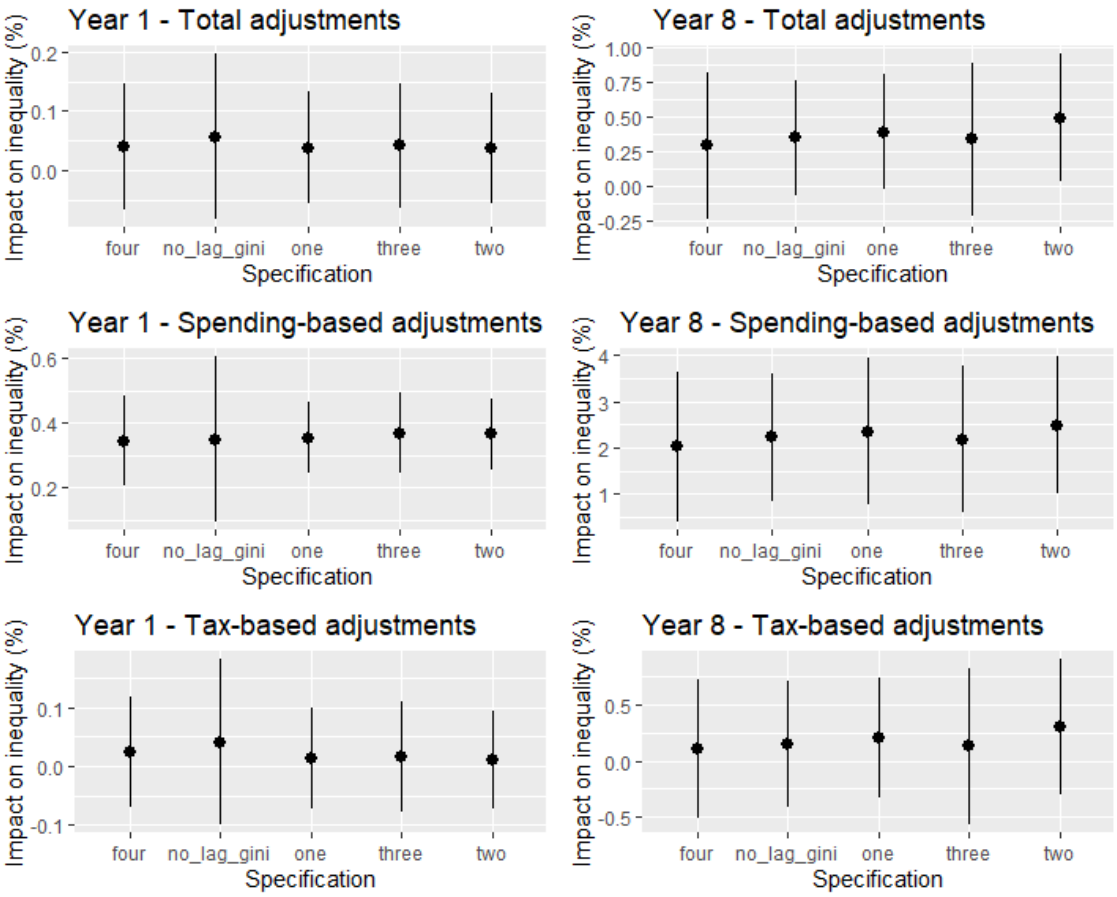
When it comes to the medium-run effect of spending-based fiscal adjustments, our main finding was robust for all specifications, samples, and methods, increasing income inequality with statistical significance. When it comes to the impact of tax-based fiscal consolidations, which appeared not to be statistically different from zero in the baseline, the results changed in the sample that excluded Bolivia or outliers for fiscal shocks. Short-run results for year 1, along with the effect of total fiscal consolidations, also varied depending on the method, country samples, and control variables used in the estimations.

### 1.4.1 Alternative specifications

Our baseline model considered two lags of the change in income inequality on the right-hand side of the equation (1), allowing for comparability with previous studies (Ball et al. 2013; Woo et al. 2013; Furceri, Jalles, and Loungani 2016; Jalles 2017; Heimberger 2020). To verify the robustness of the results presented in section 3.2 for the choice of the lag structure, we tested for five different specifications, with one that does not include the change in income inequality as an explanatory variable and four specifications that included lags from the change in the Gini of disposable income. These specifications were named “no_lag_gini", “one", “two" (baseline), “three", and “four", representing the number of included lags of this variable.

As shown in Figure 1.2, our main baseline results are robust in all these estimations, except for the impact of total fiscal consolidation in year 8. While spending-based fiscal consolidation shocks raised income inequality in the short and medium run, tax-based fiscal adjustments did not present statistical significance when considering one standard-error band around the estimated coefficients.

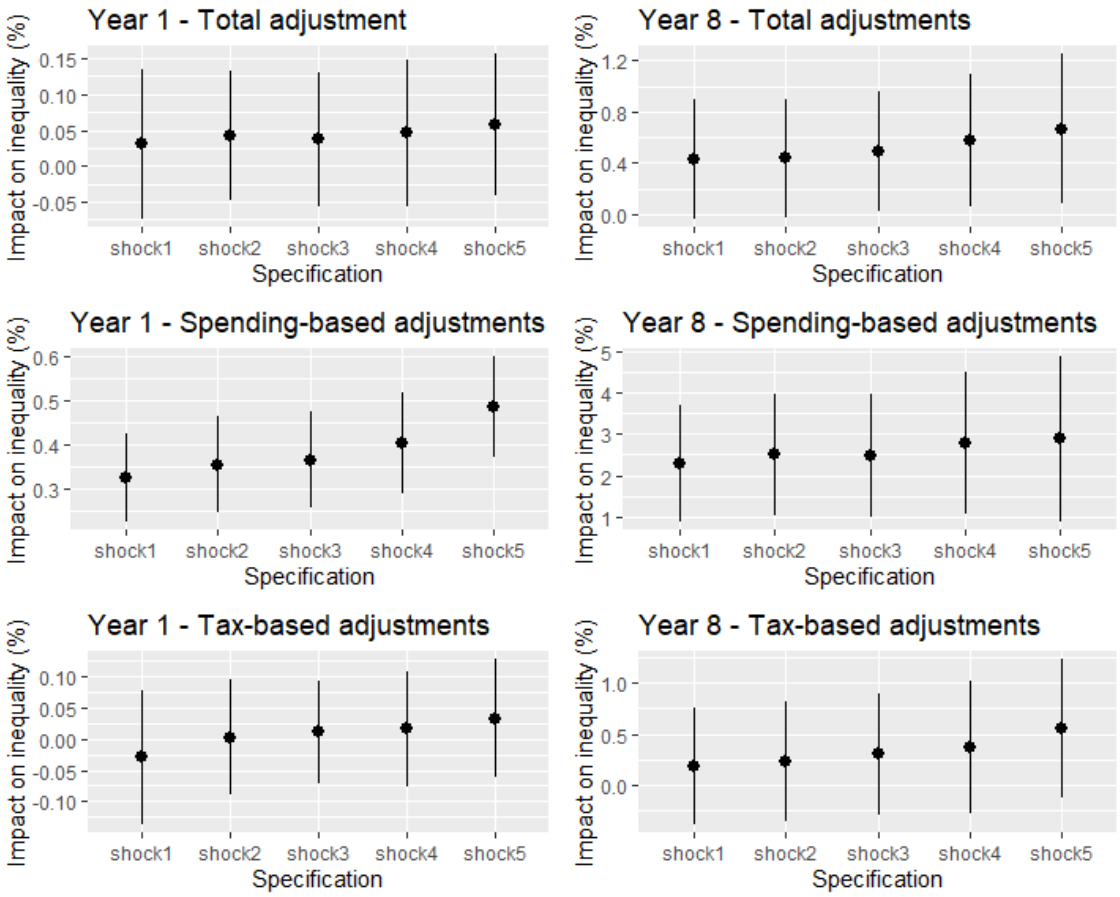
Figure 1.2: Impact of a 1% of GDP fiscal consolidation on income inequality, different lags of change in income inequality, year 1 and accumulated for year 8




Note: The figure presents the estimated coefficients in each specification and one standard error bands around them.
The X-axis indicates the number of lags of the change in Gini of disposable income used in each specification, with “two" as the baseline.

We also tested whether the results are robust for different lag lengths of fiscal shocks. Figure 1.3 presents the results of these checks and the respective nomenclature for the specifications "shock1", "shock2", "shock3" (baseline, with three lags), "shock4", and "shock5", with the suffix indicating the number of lags utilized in each of them. While spending-based fiscal consolidation shocks increased income inequality for year 1 and 8, tax-based adjustments did not yield a statistically significant effect. Again, baseline results for total fiscal consolidation effects were not robust in these tests for year 8.

Figure 1.3: Impact of a 1% of GDP fiscal consolidation on income inequality, different lags of fiscal shocks, year 1 and accumulated for year 8




Note: The figure presents the estimated coefficients in each specification and one standard error bands around them.
The suffix of the label on the X-axis indicates the number of lags of fiscal shocks utilized in each of the specifications, with “shock3" as the baseline.

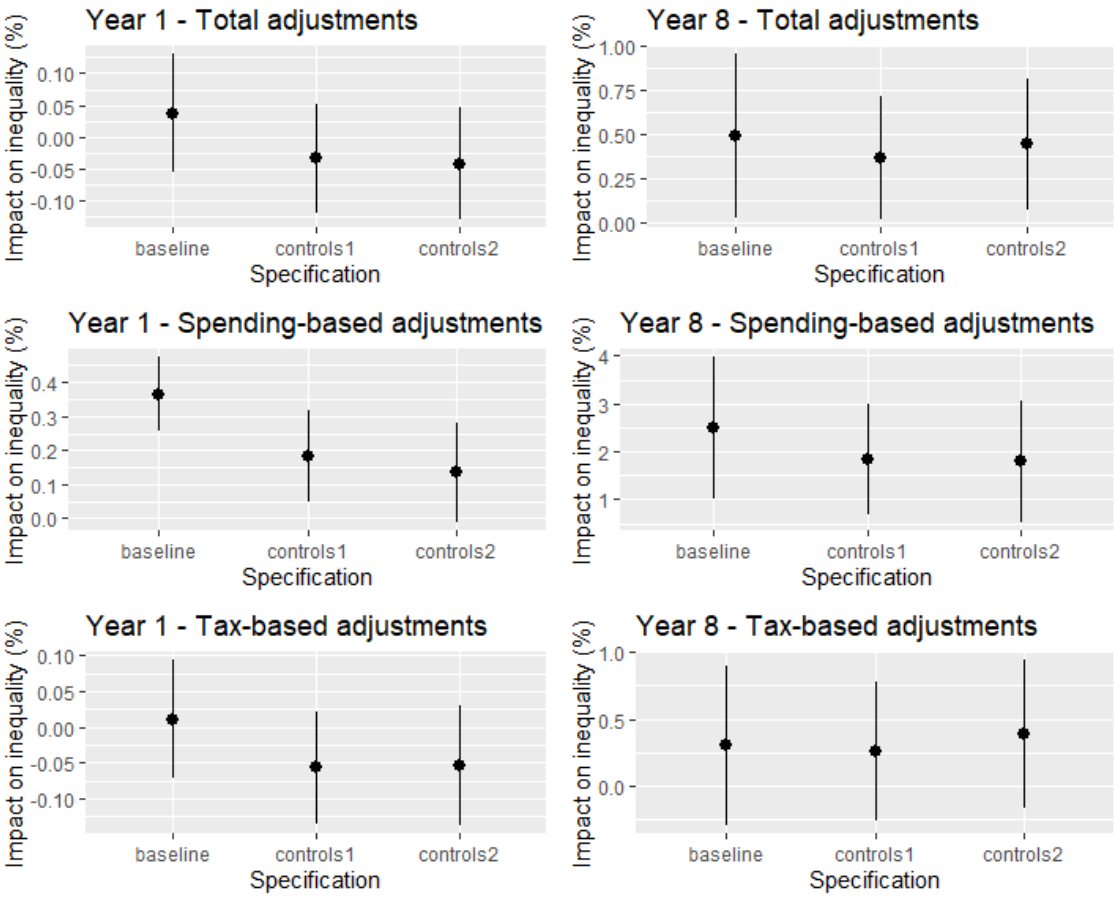
Finally, we ran different specifications with additional controls to address the possibility that omitted variables could bias our results. As shown in Table 1.4, we followed Heimberger (2020) and incorporated most of the control variables employed by the author, named "i - real GDP growth rate", "ii - change in the unemployment rate", and "iii - change in trade openness." Because of the unavailability of data for some of the series utilized by Heimberger (2020) for South American countries, we also added another variable suggested by Jalles (2017), which is "iv - change in real GDP per capita."

Figure 1.4 presents the results for all alternative specifications. While in the model “controls1", we added one lag of variables “i", “iii", and “iv" to the baseline, in “controls2", we also included one lag of the variable “ii". As we could not obtain data since 1991 for “ii", we utilized a sample from 1992 to 2017 in the model “control2".

In the medium run, baseline results remained robust for spending-based, tax-based, and

total fiscal adjustments. In the short run, the spending-based result did not show statistical significance when we considered the specification “controls2", which, as mentioned, utilized a shorter time sample due to a lack of data.

Figure 1.4: Impact of a 1% of GDP fiscal consolidation on income inequality, specifications with additional controls, year 1 and accumulated for year 8




Note: The figure presents the estimated coefficients in each specification and one standard error bands around them.
Specification “controls1" included for additional controls one lag of each of these variables: real GDP growth rate, change in real GDP per capita, and change in trade openness.
Specification “controls2" utilized a sample from 1992 to 2017 and included for additional controls one lag of each of these variables: real GDP growth rate, change in real GDP per capita, change in trade openness, and change in the unemployment rate.

### 1.4.2 Alternative samples

In this section, we verified whether the baseline results are robust using different samples for the fiscal shocks and the countries. First, we performed an analysis by dropping outliers of the fiscal shocks (see averages in Table 1.2).[15] As shown in Figure 1.5, while we

[15]Note that the averages and the standard deviations are calculated from their different groups and subgroups: fiscal expansions (total, spending-based, tax-based); fiscal contractions (total, spending-based, tax-based).

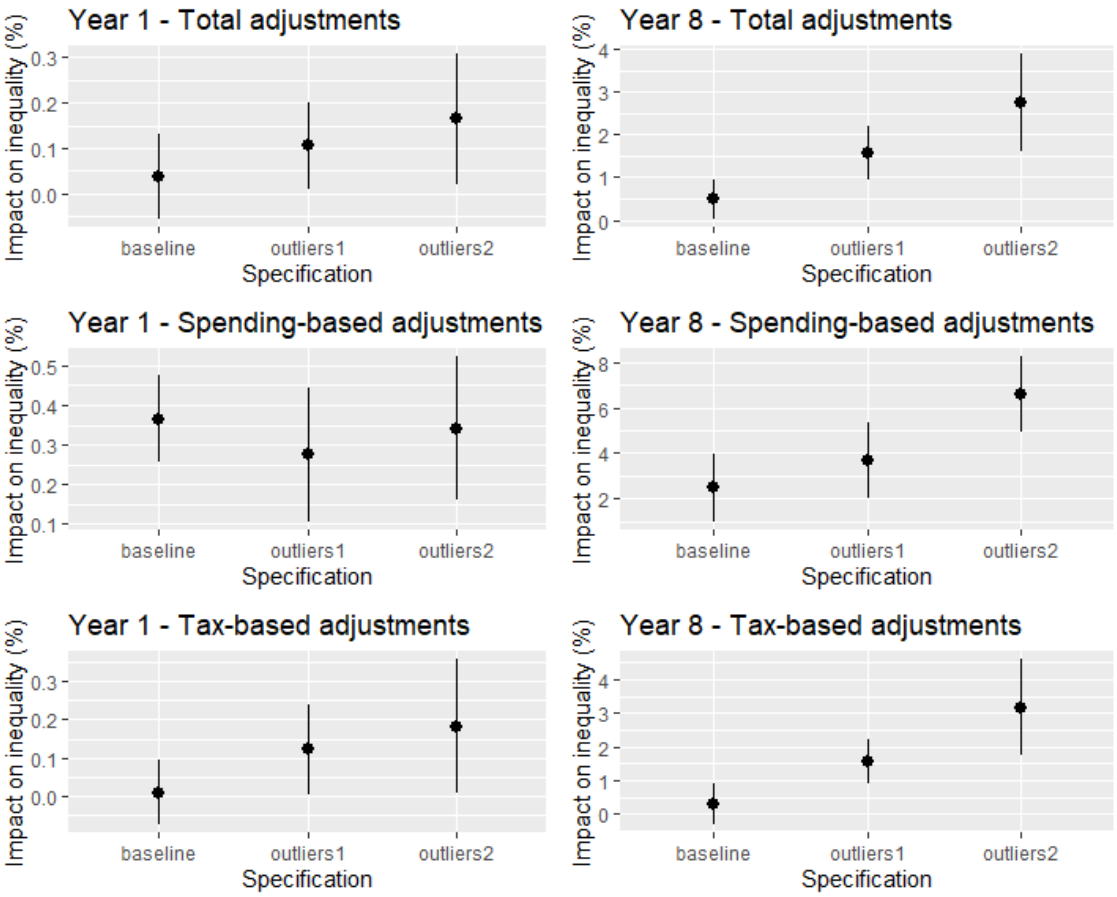
excluded observations at least two standard deviations distant from the mean in the sample "outliers1",[16] we did the same but considered one standard deviation in "outliers2".[17]

Spending-based fiscal consolidations increased income inequality for these different samples in the short and medium run. When it comes to tax-based fiscal consolidations, the effect on inequality turns positive and statistically significant when excluding outliers of the fiscal shock. Hence, some specific shocks in the sample seem to be responsible for driving our baseline results towards a non-statistically different from zero effect of tax-based episodes. Finally, total fiscal adjustments still generated an accumulated increase in income inequality after eight years.

[16]The observations that we dropped were the following: total adjustments higher than 2.67% of GDP (Uruguay in 2002, +3.275% of GDP; Bolivia in 2005, +4.1% of GDP); spending-based adjustments higher than 1.52% of GDP (Uruguay in 2002, +1.7% of GDP); tax-based adjustments higher than 2.04% of GDP (Bolivia in 2005, +4.1% of GDP).

[17]The observations that we dropped were the following: total adjustments higher than 1.8% of GDP (Uruguay in 2002, +3.275% of GDP; Bolivia in 2004 and 2005, +2% and +4.1% of GDP; Ecuador in 1993, +2.2% of GDP); spending-based adjustments higher than 1.14% of GDP (Uruguay in 2002, +1.7% of GDP; Paraguay in 2001, +1.7% of GDP); tax-based adjustments higher than 1.6% of GDP (Bolivia in 2004 and 2005, +2% and +4.1% of GDP; Ecuador in 1993, +1.7% of GDP); total fiscal expansions lower than -0.76% of GDP (Uruguay in 2005, -0.9% of GDP); tax-based fiscal expansions lower than -0.79% of GDP (Uruguay in 2005, -0.9% of GDP).

Figure 1.5: Impact of a 1% of GDP fiscal consolidation on income inequality, excluding fiscal shocks outliers, year 1 and accumulated for year 8




Note: The figure presents the estimated coefficients in each sample and one standard error bands around them.
Specification "outliers1" excluded observations for fiscal shocks at least two standard deviations distant from the averages calculated for their groups/subgroups.
Specification "outliers2" excluded observations for fiscal shocks at least one standard deviation distant from the averages calculated for their groups/subgroups.
Groups (subgroups): fiscal expansions (total, spending-based, tax-based); fiscal contractions (total, spending-based, tax-based).

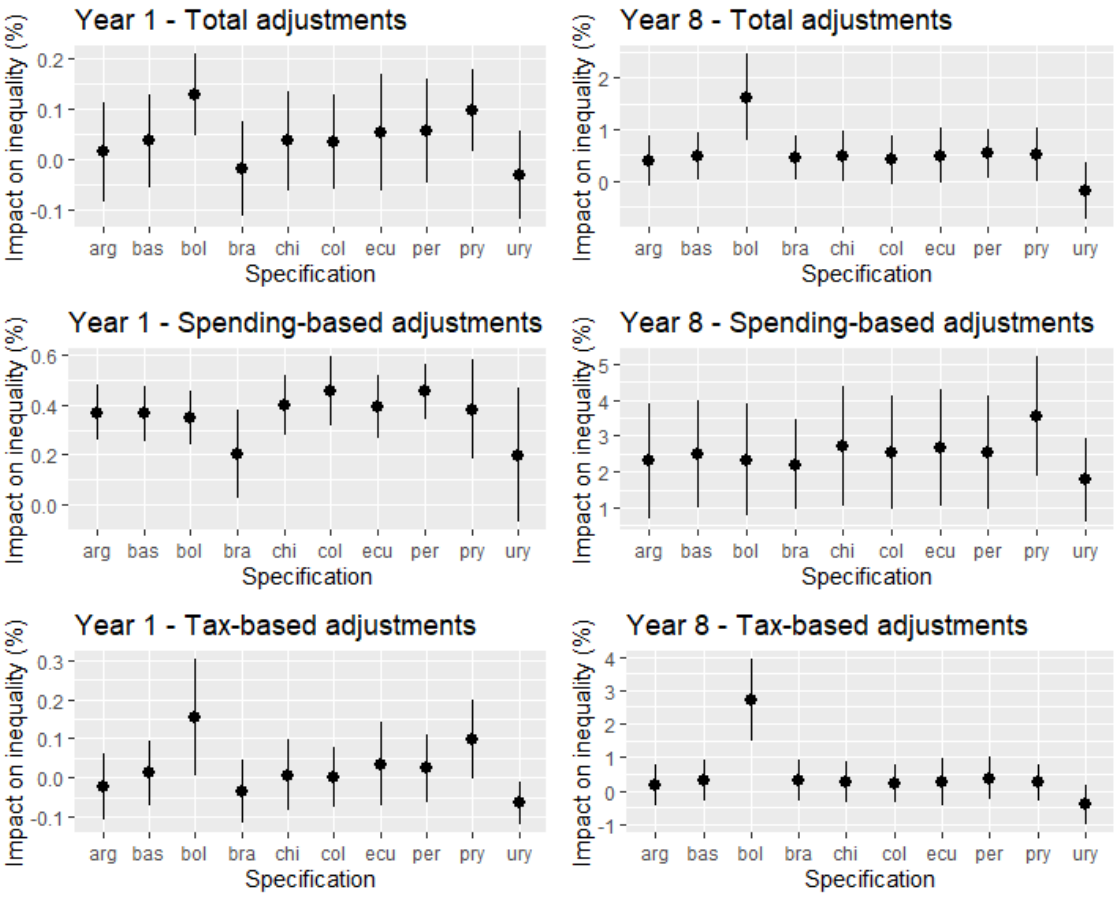
We then considered nine different country samples by dropping one country at a time. The X-axis in Figure 1.6 indicates which country we excluded in each sample: "arg" for Argentina; "bas" for baseline, with no exclusion; "bol" for Bolivia; "bra" for Brazil; "chi" for Chile; "col" for Colombia; "ecu" for Ecuador; "pry" for Paraguay; "per" for Peru; "ury" for Uruguay.[18]

[18]The null hypothesis of unit root for "yt+1 – yt" was not rejected for the samples in which we excluded Bolivia (p-value = 0.12), Chile (p-value = 0.11), Colombia (p-value = 0.11), Paraguay (p-value = 0.15), or Peru (p-value = 0.11). We followed Söderbom et al. (2015) and analyzed the graphical evolution of this variable, which suggests that the series are indeed stationary in the Figures 1.11, 1.12, and 1.13 in the Appendix. When we excluded the year 1991 for these rare cases, we rejected the null hypothesis of a unit root and found that our results remained robust (see Table 1.10 and Figure 1.14 in the Appendix).

The positive and statistically significant accumulated effect of spending-based consolidations on income inequality in year 8 holds in all country samples when considering one standard error bands around the estimated coefficients. Results for year 1 only lost statistical significance when excluding Uruguay from the sample. As for tax-based fiscal adjustments, a statistically significant positive effect on inequality in the medium run appeared when we excluded Bolivia.[19] When combined with previous results on positive effects when excluding large fiscal shocks, these results suggest that specific fiscal episodes in Bolivia drove tax-based baseline results closer to zero. When it came to the short-run impact, tax-based consolidations had a negatively significant effect on inequality when excluding Uruguay. Finally, when we considered total fiscal adjustment shocks, results varied more depending on the country's sample, although this difference is hardly statistically significant.

[19]The tax-based fiscal adjustments with the highest magnitude (in % of GDP) from David and Leigh's (2018) database were implemented in Bolivia in 2004 and 2005. In 2004, implementing a tax on financial transactions generated a fiscal adjustment of 2% of GDP. Assuming that financial assets are held disproportionately by members of the upper-income classes, this type of tax will be predominantly progressive. In 2005, a new direct tax on hydrocarbons (IDH) implied an increase in royalties from 18 to 50 percent of turnover, accounting for a 3.1% of GDP fiscal adjustment. Revenues from IDH and royalties increased from US$338 million in 2004 to over US$726 million in 2005 and became a key to Bolivia‘s social development. Therefore, the magnitude, characteristics, and indirect effects of these measures may have driven tax-based baseline results closer to zero.

Figure 1.6: Impact of a 1% of GDP fiscal consolidation on income inequality, different samples dropping one country at a time, year 1 and accumulated for year 8




Note: The figure presents the estimated coefficients in each sample and one standard error bands around them.
The X-axis indicates which country we excluded in each sample: "arg" for Argentina; "bas" for baseline, with no exclusion; "bol" for Bolivia; "bra" for Brazil; "chi" for Chile; "col" for Colombia; "ecu" for Ecuador; "pry" for Paraguay; "per" for Peru; "ury" for Uruguay.

### 1.4.3 Alternative methodological approaches

In this section, we tested whether the main results of the baseline model also held when utilizing a different strategy to identify fiscal shocks, the conventional approach, and another econometric method, the Instrumental Variable Local Projections.

To apply the conventional approach, we extracted data for the central government's primary balance and total primary revenues and expenditures as a percentage of GDP from CEPALSTAT for all countries and years in our sample.[20] We also applied Fedelino, Horton, and Ivanova's (2009) approach to cyclically adjust the data, assuming a zero elasticity of government expenditures relative to the output gap (Blanchard and Leigh 2013). The output gap series was obtained from Carrière-Swallow, David, and Leigh (2021).

[20]For Bolivia, we could only obtain data for the general government.

Following Furceri, Jalles, and Loungani (2016) and Jalles (2017), we considered three alternative measures (Giavassi and Pagano 1996;[21] Alesina and Ardagna 1998;[22] Afonso 2010)[23] to obtain a variable that takes a value equal to one when there is an episode of fiscal consolidation, minus one when there is an episode of fiscal expansion, and zero otherwise. Based on Jalles (2017), we classified a consolidation episode as spending-based (tax-based) when more than 50% of the total adjustment occurred via expenditure cuts (tax increases).

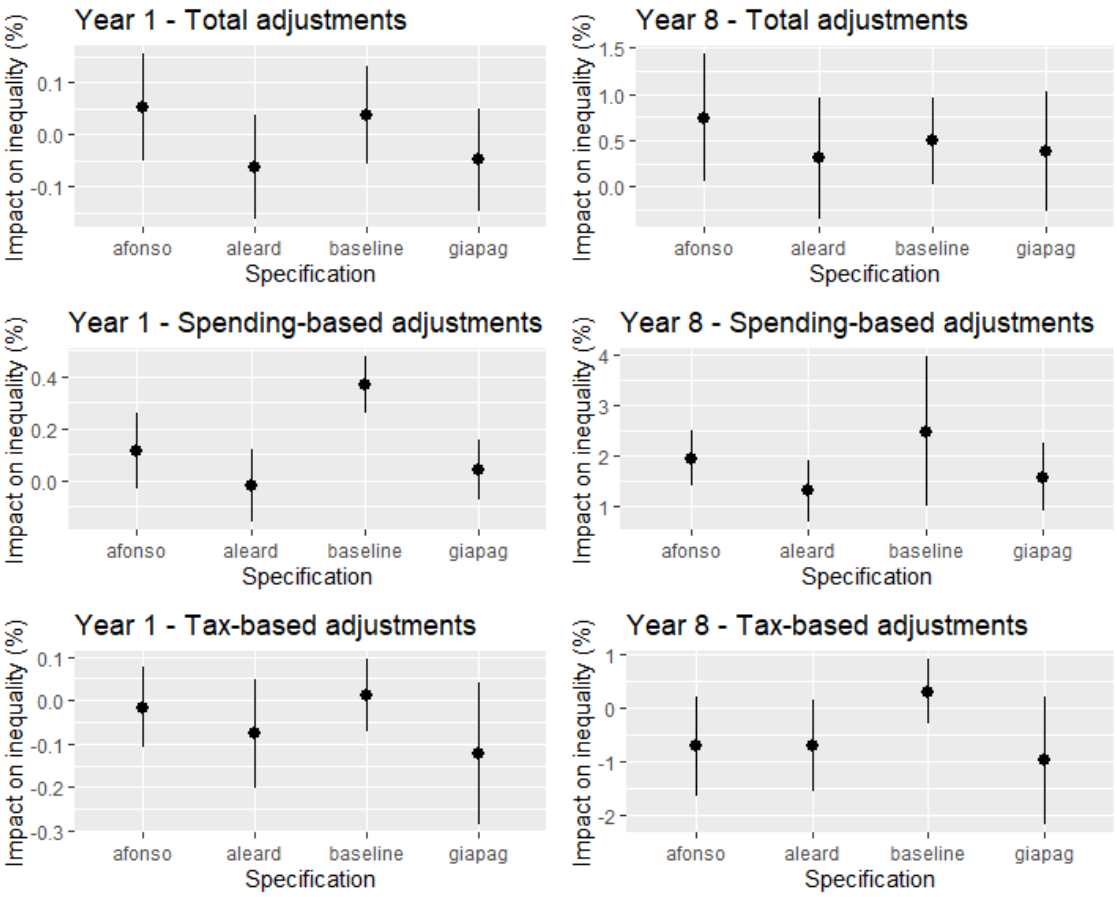
Results presented in Figure 1.7 show that, once again, spending-based fiscal consolidation episodes increased inequality after 8 years in all the estimations, no matter the criteria applied for defining the fiscal shocks (narrative or conventional). The same did not hold for the positive effect of total fiscal consolidations on inequality, which lost significance after 8 years in two out of three estimations based on the CAPB approach. Such as baseline results based on a narrative dataset, the impact of tax-based fiscal adjustments did not show statistical significance when using the CAPB approach, but the medium-run effects now appeared negative in all three estimations.

[21] Giavassi and Pagano (1996) identified fiscal adjustment episodes when the cumulative changes in the CAPB reached at least 5, 4, 3 percentage points of GDP in respectively 4, 3, or 2 years, or 3 percentage points in one year.

[22] Alesina and Ardagna (1998) assumed a fiscal consolidation episode when the change in the CAPB reaches at least 2 percentage points of GDP in one year or at least 1.5 percentage points for two consecutive years in the last two years.

[23] Afonso (2010) identified fiscal shocks when the change in the CAPB reaches at least one and a half times the standard deviation for the last year, or one standard deviation on average for two years.

Figure 1.7: Impact of a 1% of GDP fiscal consolidation on income inequality, narrative and conventional approaches, year 1 and accumulated for year 8




Note: The figure presents the estimated coefficients in each sample and one standard error bands around them.

Specification “baseline" refers to the narrative approach.

Specification “aleard" refers to Alesina and Ardagna’s (1998) conventional approach.

Specification “giapag" refers to Giavassi and Pagano’s (1996) conventional approach.

Specification “afonso" refers to Afonso’s (2010) conventional approach.

Finally, to address the possibility of measurement errors in the narrative approach that, according to Escolano et al. (2014), could derive from the use of multiple sources to obtain estimates of the budgetary impact of fiscal policy actions, we implemented the Local Projections Instrumental Variable (LP – IV) approach from Ramey and Zubairy (2018).

This method has some advantages, such as the direct estimation of standard errors of the multiplier and the possibility that the instrument and instrumented variables have measurement errors, as long as they are uncorrelated. To implement it, we followed Carrière-Swallow, David, and Leigh (2021) and employed narrative shocks as instruments for changes in the CAPB[24] (d.CAPB, in % of GDP). Table 1.6 shows that the results

[24]F Kleibergen-Paap Wald statistics indicate that narrative shocks are strong instruments for the d.CAPB. The standard rule of thumb is that an F-statistic below 10 shows a potential problem with

of the IV estimation were very similar to those obtained in the baseline specification for h = 1, although the IV coefficient was lower for h = 8 and did not present statistical significance.

Table 1.6: Effect of a 1% of GDP Fiscal Consolidation in year h

| **Specification** | **h = 1** | **h = 8** |
|---|---|---|
| **Baseline** | 0.0371 | 0.493 |
| | 0.6461 | (0.463) |
| Observations | (0.0929) | 153 |
| $R^2$ | 216 | 0.6409 |
| **IV estimator** | 0.0507 | 0.359 |
| | (0.071) | (0.748) |
| Observations | 207 | 144 |
| $R^2$ | 0.662 | 0.667 |
| F-Stat | 31.93 | 15.45 |

Note: The table reports estimates for the $\beta^h$ coefficient in equation (1), where h refers to the horizon in years. Additional controls include two lags of the change in income inequality and fixed effects for years and countries. Driscoll–Kraay standard errors are in parentheses for the baseline specification. For IV regressions, we applied Newey-West correction for standard errors (Newey and West 1987) with automatic bandwidth selection at all horizons. Kleibergen–Paap Wald F-statistic was reported.

∗Significant at 10%.

∗∗Significant at 5%.

∗∗∗Significant at 1%.

## 1.5 Conclusion

This Chapter contributed to the empirical literature on the effect of fiscal consolidations on income inequality by focusing on South American economies. Thus, we based on David and Leigh's (2018) narrative dataset for estimating impulse response functions using Jordà's (2005) Local Projections method for a panel covering nine South American countries between 1991 and 2017.

Our baseline results indicated that while spending-based fiscal austerity measures have significantly increased inequality as measured by the Gini index for disposable income, tax-based consolidation shocks effects were not statistically significant.

These results showed that the Gini index for disposable income rose 0.365% in the short run and 2.48% in the medium run after a spending-based fiscal adjustment of 1% of GDP. The magnitude of this effect is higher than in most studies in the recent literature on

instrument relevance (Staiger and Stock 1997).

OECD countries. In contrast, the impact of tax-based fiscal consolidations on inequality is smoother, increasing by 0.01% for year 1, and by 0.3% in the accumulated for year 8, and it was not statistically significant.

We carried out a series of robustness checks using different control variables, lag structures, country samples, and econometric strategies. When it comes to tax-based fiscal adjustments, the effect after eight years was still not statistically significant in most of our estimations, except for the samples that excluded Bolivia or large shocks. Excluding Bolivia, it became positive. In the specifications that we employed the CAPB approach to identify fiscal consolidations, tax-based adjustments showed a negative non-significant effect on inequality in the medium run. As a consequence of the mixed findings for tax-based results, the medium-run impact of the total fiscal adjustments, including tax-based and spending-based, was still positive in most specifications, but it lost statistical significance in some of them.

Instead, our main finding that spending-based fiscal consolidations significantly increased inequality after eight years remained robust to all alternative specifications, including when we applied conventional CAPB approaches for identifying the consolidation shocks. Therefore, given the adverse socio-economic effects of the Covid-19 pandemic currently faced by South American countries, the potential implementation of a new round of spending-based fiscal consolidation plans raises concerns.

# Appendix

Table 1.7: Tax structures for the OECD and LAC in 2019, % of total taxation

| **Category** | **Latin America and the Caribbean (LAC)** | **OECD countries** |
|---|---|---|
| Personal Income Tax | 9 | 23 |
| Corporate Income Tax | 16 | 10 |
| Social security contributions | 17 | 26 |
| Value Added Taxes | 28 | 20 |
| Taxes on goods and services | 22 | 12 |
| Other Taxes | 8 | 8 |

Source: Revenue Statistics in Latin America and the Caribbean (OECD 2021).

Table 1.8: Tax structures for the OECD and LAC in 2019, % of GDP

| **Category** | **Latin America and the Caribbean** | **OECD countries** |
|---|---|---|
| Taxes on income and profits | 6.2 | 11.3 |
| Taxes on property | 0.8 | 1.8 |
| Social security contributions | 3.9 | 8.9 |
| Taxes on goods and services | 11.2 | 10.8 |
| Other Taxes | 0.4 | 0.2 |

Source: Revenue Statistics in Latin America and the Caribbean (OECD 2021).

Table 1.9: Fiscal consolidation packages in the narrative dataset by David and Leigh (2018)

| **Country/Year** | **Composition of the Fiscal Shock** | **Summary of the Measures** | **Impact – in % of GDP** |
|---|---|---|---|
| Argentina (1996) | ↑Tax | - ↑Rates of corporate and personal income taxes.<br>- ↑Tariffs on imports of capital goods and removal of subsidies for domestic producers of capital goods.<br>- ↓Tax rebates for exporters.<br>- ↑Fuel excises. | + 0.25%. |

| | | | |
|---|---|---|---|
| Argentina (1997) | ↑Tax | - Continuation of measures implemented in 1996. | + 0.75%. |
| Bolivia (1995) | ↑Tax | - ↑Rate of transaction tax.<br>- ↑Excise tax on vehicles.<br>- ↑Beer taxes. | + 0.9%. |
| Bolivia (2004) | ↑Tax | - Introduction of a financial transactions tax. | + 2%. |
| Bolivia (2005) | ↑Tax | - Introduction of a new direct tax on hydrocarbons.<br>- Increase in the level of royalties from 18% to 50% of turnover. | + 4.1%. |
| Brazil (2015) | ↑Tax / ↓Expenditure | On the tax side:<br>- ↑Taxes on fuels, household credit operations, car sales, imports, and cosmetics.<br>- Elimination of electricity subsidies (supported by tariff adjustments).<br>On the expenditure side:<br>- ↓Benefits and tighter eligibility criteria for survivor pensions, unemployment, and sickness benefits, and salary bonuses for private employees. | + 0.3% via Tax / + 0.5% via Expenditure. |
| Chile (1990) | ↑Tax | - ↑Value Added Tax (VAT) rate.<br>- Change in the base for Corporate Income Tax (CIT) from distributed to earned profits and ↑CIT from 10% to 15%. | + 0.5%. |
| Chile (1991) | ↑Tax | - Continuation of measures implemented in 1990. | + 0.17%. |
| Chile (2003) | ↑Tax / ↓Expenditure | On the tax side:<br>- ↑Effective VAR rate (VAT receipts/domestic demand).<br>On the expenditure side:<br>- ↓Spending limits of several ministries amounting to the equivalent of US$ 300 MM. | + 0.2% via Tax / + 0.4% via Expenditure. |

| | | | |
|---|---|---|---|
| Chile (2004) | ↑Tax | - Continuation of measures implemented in 2003 | + 0.4%. |
| Chile (2008) | ↑Expenditure | - ↓Level of the structural balance target from 1% of GDP to 0.5% of GDP.<br>- ↑Spending on education. | - 0.5%. |
| Chile (2014) | ↑Tax | - ↑Corporate income tax rates, increases in excise duties, among other changes to the tax system.<br>- Changes to the taxation of dividends. | + 0.1%. |
| Chile (2015) | ↑Tax | - Continuation of measures implemented in 2014. | + 0.18%. |
| Chile (2016) | ↑Tax | - Continuation of measures implemented in 2014. | + 0.31%. |
| Colômbia (2000) | ↓Expenditure | - ↓Capital expenditure.<br>- Initiatives to strengthen efficiency and expenditure control at all levels of the public sector. | + 0.9%. |
| Colombia (2003) | ↑Tax | - One-time wealth tax.<br>- Income tax surcharge and a broadening of the VAT base.<br>- Impact of reforms was offset by ↑expenditure. | + 1.1%. |
| Colombia (2011) | ↑Tax | - Closing of loopholes in financial transactions tax.<br>- Elimination of tax credits and ↑net wealth tax.<br>- Impact of the measures was offset by ↓import tariffs. | + 0.4%. |
| Colombia (2012) | ↑Tax | - Elimination of the fixed asset tax credit, ↑progressivity in personal income tax, simplification of the VAT structure, and introduction of a new tax on corporate profits.<br>- Measures offset by ↓payroll and corporate income taxes. | + 0.8%. |
| Colombia (2015) | ↓Expenditure | - ↓General government expenditures. | + 0.5%. |

| | | | |
|---|---|---|---|
| Colombia (2016) | ↓Expenditure | - Expenditure freeze that affects investment, wage bill, and transfers.<br>- On the other side, protection of key social programs. | + 0.7%. |
| Ecuador (1990) | ↑Tax | - ↑Domestic prices of petroleum products.<br>- Measures offset by ↓import tariff rates, in addition to changes in income and indirect taxes. | + 0.33%. |
| Ecuador (1993) | ↑Tax / ↓Expenditure | On the tax side:<br>- Adjustment in fuel prices, in electricity tariffs.<br>- One-time levy in the range of 0.2-0.7% on company assets.<br>On the expenditure side:<br>- ↓Current expenditures.<br>- ↓Public investment. | + 1.7% via Tax / + 0.5% via Expenditure. |
| Ecuador (2000) | ↑Tax | - ↑Domestic prices for petroleum products (reduction of subsidies). | + 0.8%. |
| Paraguay (1989) | ↑Tax / ↓Expenditure | On the tax side:<br>- ↑Public tariffs and an effort to improve the operational efficiency of public enterprises.<br>- Efforts to improve tax administration and combat evasion.<br>On the expenditure side:<br>- ↓Public investment. | + 2% via Tax / + 0.6% via Expenditure. |

| | | | |
|---|---|---|---|
| Paraguay (2001) | ↑Tax / ↓Expenditure | On the tax side:<br>- ↑Excise tax on diesel.<br>- Inclusion of transport and personal services in the VAT tax base.<br>- Elimination of VAT exemptions on goods in the re-export trade.<br>On the expenditure side:<br>- ↓Public investment and ↓government consumption.<br>- Freeze of public sector wages in nominal terms and restriction of the public employment, while overtime pay being sharply curtailed. | + 0.5% via Tax / + 1.3% via Expenditure. |
| Paraguay (2003) | ↑Tax | - ↑Excise taxes.<br>- ↑Excise duties. | + 1.25%. |
| Paraguay (2004) | ↑Tax | - ↑Excise tax on diesel.<br>- Introduction of a soy exports tax.<br>- Introduction of a new agricultural income tax and a new personal income tax.<br>- Broadening of the VAT base, in addition to adjustments in some excise tax rates, and strengthening of the legal authority for tax administration. | + 0.8%. |
| Paraguay (2005) | ↓Tax | - Elimination of the export tax on soy.<br>- ↓CIT rate. | - 0.6%. |
| Paraguay (2006) | ↓Tax | - Further ↓CIT rate. | - 0.7%. |
| Paraguay (2014) | ↑Tax | - Broadening of the VAT base (at a reduced tax) to include unprocessed agricultural products.<br>- A revamped tax on agricultural income. | + 0.24%. |
| Paraguay (2016) | ↓Expenditure | - ↓Current expenditures (especially a decrease of the wage bill in real terms).<br>- Measures partially offset by ↑public investment. | + 0.8%. |

| | | | |
|---|---|---|---|
| Peru (1992) | ↑Tax | - ↑VAT rate (from 16% to 18%), with a broadening of its base.<br>- ↑Rates of several excise taxes.<br>- Elimination of certain deductions to the CIT and continued efforts to strengthen tax administration. | + 1%. |
| Peru (2002) | ↑Tax | - Broadening of the income tax base.<br>- ↑Kerosene excise.<br>- Elimination (or restriction) of some VAT exemptions.<br>- On the tax administration, measures aimed at reducing tax evasion. | + 0.2%. |
| Peru (2003) | ↑Tax | - Continuation of the measures implemented in 2002. | + 0.8%. |
| Peru (2011) | ↓Tax | - ↓Trade tariffs.<br>- ↓Financial transactions tax and ↓general sales tax.<br>- Measures were partially offset by a new mining taxation framework that included a new special mining tax and a new royalties system based on operating profits. | - 0.39%. |
| Peru (2012) | ↑Tax | - Continuation of new mining taxation regime. | + 0.38%. |
| Uruguay (1990) | ↑Tax | - ↑VAT rate, ↑public sector tariffs, ↑agricultural income taxes, ↑several excise taxes.<br>- Creation of a tax on real estate transfers and a temporary surcharge on certain imports.<br>- Efforts to reduce smuggling and tax evasion and to improve the efficiency of collections. | + 1.7%. |

| | | | |
|---|---|---|---|
| Uruguay (1995) | ↑Tax / ↓Expenditure | On the tax side:<br>- ↑VAT rates while reducing VAT exemptions.<br>- ↑Rates of the tax on wages and retirement pensions.<br>- Various changes in the corporate income, agricultural, and sales taxes to strengthen collections.<br>On the expenditure side:<br>- ↓Public investment.<br>- Curtailing hiring in the public sector and ↓current expenditures. | + 0.75% via Tax / + 0.9% via Expenditure. |
| Uruguay (1996) | ↑Tax | - Continuation of the tax measures implemented in 1996. | + 0.25%. |
| Uruguay (2000) | ↓Expenditure | - ↓Public investment. | + 0.8%. |
| Uruguay (2002) | ↑Tax / ↓Expenditure | On the tax side:<br>- ↑Tax on wages and pensions.<br>- New excise taxes and a broadening of the VAT base.<br>On the expenditure side:<br>- ↓Public investment.<br>- ↓Government consumption. | + 1.58% via Tax / + 1.7% via Expenditure. |
| Uruguay (2003) | ↑Tax / ↓Expenditure | On the tax side:<br>- Tariff adjustments.<br>On the expenditure side:<br>- Centralization of public sector procurement of medical supplies and food. | + 1.4 via Tax / + 0.2 via Expenditure. |
| Uruguay (2004) | ↓Tax | - Elimination of emergency surcharges (on wage tax and CIT) and tax (on commissions and public utilities) implemented since 2002. | - 0.5%. |
| Uruguay (2005) | ↓Tax | - Measures related to the elimination of emergency surcharges implemented in 2004 continued in 2005. | - 0.9%. |
| Uruguay (2015) | ↓Expenditure | - ↓Public investment, partially offset by ↑current expenditures. | + 0.6%. |

Source: David and Leigh (2018).
Note: A negative sign indicates a fiscal expansion.

Table 1.10: Levin-Lin-Chu unit root tests – p-values (null hypothesis of unit root)

| **Sample** | **VAR1** | **VAR2** | **VAR3** | **VAR4** | **VAR5** | **VAR6** | **VAR7** | **VAR8** |
|---|---|---|---|---|---|---|---|---|
| Baseline | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Argentina | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Bolivia | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Bolivia2 | 0.04 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Brazil | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Chile | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Chile2 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Colombia | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Colombia2 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Ecuador | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Paraguay | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Paraguay2 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Peru | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Peru2 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Uruguay | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

Note:
VAR1: $y_{t+1}$ - $y_t$.
VAR2: $y_{t+2}$ - $y_t$.
VAR3: $y_{t+3}$ - $y_t$.
VAR4: $y_{t+4}$ - $y_t$.
VAR5: $y_{t+5}$ - $y_t$.
VAR6: $y_{t+6}$ - $y_t$.
VAR7: $y_{t+7}$ - $y_t$.
VAR8: $y_{t+8}$ - $y_t$.
“y" = Gini (in log) – disposable income.
The column “Sample" represents which country we excluded from the sample in the robustness tests. In “Baseline," we included all countries.
The suffix “2" indicates time samples between 1992 and 2017, excluding the year 1991.

Table 1.11: Levin-Lin-Chu unit root tests – p-values (null hypothesis of unit root)

| **Specification** | **VAR1** | **VAR2** | **VAR3** | **VAR4** | **VAR5** | **VAR6** | **VAR7** | **VAR8** |
|---|---|---|---|---|---|---|---|---|
| LP - IV | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.03 | 0.01 | 0.05 |

Note:
VAR1: $x_{t-0}$.
VAR2: $x_{t+1} + x_{t-0}$.
VAR3: $x_{t+2} + x_{t+1} + x_{t-0}$.
VAR4: $x_{t+3} + x_{t+2} + x_{t+1} + x_{t-0}$.
VAR5: $x_{t+4} + x_{t+3} + x_{t+2} + x_{t+1} + x_{t-0}$.
VAR6: $x_{t+5} + x_{t+4} + x_{t+3} + x_{t+2} + x_{t+1} + x_{t-0}$.
VAR7: $x_{t+6} + x_{t+5} + x_{t+4} + x_{t+3} + x_{t+2} + x_{t+1} + x_{t-0}$.
VAR8: $x_{t+7} + x_{t+6} + x_{t+5} + x_{t+4} + x_{t+3} + x_{t+2} + x_{t+1} + x_{t-0}$.
"x" = change in the Cyclically Adjusted Primary Balance.
"LP - IV" refers to the fiscal consolidation variable employed in the Local Projections Instrumental Variable robustness test.

Table 1.12: Levin-Lin-Chu unit root tests – p-values (null hypothesis of unit root)

| **Specification** | **VAR1** | **VAR2** | **VAR3** | **VAR4** |
|---|---|---|---|---|
| Controls 1 | 0.00 | 0.00 | 0.00 | |
| Controls 2 | 0.00 | 0.00 | 0.00 | 0.00 |

Note:
VAR1: change in real GDP per capita.
VAR2: real GDP growth rate.
VAR3: change in trade openness.
VAR4: change in the unemployment rate.
Controls 1 (sample from 1991 to 2017) and Controls 2 (sample from 1992 to 2017): both specifications included additional variables as controls to implement robustness tests.

Table 1.13: Impact on inequality from fiscal consolidation shocks

| | **Year 1** **(1)** | **Year 2** **(2)** | **Year 3** **(3)** | **Year 4** **(4)** | **Year 5** **(5)** | **Year 6** **(6)** | **Year 7** **(7)** | **Year 8** **(8)** |
|---|---|---|---|---|---|---|---|---|
| Shock (t) | 0.037 | 0.001 | -0.064 | -0.007 | 0.082 | 0.329 | 0.644 | 0.493 |
| | (0.092) | (0.246) | (0.312) | (0.414) | (0.500) | (0.569) | (0.536) | (0.463) |
| Shock (t-1) | -0.069 | -0.141 | -0.136 | -0.096 | 0.050 | 0.243 | 0.001 | -0.092 |
| | (0.112) | (0.164) | (0.258) | (0.340) | (0.341) | (0.306) | (0.273) | (0.285) |
| Shock (t-2) | -0.030 | 0.031 | 0.117 | 0.327 | 0.516∗ | 0.362 | 0.342 | 0.272 |
| | (0.086) | (0.122) | (0.137) | (0.168) | (0.238) | (0.342) | (0.452) | (0.537) |
| Change in Gini (t) | 0.519∗∗ | 0.931∗∗ | 1.178∗∗ | 1.305∗∗ | 1.679∗∗∗ | 1.981∗∗∗ | 2.093∗∗∗ | 2.093∗∗ |
| | (0.140) | (0.266) | (0.331) | (0.423) | (0.303) | (0.338) | (0.491) | (0.667) |
| Change in Gini (t-1) | 0.075 | 0.076 | -0.044 | -0.165 | -0.645 | -1.021∗∗ | -1.38∗∗∗ | -1.8∗∗∗ |
| | (0.096) | (0.222) | (0.323) | (0.464) | (0.417) | (0.328) | (0.306) | (0.394) |
| Observations | 216 | 207 | 198 | 189 | 180 | 171 | 162 | 153 |

Note:

∗*p<0.05;*∗∗ *p<0.01;* ∗∗∗*p<0.001*; *Standard errors in parentheses*

Table 1.14: Impact on inequality from spending-based fiscal consolidation shocks

| | **Year 1** **(1)** | **Year 2** **(2)** | **Year 3** **(3)** | **Year 4** **(4)** | **Year 5** **(5)** | **Year 6** **(6)** | **Year 7** **(7)** | **Year 8** **(8)** |
|---|---|---|---|---|---|---|---|---|
| Shock (t) | 0.365∗∗ | 0.673∗ | 0.605 | 1.178 | 1.902 | 2.587∗ | 2.989∗ | 2.484 |
| | (0.109) | (0.315) | (0.570) | 0.762) | (0.920) | (1.141) | (1.314) | (1.487) |
| Shock (t-1) | 0.211 | 0.057 | 0.572 | 1.441 | 1.864 | 2.385 | 1.855 | 1.490 |
| | (0.198) | (0.485) | (0.674) | (0.815) | (0.993) | (1.187) | (1.395) | (1.627) |
| Shock (t-2) | -0.318 | 0.026 | 0.819 | 1.380 | 1.811 | 1.495 | 1.284 | 0.797 |
| | (0.269) | (0.541) | (0.696) | (0.994) | (1.199) | (1.418) | (1.727) | (2.062) |
| Change in Gini (t) | 0.517∗∗ | 0.930∗∗ | 1.147∗∗ | 1.241∗∗ | 1.544∗∗∗ | 1.856∗∗∗ | 1.989∗∗∗ | 2.033∗∗ |
| | (0.142) | (0.267) | (0.326) | (0.402) | (0.314) | (0.320) | (0.452) | (0.607) |
| Change in Gini (t-1) | 0.082 | 0.069 | -0.046 | -0.162 | -0.576 | -0.939∗∗ | -1.3∗∗∗ | -1.8∗∗∗ |
| | (0.0935) | (0.212) | (0.302) | (0.419) | (0.399) | (0.313) | (0.294) | (0.344) |
| Observations | 216 | 207 | 198 | 189 | 180 | 171 | 162 | 153 |

Note:

∗*p<0.05;*∗∗ *p<0.01;* ∗∗∗*p<0.001*; *Standard errors in parentheses*

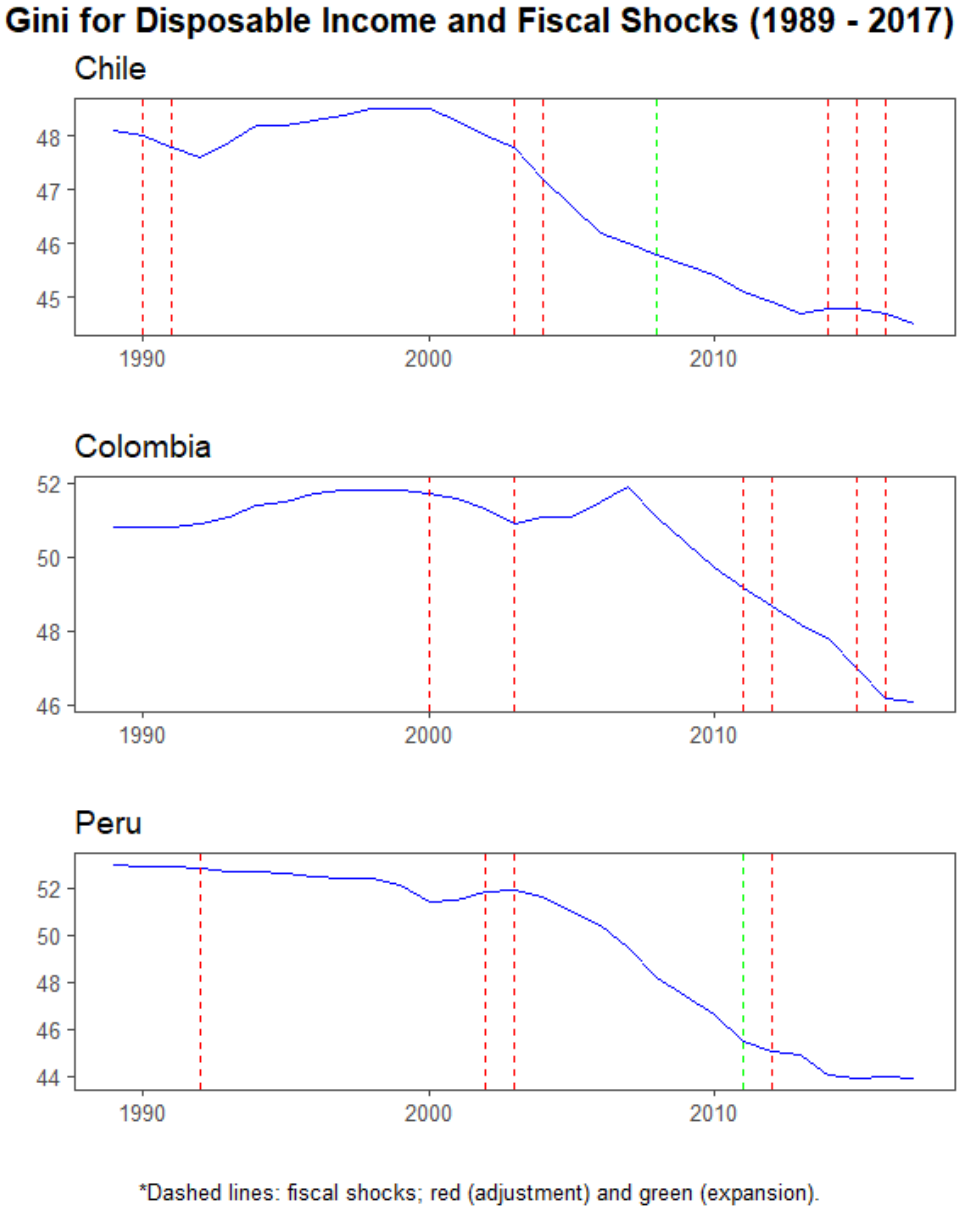
Table 1.15: Impact on inequality from tax-based fiscal consolidation shocks

| | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **Year 5** | **Year 6** | **Year 7** | **Year 8** |
|---|---|---|---|---|---|---|---|---|
| | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** | **(6)** | **(7)** | **(8)** |
| Shock (t) | 0.011 | -0.136 | -0.215 | -0.199 | -0.216 | 0.0259 | 0.406 | 0.304 |
| | (0.083) | (0.229) | (0.331) | (0.469) | (0.552) | (0.673) | (0.696) | (0.597) |
| Shock (t-1) | -0.148 | -0.160 | -0.210 | -0.276 | -0.079 | 0.114 | -0.148 | -0.270 |
| | (0.095) | (0.164) | (0.301) | (0.354) | (0.399) | (0.379) | (0.350) | (0.294) |
| Shock (t-2) | 0.029 | 0.008 | 0.007 | 0.235 | 0.402 | 0.244 | 0.252 | 0.257 |
| | (0.058) | (0.145) | (0.175) | (0.209) | (0.258) | (0.375) | (0.479) | (0.531) |
| Change in Gini (t) | 0.518** | 0.927** | 1.168** | 1.294** | 1.681*** | 1.980*** | 2.075*** | 2.067** |
| | (0.141) | (0.265) | (0.332) | (0.426) | (0.297) | (0.331) | (0.484) | (0.655) |
| Change in Gini (t-1) | 0.077 | 0.082 | -0.035 | -0.149 | -0.634 | -1.015** | -1.37*** | -1.8*** |
| | (0.096) | (0.219) | (0.322) | (0.467) | (0.416) | (0.329) | (0.310) | (0.398) |
| Observations | 216 | 207 | 198 | 189 | 180 | 171 | 162 | 153 |

Note:

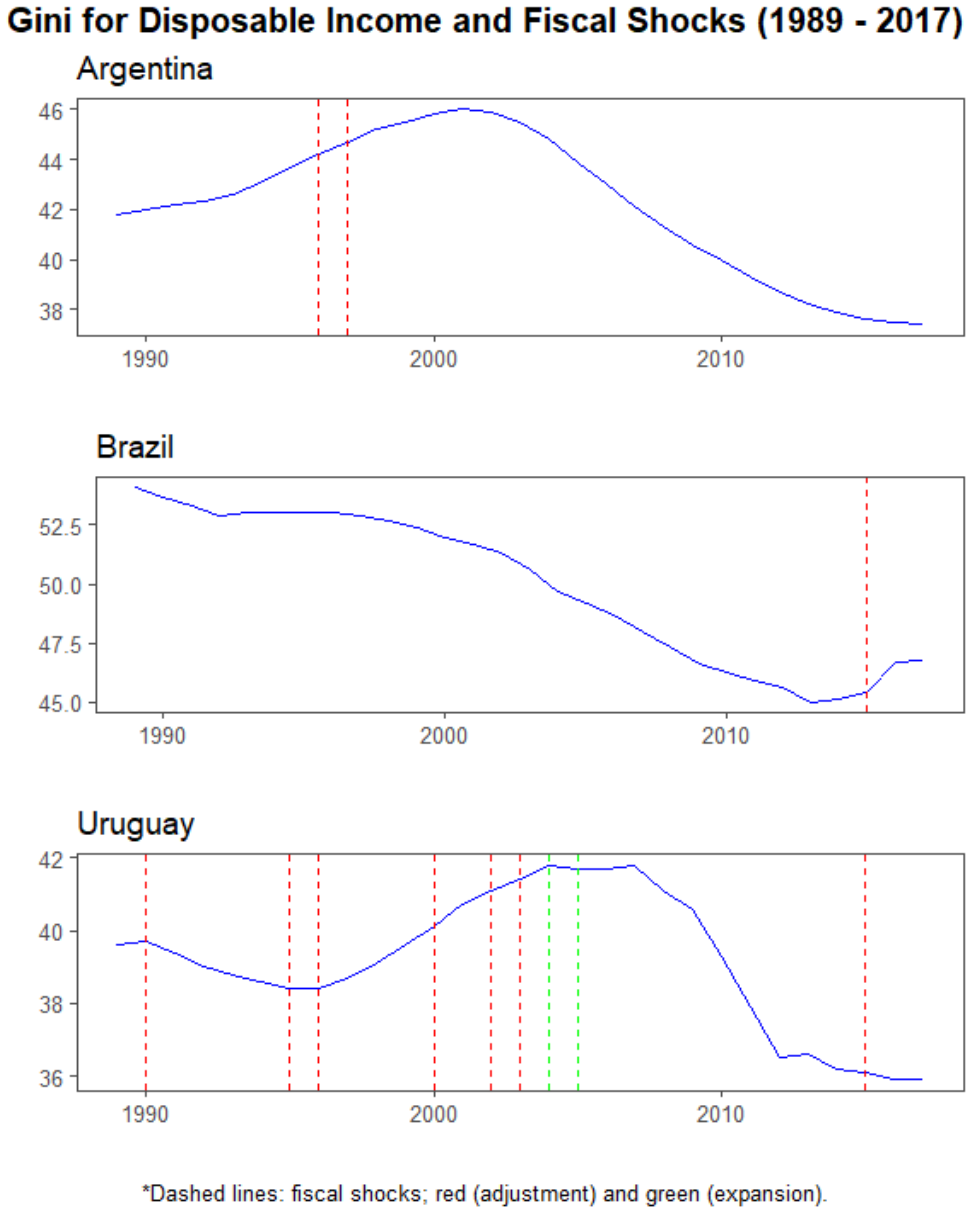
*$*p<0.05$;** $p<0.01$; *** $p<0.001$*; *Standard errors in parentheses*

Figure 1.8: Gini index for disposable income and Fiscal shocks for Chile, Colombia and Peru (1989 – 2017)



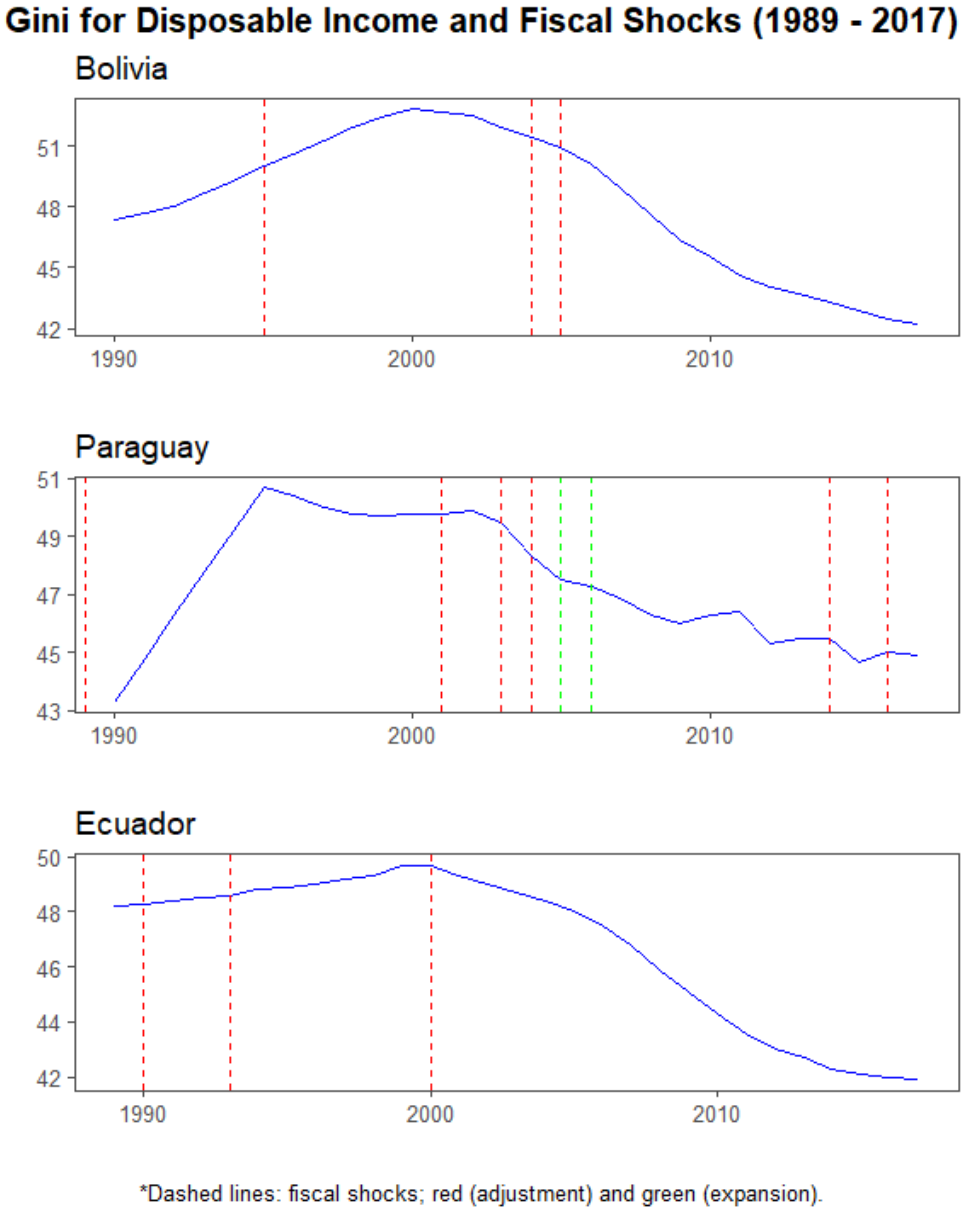

Note: The Gini index can range from 0 to 100.

Figure 1.9: Gini index for disposable income and Fiscal shocks for Argentina, Brazil and Uruguay (1989 – 2017)



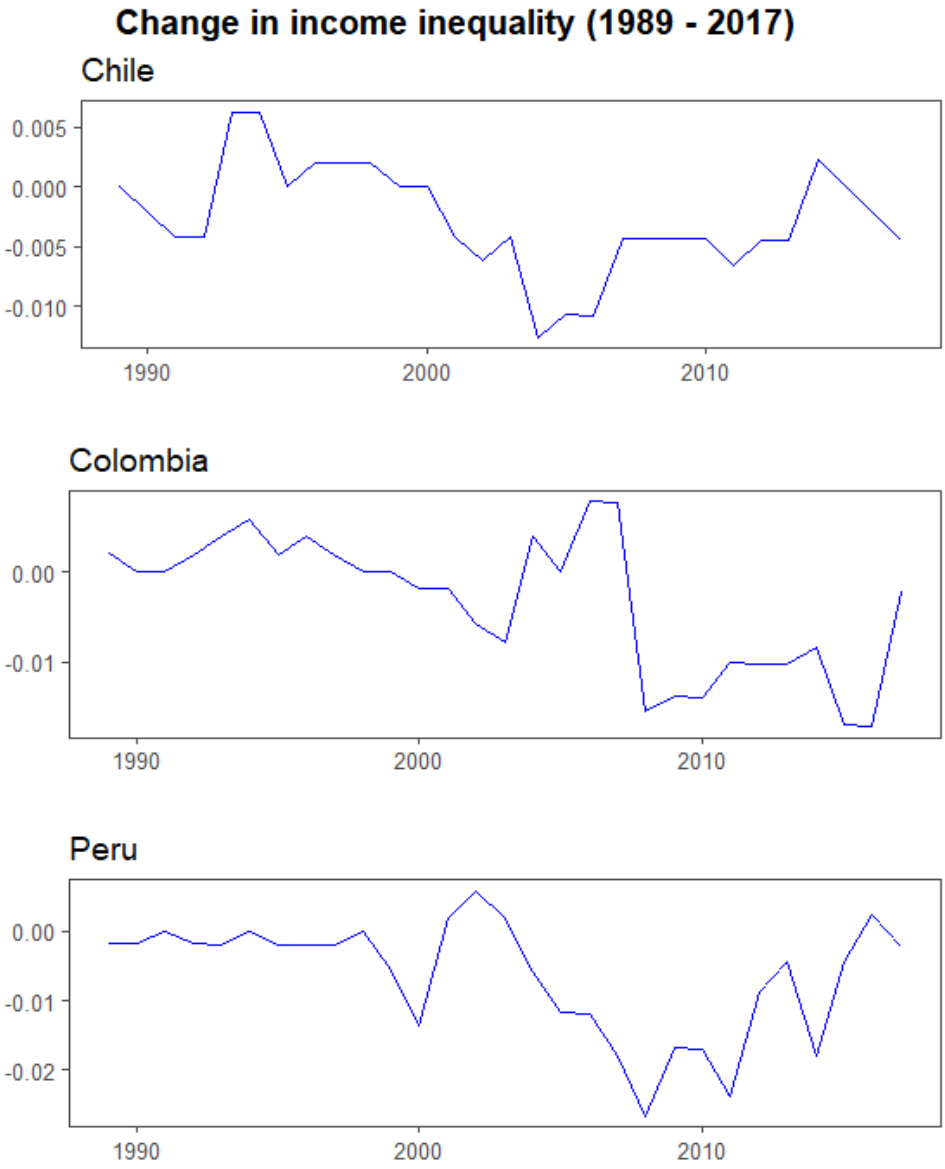

Note: The Gini index can range from 0 to 100.

Figure 1.10: Gini index for disposable income and Fiscal shocks for Bolivia, Paraguay and Ecuador (1989 – 2017)



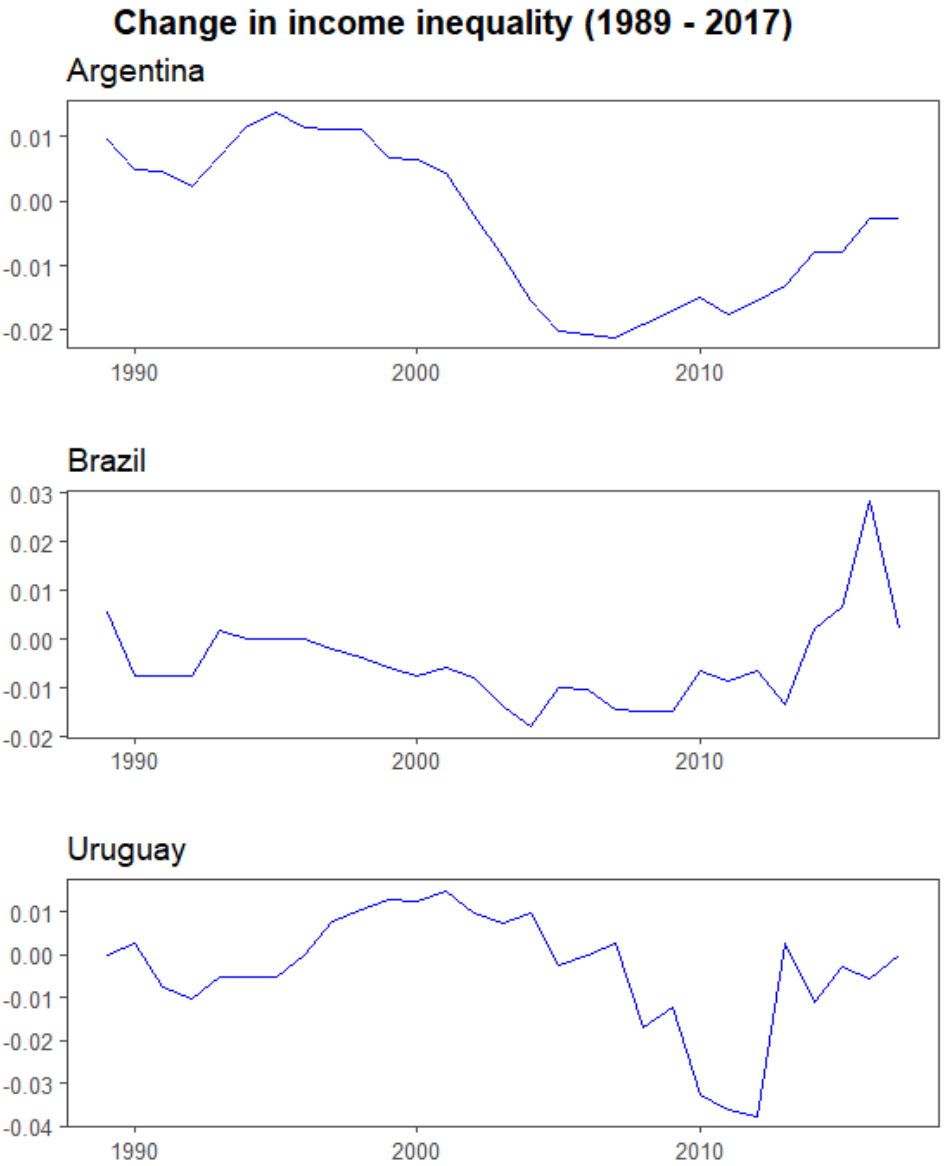

Note: The Gini index can range from 0 to 100.

Figure 1.11: Changes in income inequality for Chile, Colombia and Peru (1989 – 2017)



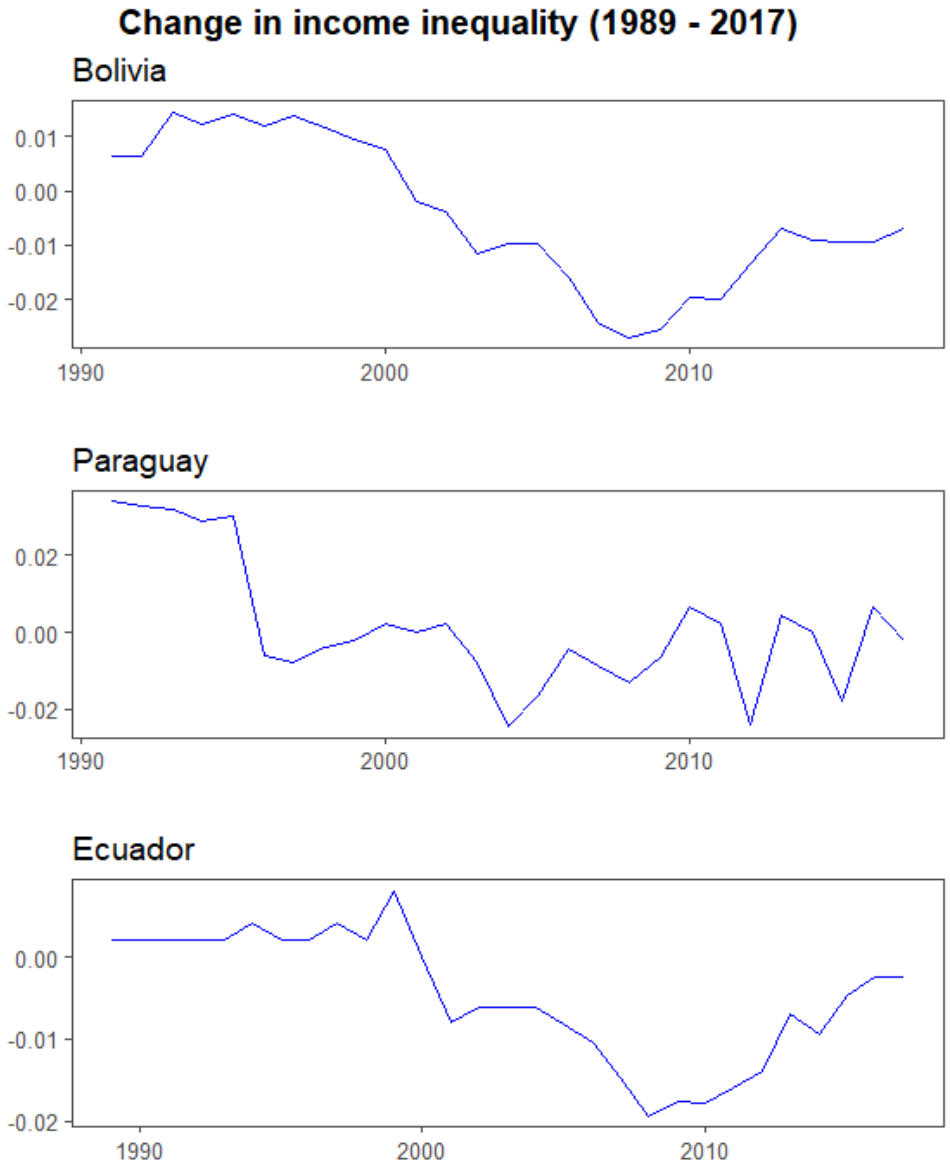

Note: In Y-axis, we consider 0.01 as 1%, for instance.

Figure 1.12: Changes in income inequality for Brazil, Argentina and Uruguay (1989 – 2017)



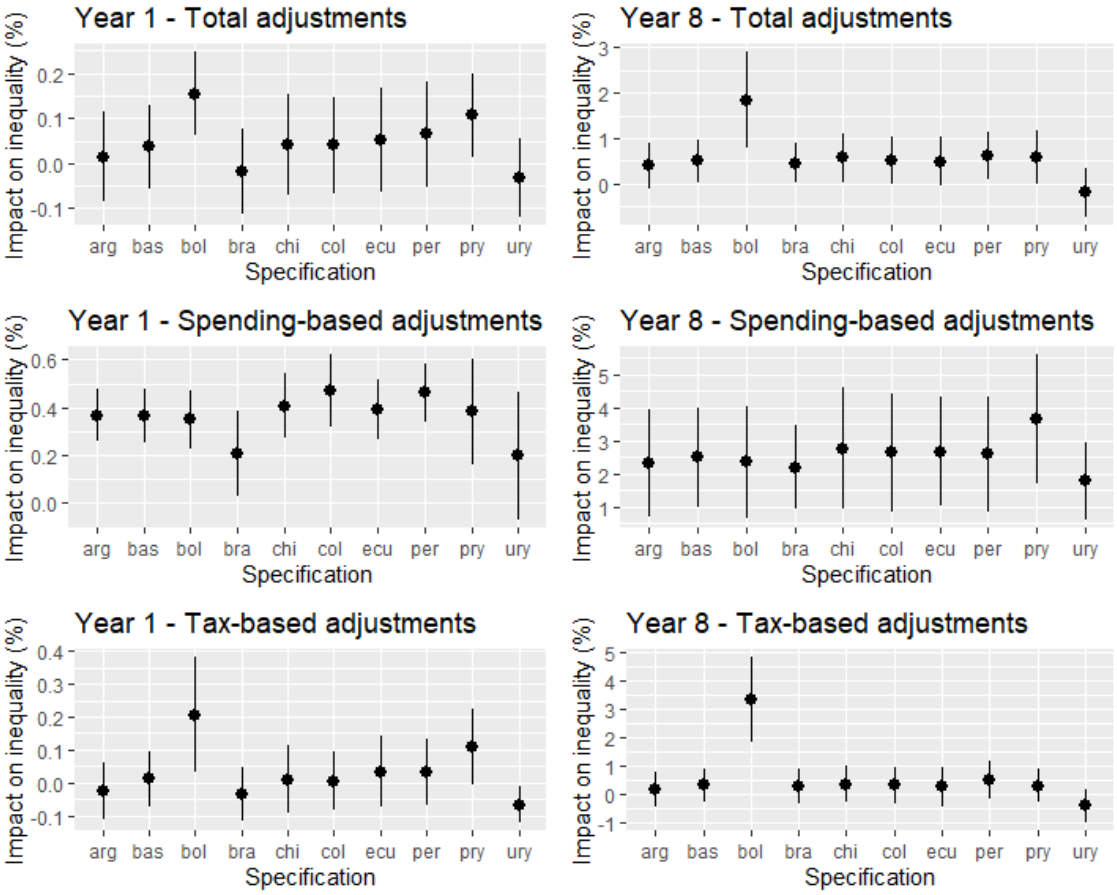

Note: In Y-axis, we consider 0.01 as 1%, for instance.

Figure 1.13: Changes in income inequality for Bolivia, Paraguay and Ecuador (1989 – 2017)



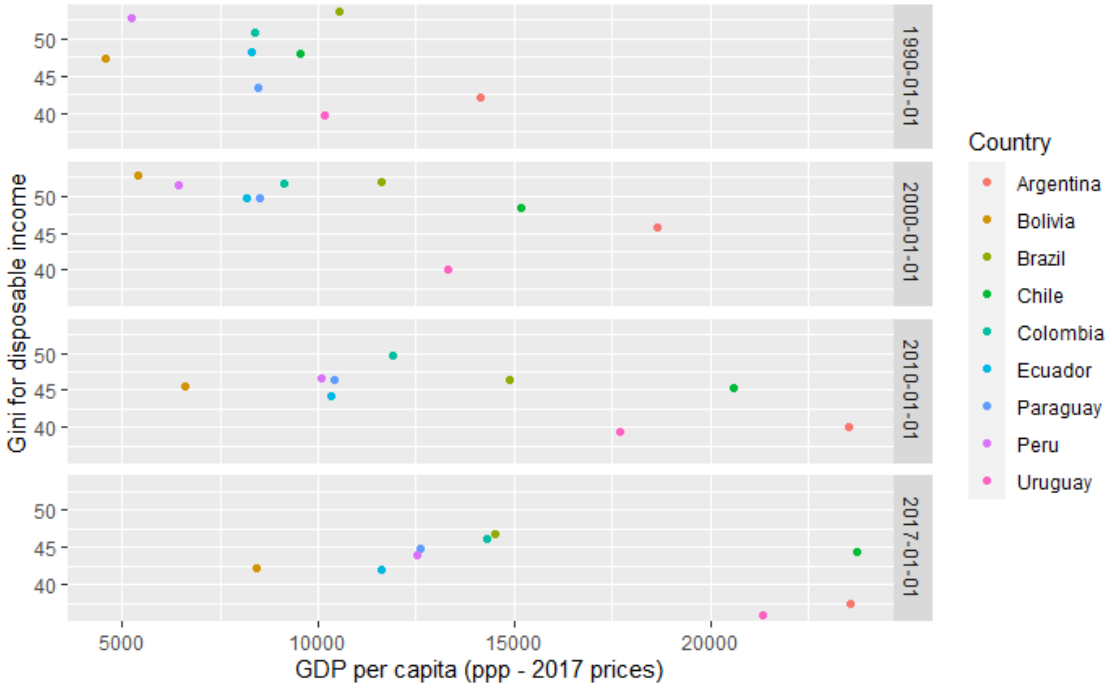

Note: In Y-axis, we consider 0.01 as 1%, for instance.

Figure 1.14: Impact of a 1% of GDP fiscal consolidation on income inequality, considering different samples dropping one country at a time (year 1, accumulated for year 8)



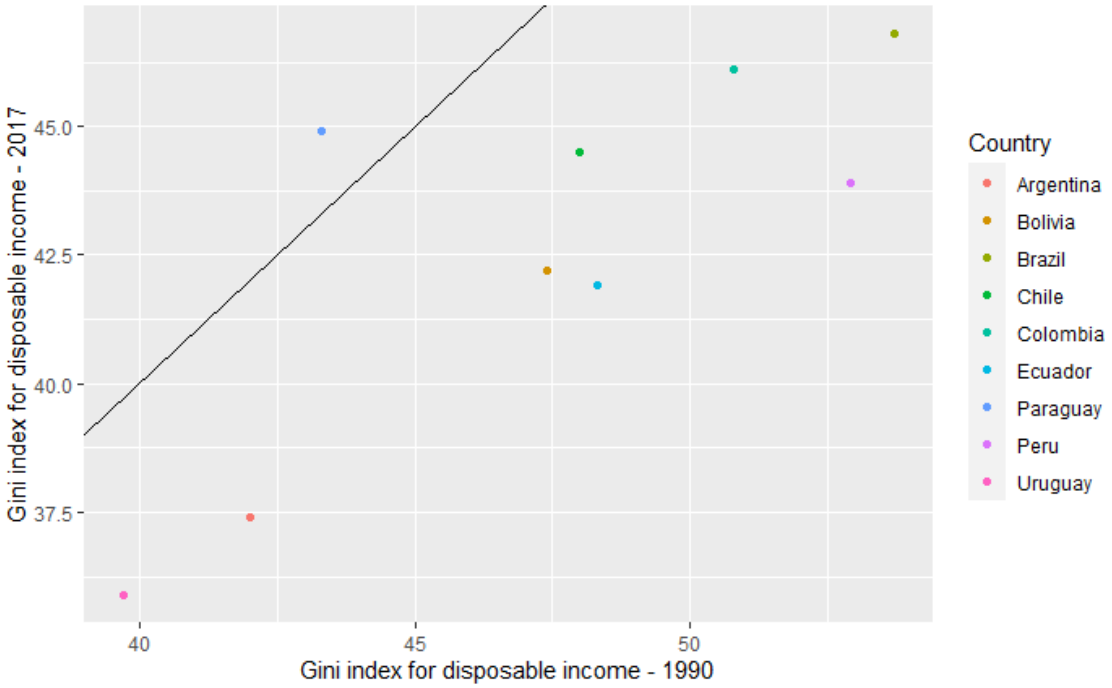

Note: The figure presents the estimated coefficients in each sample and one standard error bands around them.
The X-axis indicates which country we excluded in each sample: "arg" for Argentina; "bas" for baseline, with no exclusion; "bol" for Bolivia; "bra" for Brazil; "chi" for Chile; "col" for Colombia; "ecu" for Ecuador; "pry" for Paraguay; "per" for Peru; "ury" for Uruguay.
Because of unit root test issues, we utilized a sample from 1992 to 2017 for “bol", “chi", “col", “pry", and “per". For the rest, we utilized a sample from 1991 to 2017.

Figure 1.15: Relationship between the Gini index for disposable income and GDP per capita (1990, 2000, 2010 and 2017)




Note: Gini index data extracted from SWIID 8.2. GDP per capita data extracted from WDI-World Bank.

Figure 1.16: Gini index for disposable income in 1990 and 2017




Note: Gini index data extracted from SWIID 8.2.

# 2 A NARRATIVE APPROACH ON DIRECT AND INDIRECT TAX-BASED FISCAL POLICY SHOCKS: DECOMPOSING DAVID AND LEIGH (2018)'S DATASET

## 2.1 Introduction

Based on the dataset constructed by David and Leigh (2018), which deployed a narrative approach to identify fiscal consolidation episodes for Latin American and Caribbean countries, this Chapter identified the exogenous tax measures related to the fiscal packages mentioned above for a sample of 14 Latin American and Caribbean economies from 1989 to 2016 and classified the tax-based fiscal shocks of the David and Leigh (2018) 's dataset into direct tax-based and indirect tax-based.[25] Given that the papers that estimate the effects of fiscal adjustments do not reach this level of disaggregation for the impacts of different types of shocks, even for OECD economies, our effort aims to provide the necessary database to fill this gap on this topic. Thus, we provide a major contribution to the literature since this is the first narrative dataset that decomposed fiscal consolidation episodes into direct- and indirect tax-based for Latin American and Caribbean economies. Based on this new dataset, other papers can estimate the macroeconomic effects of direct and indirect tax-based fiscal consolidations in LAC countries, as we did for economic activity and income inequality in Chapter 3.

Several studies on fiscal consolidation deployed the Cyclically Adjusted Primary Balance (CAPB) to measure fiscal policy changes. However, other authors raise criticisms about this identification strategy for the fiscal shocks (Devries et al. 2011; Woo et al. 2013; Schaltegger and Wedder 2014; Furceri et al. 2016, 2018; Jalles 2017; David and Leigh 2018; Klein and Winkler 2019; Heimberger 2020). The methods that adjust to the cycle usually fail to remove the impact of strong economic activity fluctuations and asset (or commodity) prices from fiscal data. Thus, changes in CAPB may be correlated to the business cycle and non-policy related.[26] Moreover, even if changes in CAPB consistently reflect the discretionary changes in fiscal policy, the motivations may be associated to the desire of responding to cyclical fluctuations, and the fiscal policy is also endogenous

[25]Following other works for this literature (Guajardo et al. 2014; Jalles 2017; David and Leigh 2018), we assumed predominance when a tax category represented more than half of the impact, in % of GDP, for the episode. If direct tax measures were predominant in the fiscal package, we categorized the episode as based on direct taxes. If indirect tax measures were predominant, we classified it as an indirect tax-based fiscal package. Section 3 explained which measures we considered direct and indirect taxes.

[26]For instance, a boom in the stock market raises the CAPB through tax revenues generated by capital gains. A commodity price boom can stimulate private investment and raise cyclically adjusted government revenues (Devries et al. 2011; David and Leigh 2018).

to the economic cycle in this case.[27]

Despite potential caveats related to the narrative approach (see Section 1.2.1), this strategy arguably reduces the recognized endogeneity problems in the CAPB method by focusing on specific historical episodes of fiscal consolidation. This approach is based on Romer and Romer's (2010) seminal paper, which relied on governments' budget documents to assess the size, timing, and principal motivation for all significant postwar tax policy actions in the United States. By doing so, they identified measures motivated primarily by deficit reduction - "exogenous" fiscal policy shocks - which should reflect discretionary changes without the influence of economic cycle fluctuations.

Following Romer and Romer (2010), Devries et al. (2011) constructed a new dataset of fiscal consolidation episodes for 17 OECD economies from 1978 to 2009, examining contemporaneous policy documents to identify the motivation and the budgetary impact of fiscal policy changes. Alesina et al. (2017) reviewed and extended this database to cover the years from 2009 to 2014 for 16 out of 17 countries of the Devries et al. (2011) sample,[28] and produced a new time-series with exogenous shifts in fiscal variables categorized between direct and indirect taxes, transfers, and other government spending.

Although these datasets have become popular in the recent econometric literature, they did not include emerging countries. Thus, David and Leigh (2018) constructed a narrative database of fiscal consolidations for fourteen Latin American and Caribbean economies from 1989 to 2016 to fill this gap. The authors examined the intentions and actions of policymakers as described in contemporaneous policy documents, identifying measures motivated primarily by deficit reduction and long-term fiscal health objectives. Such fiscal actions have not responded to developments that affected economic activity in the short run. Therefore, they may be utilized as exogenous shocks in estimating the impacts of fiscal adjustments.

In addition, David and Leigh (2018) included in the dataset policy actions motivated by other long-term objectives, such as changes in taxes that intend to reduce inequality, improve incentives, and increase efficiency, or based on a philosophical belief in the benefits of "small" government – as discussed in Romer and Romer (2010). Also, the fiscal expansions were assigned in the database with a negative sign.

Historical sources examined by the authors include reports by multilateral institutions,

[27] If a fiscal adjustment is a response to pressures generated by strong domestic demand, this budgetary policy measure will be endogenous to the economic activity.

[28] They did not include the Netherlands.

such as IMF Staff Reports and OECD Economic Surveys, budget documents,[29] and reports by Central Banks. In some cases, they supplemented these sources with information from Working Papers or other research documents.

The dataset built by David and Leigh (2018) includes 76 fiscal actions for LAC countries from 1989 to 2016 with annual frequency. Based on this sample, and similarly to the decomposition of Devries et al.'s (2011) OECD database carried out by Alesina et al. (2017), we analyzed the 65 tax-based fiscal packages for these 14 Latin American and Caribbean economies, and classified them into (i) 18 direct tax-based fiscal consolidations, (ii) 2 direct tax-based fiscal expansions, (iii) 39 indirect tax-based fiscal consolidations, and (iv) 6 indirect tax-based fiscal expansions. This approach was implemented through a careful assessment of David and Leigh's (2018) paper, IMF Staff Country Reports, budget documents and articles related to the public finances of these LAC economies, and other databases such as CEPALSTAT and IDB-CIAT Revenue Collection. Our sample included Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Jamaica, Mexico, Paraguay, Peru, and Uruguay.

The rest of this Chapter is structured as follows. Section 2.2 describes the motivation of the fiscal actions considered by David and Leigh (2018) and their budgetary effects. Section 2.3 presents the method we used to identify the fiscal austerity episodes and categorize them. Section 2.4 provides details for each fiscal package of the new dataset. Finally, section 2.5 tabulates the new series of fiscal consolidation as decomposed into direct and indirect tax-based.

## 2.2 David and Leigh (2018)'s approach

### 2.2.1 Motivation of measures

The tax-based packages presented in the narrative dataset by David and Leigh (2018) were motivated by the intention to reduce the budget deficit or to improve the long-term sound finances of the government rather than as a response to prospective conditions. The three main motivations identified by the authors from the documents they analyzed were the following:

1. Desire to reduce the budget deficit to ensure the sustainability of the public finances.

2. intention of offsetting a strong economic contraction, including in connection with a financial crisis.

[29] The *Informe de Finanzas Publicas* from Chile and Paraguay, *Marco Fiscal de Mediano Plazo* from Colombia, and *Marco Macroeconomico Multianual* from Peru.

3. Desire to restrict domestic demand for cyclical reasons.

Only motivation "1" is considered in selecting the fiscal packages included in the narrative dataset.

If the fiscal consolidation was offset by fiscal measures not primarily linked to long-term considerations, the authors assigned the episode to the dataset only if the total change generated budgetary savings (for an example, see "Chile – 2014" entry in section 4). In some cases, fiscal actions were motivated by other long-term objectives, such as tax changes that intend to reduce inequality, improve incentives, and increase efficiency, or based on a philosophical belief in the benefits of "small" government – as discussed in Romer and Romer (2010). The fiscal expansions associated with the motivations David and Leigh (2018) considered were assigned in the database with a negative sign.

### 2.2.2 Budgetary effects

David and Leigh (2018) utilized historical sources that presented retrospective and prospective descriptions of fiscal policy actions, including estimates of their likely budgetary impact, as sources to construct the narrative dataset. These documents provided evidence of the motivations behind each fiscal action when the decisions were taken. The authors relied on reports by multilateral institutions, such as IMF Country Reports and the OECD Economic Surveys, budget documents, and reports by Central Banks. In some cases, they supplemented these sources with information from Working Papers or other research documents.

Devries et al. (2011) and David and Leigh (2018) also distinguished permanent from temporary measures. The temporary measures were registered with a positive sign in the dataset (indicating budgetary savings) when they were implemented and a negative sign when they expired. As an example, the authors would assign a one-year temporary tax hike of $1 billion in year "t" as having an impact of $1 billion in the same year "t" and an impact of -$1 billion in year "t+1". A supposed permanent tax hike of $1 billion would be assigned as having an impact of $1 billion in the year "t" and zero after that. Therefore, as mentioned above, the budgetary effect may be positive and negative.

## 2.3 Decomposing the tax-based fiscal packages into direct- and indirect tax-based

Five different procedures were utilized to identify the fiscal packages' measures and categorize them. There is a hierarchy between them in the definition of episodes,

following the order from 1 to 5. If procedure 1 is insufficient to classify the episode, the second strategy is employed, and so on, until determining whether the fiscal consolidation is based on direct or indirect taxes. Table 2.1 shows which strategies were used to categorize each fiscal policy shock.

In the first one, the information needed to classify tax-based fiscal consolidations was presented by David and Leigh (2018). For instance, in the "Argentina – 1996" entry, David and Leigh (2018) stated that increases in fuel excises would provide about half of the additional revenue of the fiscal consolidation package and showed that other indirect taxes were implemented in this episode (tariffs on imports, reduction in tax rebates for exporters, and removal of subsidies for domestic producers of capital goods).

The second strategy is based on the description of the episodes in David and Leigh (2018) that were a continuation of fiscal packages previously implemented. See David and Leigh (2018), on page 9, for the "Argentina – 1997" entry: "*The fiscal consolidation initiated in 1996 continued in 1997, with tax measures totaling 0.75 percent of GDP. Fiscal consolidation was motivated by maintaining sound public finances (see entry for 1996 above).*" The tax that predominated in this situation was defined in the previous entry, "Argentina - 1996."

As a third strategy, we relied on David and Leigh (2018) as well as on IMF Country Reports to determine which tax category was predominant for each tax-based fiscal shock. For the "Bolivia – 2004" entry, the tax measures and their impacts (in % of GDP) were detailed in Box 2 of the 2004 3rd Stand-By Arrangement review report (IMF Country Report 04/193), on page 12. From the information shown in this report, we classified the episode as a fiscal consolidation of 2% of GDP mostly based on indirect taxes.

The fourth strategy was based on public budget documents, IMF Country Reports, and other research documents that provided the necessary information to categorize which tax was predominant in the fiscal package. For the "Chile – 1990" entry, we used cuadro III of the 2003 *Informe de Finanzas Publicas*, presented on page 50, to demonstrate the impact (in millions of 2001 dollars) of the tax measures implemented in this episode. Using this information, we classified this episode as a direct tax-based fiscal consolidation of 0.5% of GDP.

For 10 of the 65 tax-based fiscal packages in the sample, we could not determine the predominant tax category using the four strategies presented above. In these cases, we first identified the tax measures that were part of each one of these packages based on David and Leigh (2018), IMF Country Reports, budget documents, and other works

related to public finances for the 14 Latin American and Caribbean economies we analyzed. Then, we followed Fedelino et al. (2009)'s method for adjusting the economic cycle to verify the variation in % of GDP for each of the fiscal packages' tax categories. We present this strategy below.

Assuming that Y is GDP, $Y^*$ is potential PIB, and $\theta$ is the output gap, we have:

$$\theta = \frac{Y - Y^*}{Y^*} \tag{2}$$

From (2), we could obtain (3):

$$\frac{1}{1+\theta} = \frac{Y^*}{Y} \tag{3}$$

The cyclically adjusted fiscal revenue ($R^{CA}$) was obtained, in % of GDP, from the fiscal revenue (R) and the elasticity of this tax category to the output gap (e):[30]

$$\frac{R^{CA}}{Y} = \frac{R}{Y} * \left(\frac{Y^*}{Y}\right)^e \tag{4}$$

Inserting (3) in (4), we obtained (5):

$$\frac{R^{CA}}{Y} = \frac{R}{Y} * \left(\frac{1}{1+\theta}\right)^e \tag{5}$$

In order to calculate the cyclically adjusted revenue in % of GDP, we used revenue data from CEPALSTAT, IDB-CIAT Revenue Collection, IMF Staff Country Reports, budget documents and other works related to public finances, elasticities of these tax categories to the output gap estimated by Fricke and Süssmuth (2014) and Ardanaz et al. (2015), and a measure of the output gap obtained from Carrière-Swallow, David and Leigh (2021) for Latin-American economies.

Equation (6) shows the calculation of the fiscal adjustment, in % of GDP, for the tax measures contained in the fiscal packages we analyzed. Using this equation, we could verify which tax category was predominant for each episode:

$$Tax\ measure\ impact\ (in\ \%\ of\ GDP) = \left(\frac{R^{CA}}{Y}\right)_t - \left(\frac{R^{CA}}{Y}\right)_{t-1} \tag{6}$$

[30] If revenue elasticity equals one, revenues correlate perfectly with the cycle). If it equals zero, revenues are not affected by the cycle.

If there is any divergence between the total impact calculated for the tax-based fiscal packages and the impact presented by David and Leigh (2018), we deployed a proportional correction to obtain the same values presented by the authors for the fiscal packages.[31]

Table 2.1: Fiscal packages and decomposition strategies

| **1** | **2** | **3** | **4** | **5** |
|---|---|---|---|---|
| ARG (1996); BOL (1995); BRA (2015); CHL (2003); COS (1990, 1991, 1993, 1994); DOM (2006); ECU (1990, 2000); JAM (1992); PRY (2005); URY (2003). | ARG (1997); CHL (1991, 2004, 2015, 2016); JAM (1996, 2004, 2005); URY (1996, 2004, 2005). | BOL (2004, 2005); CHL (2014); COS (2016); ECU (1993); GTM (1995, 1996, 2013); PRY (2003, 2004, 2006); PER (2002, 2003); URY (1995). | CHL (1990); COL (2011, 2012); DOM (2007, 2011, 2013); GTM (2000, 2002); JAM (2012, 2013); MEX (1989, 2010, 2014); PRY (2014); PER (2011, 2012). | COL (2003); COS (1992, 1995, 1996); DOM (2004); PRY (1989, 2001); PER (1992); URY (1990, 2002). |
| (14) | (11) | (14) | (16) | (10) |

Note: Total number of observations in parentheses.

We classified as a direct tax every fiscal measure imposed on persons, corporations, enterprises, properties, and other assets that did not involve a transaction, including income, profits, capital gains, and property taxes. We also included in this category income tax credits and tax deductions. Indirect taxes are imposed on transactions of goods or services, including VAT, sales tax, excise duties, stamp duty, export or import taxes, financial transaction tax, and others. We also accounted for exemptions and tax rebates. We classified "tax administration measures" and "measures to combat fiscal evasion" as neutral if major details were not presented about them.[32]

## 2.4 Country-by-country summary of the fiscal packages

### 2.4.1 Argentina

**Argentina – 1996**

The 1996 fiscal consolidation consisted of a tax hike amounting to 0.25% of GDP, intending to reduce the fiscal deficit. The 1996 Article IV Consultation staff report (EBS/06/161) states that: "... *the Government is relying on a package of revenue measures that went into effect in late September 1996 and includes: increases in fuel excises–which would provide about half of the additional revenue; the elimination of some*

[31] As a robustness check, we implemented this strategy for all other fiscal consolidation episodes we had decomposed employing another approach (except the twenty cases that presented only one tax category). The results were not robust in 3 of the 35 episodes (Argentina 1996-97 and Peru 2011), and they are available upon request.

[32] Only 7 of more than 200 measures were considered neutral.

*corporate income tax exemptions and loopholes; increases in the rates of the corporate and personal income taxes; increases in tariffs on imports of capital goods consistent with the agreements under MERCOSUR; various actions to raise collections of social security contributions; a reduction in tax rebates for exporters; a removal of subsidies for domestic producers of capital goods; and steps to curtail outlays on family allowances (PM, 15). Also, Congress passed legislation whereby the revenue from the increase in fuel excises will not be shared with the provinces for the next two years (PM, IS). These measures are expected to yield about 1 percent of GDP on an annual basis.*"

As the tax measures were implemented at the end of September 1996, David and Leigh (2018) assigned a net impact of 0.25% of GDP in 1996 and 0.75% in 1997. From the citation above, note that increases in fuel excises would provide about half of the additional revenue of the fiscal consolidation package. Moreover, the other measures presented by the EBS/06/161 were indirect taxes (tariffs on imports, reduction in tax rebates for exporters, and removal of subsidies for domestic producers of capital goods.

Considering the information presented in this entry, we defined this episode as an indirect tax-based fiscal adjustment of 0.25% of GDP.

**Argentina – 1997**

As indicated in the previous entry, fiscal consolidation tax measures were implemented in September 1996 and continued in 1997, amounting to 0.75% of GDP in this last year.

Therefore, this package is also categorized as an indirect tax-based fiscal consolidation of 0.75% of GDP.

### 2.4.2 Bolivia

**Bolivia – 1995**

Fiscal adjustment consisted of tax hikes amounting to 0.9% of GDP. This impact is part of a tax reform presented to Congress in November 1994 intending to cover the cost of structural reforms, with expected revenue of 1.2% of GDP, offset by expenditure increases of 0.3% (David and Leigh 2018, 9). In the 1994 Article IV Consultation staff report (EBS/94/228), the Memorandum on Economic and Financial Policies, on page 48, presented that: "*A central element of the Government's program is to increase economic growth by transferring control of the largest public enterprises (oil, electricity, telecommunications, railway, airlines, and smelter companies) to the private sector through a*

*process of capitalization and privatization. The framework law for capitalization that was approved by Congress in March 1994 opens the companies to private investment and provides for the distribution of shares in the enterprises to the accounts of adult Bolivian citizens (to be established in newly created private pension funds). ...The macroeconomic framework for 1995-97 takes into account the costs associated with the capitalization and privatization of the major public enterprises (particularly severance payments) as well as expenditures related to reforms of the education, pension, civil service, and judicial systems. One-time costs of the reforms are estimated at about 3 ½ percent of GDP in 1995 and ½ percent of GDP a year in 1996 and 1997, and recurrent costs amount to 0.4 percent of GDP in 1995 and about 1.2 percent of GDP in 1996 and 1997.*"

David and Leigh (2018) listed the details of the measures that were implemented in this tax reform: i) increase in the rate of the transactions tax from 2% to 3%, with expected additional revenue of 0.9% of GDP; ii) an increase in the excise tax on vehicles from 10% to 20% and higher beer taxes, both effective in August and with expected additional revenue of 0.3% of GDP. As shown above, this impact was offset by an increase in expenditure.

From the information presented in this entry regarding the expected impact and the categories of the tax measures, we classify this episode as an indirect tax-based fiscal consolidation of 0.9% of GDP.

**Bolivia – 2004**

The 2004 package consisted of increases in taxes amounting to 2% of GDP, aiming to reduce the fiscal deficit as a part of a program supported by an IMF Stand-By Arrangement. The Supplementary Memorandum of Economic and Financial Policies of the Government of Bolivia, part of the IMF Country Report 04/193, on page 51, stated that: "*The 2004 program targets a reduction of the fiscal deficit after grants to 6.1 percent of GDP and to 9.7 percent of GDP before grants, while raising the level of pro-poor spending by 0.6 percent of GDP. This fiscal consolidation will be particularly challenging in light of expected increases in several spending categories owing to (i) improved implementation capacity by local governments and upcoming municipal elections (0.4 percent of GDP); (ii) increased interest payments resulting from the buildup of domestic debt since 2001 (0.3 percent of GDP); and (iii) larger pension payments resulting mostly from the incorporation into the system of eligible pensioners that had been postponed by previous administrations (0.1 percent of GDP). Against this background, we are implementing a large revenue package. We are also putting in place strong mechanisms to closely monitor and control expenditure in line with the findings of the IDB-World Bank's ongoing Public Expenditure Review (PER)*

*and a Poverty and Social Impact Analysis (PSIA) jointly conducted with the World Bank.*"

The tax measures and their impact (in % of GDP) are detailed in Box 2 of the 2004 3rd Stand-By Arrangement review report (IMF Country Report 04/193), on page 12, including: i) a new tax code, approved in September 2003, that allows for stronger enforcement capabilities and prompter resolution of tax disputes (tax administration effort of 0.3% of GDP); ii) a modification to Tax law 843 that intended to broaden the base of hydrocarbons taxation (direct tax measure amounting to 0.3% of GDP); iii) the tax regularization scheme accompanying the tax code generated larger than initially expected revenue in 2004, but the repeated adoption of regularization schemes could harm future tax collections (tax administration effort of about 0.8 percent of GDP); iv) a financial transaction tax approved in April 2004 with a rate of 0.3 percent on both debits and credits (indirect tax measure amounting to 0.6% of GDP).

From the above information, we categorized this entry as a fiscal consolidation mostly based on indirect taxes of 2% of GDP.

**Bolivia – 2005**

In 2005, the Bolivian government implemented tax hikes amounting to 4.1% of GDP motivated by the following objectives: i) reducing the fiscal deficit; ii) long-term considerations related to higher state participation in the hydrocarbons sector. The 2005 5th Stand-By Arrangement review report (IMF Country Report 05/146) presented these motivations on page 9: "*The authorities aim to reduce the fiscal deficit to 5¼ percent of GDP after grants in 2005, and limit nonconcessional financing to 1½ percent of GDP.*" In addition, as stated on page 54 of the 2005 5th Stand-By Arrangement review report (IMF Country Report 05/146): "*Approval by Congress of a Hydrocarbons Law that adopts a strategy on gas exports based on the national referendum including issuing the implementing regulations, regulating the taxation of hydrocarbons and providing an appropriate framework for developing the large hydrocarbon reserves.*"

The 2005 5th Stand-By Arrangement review report (IMF Country Report 05/146) showed that the increases in fuel excise taxes (indirect tax) had an expected yield of 1% of GDP. Moreover, Box 2 on page 14 of the 2005 6th Stand-By Arrangement review report (IMF Country Report 05/393) described the New Hydrocarbons Regime: "*In May 2005, a new hydrocarbons law introduced sharp changes to the legal framework, largely consistent with the results of a national referendum conducted in mid-2004. The new law introduced a production-based tax, the Impuesto Directo a los Hidrocarburos (IDH), which—together with the existing royalties—implies a flat production-based tax*

*rate of 50 percent for all fields. Moreover, the role of YPFB has been expanded into that of a more active market participant as well as a regulator. Specifically, following the required implementing regulations, the law provides that YPFB will intermediate all contracts to export natural gas and would become the only importer and wholesale distributor of fuel products."* David and Leigh (2018), based on Table 15 on page 43 of the 2006 Memoria Fiscal report elaborated by the Ministry of Finance, assumed a 3.1% of GDP revenue collection from the implementation of the IDH (direct tax) in 2005.

Therefore, as the revenue raised by the IDH was predominant in this package, we defined this episode as a fiscal consolidation of 4.1% of GDP, mostly based on direct taxes.

### 2.4.3 Brazil

**Brazil – 2015**

According to David and Leigh (2018), part of the 2015 fiscal consolidation episode consisted of tax hikes of 0.4% of GDP, offset by tax cuts of 0.1% of GDP, amounting to a net impact of 0.3%. As shown in the 2014 Article IV Consultation staff report (IMF Country Report 15/121), on page 12, these tax measures intended to reduce public debt: "*Over December 2014−January 2015, a new economic team was brought on board with a mandate to strengthen macroeconomic policies and restore credibility. The team announced an ambitious fiscal adjustment strategy to bring the primary surplus to 1.2 percent of GDP in 2015 and to at least 2 percent of GDP in 2016 and 2017. This strategy, together with the ending of policy lending from the treasury to public banks, aims to stabilize and then reduce gross public debt.*"

On page 13 of the same report, box 2 indicates that: "*On the revenue side, taxes were raised on fuels, household credit operations, car sales, imports, and cosmetics, and a planned revision of PIT brackets was vetoed by the President (yielding 0.4 percent of GDP in total).*"

David and Leigh (2018) also presented other tax measures, such as the reinstatement of the IPI tax on several products, the increase in the financial transactions tax (IOF) on new loans for individuals and increases in fuel taxes (Decree 8.395 of January 2015). Note that all this additional revenue is based on indirect taxes.

Therefore, we classified this episode as an indirect tax-based fiscal consolidation of 0.3% of GDP.

### 2.4.4 Chile

**Chile – 1990**

1990 fiscal consolidation was based on tax hikes partially offset by social expenditure increases, aiming to maintain sound public finances and amounting to 0.5% of GDP (David and Leigh 2018, 14). On page 18, the 1993 Recent Economic Developments report (SM/93/135) stated that: "*To maintain public finances on a sound footing while meeting the commitments regarding expenditure, the new Government proposed and Congress approved in mid-1990 tax measures yielding additional annual revenue of about 2 percent of GDP.*"

On page 5, the 1990 Article IV Consultation staff report (SM/91/50) presented tax measures approved by Congress in June 1990, expecting to raise 1.5% of GDP in revenues in the second half of 1990. The same report states that around 2/3 of these measures would be designated to finance additional social expenditures. Consequently, David and Leigh (2018) only consider for this entry revenues that were not earmarked (0.5% of GDP for 1990 and 0.17% for 1991).

From *Cuadro III* of the *2003 Informe de Finanzas Publicas*, on page 50, we extracted the information necessary to demonstrate the impact (in millions of 2001 dollars) of these tax measures by category. Table 2.2 indicates that the net effect of direct taxes predominates in this package.

Table 2.2: Tax measures impact (in millions of 2001 dollars) for "Chile – 1990" entry

| **Increases in direct taxes** | **Decreases in direct taxes** | **Increases in indirect taxes** | **Decreases in indirect taxes** |
|---|---|---|---|
| CIT rate from 10% to 15%: $ 507 | Income tax credit: $ 49 | VAT rate from 16% to 18%: $ 134 | Excise tax: $ 80 |
| PIT: $ 81 | Mortgage dividends: $ 7 | Fuel tax: $ 218 | Tariffs: $ 371 |
| *Ley de pensiones*: $35 | PIT: $ 13 | | Taxes associated with tolls paid by buses and trucks: $ 10 |
| Agricultural tax: $ 38 | CIT: $ 155 | | |
| | Real estate tax: $ 36 | | |
| | | | |
| Sum: $ 661 | Sum: $ 260 | Sum: $ 432 | Sum: $ 470 |
| **Net effect of direct taxes: + $401** | | **Net effect of indirect taxes: - $ 38** | |

Source: *Cuadro III* of the *2003 Informe de Finanzas Publicas*, on page 50.

From the information presented in this entry, we categorized this episode as a direct tax-based fiscal consolidation of 0.5% of GDP.

**Chile – 1991**

The fiscal consolidation episode of 1990 continued in 1991, motivated by the intention of maintaining sound public finances, with tax measures totaling 0.17 percent of GDP. As "Chile – 1990" indicates, this episode is categorized as a direct tax-based fiscal adjustment of 0.17% of GDP.

**Chile – 2003**

Tax hikes of 0.2% of GDP were implemented to reduce the deficit and comply with the existing 2003 fiscal rule (David and Leigh 2018, 15). On page 65, the 2003 Article IV Consultation staff report (IMF Country Report 03/303) presented these motivations: "*The government is committed to an intertemporal fiscal policy target, in the form of a structural surplus equivalent to 1 percent of GDP, and in fact the structural fiscal balance has steadied around this target. The authorities' commitment to the fiscal target is reflected in the recently approved 1 percent increase in the VAT, to offset the increased spending caused by new social programs and by some structural reductions in tax revenues resulting from recent and prospective trade agreements.*"

On page 15, David and Leigh (2018) listed the tax measure that was implemented and its expected revenue: "*The effective VAT rate (measured as VAT receipts divided by domestic demand) increased by 0.2 percentage points in 2003 to 8.3 percent and by an additional 0.5 percentage points in 2004 to 8.8 percent. This would translate into increases in revenues amounting to 0.2 percent of GDP in 2003 and 0.4 percent in 2004 in our assessment of the impact of the tax hikes.*"

See that all the impact of this package is related to VAT changes. Considering this information, we defined this episode as an indirect tax-based fiscal consolidation of 0.2% of GDP.

**Chile – 2004**

The fiscal consolidation implemented in 2003 continued in 2004, aiming to reduce the deficit to adhere to the structural fiscal balance rule, with tax measures totaling 0.4 percent of GDP. As "Chile – 1990" indicates, this episode is categorized as an indirect tax-based fiscal adjustment of 0.4% of GDP.

**Chile – 2014**

According to David and Leigh (2018), the tax reform approved in September 2014 had an expected 3 percent of GDP revenue by 2018. One-third of this package was directed toward closing the structural deficit, and the rest to finance additional expenditures linked to the structural reform agenda (education and health).

Box 2 of the 2014 Article IV Consultation staff report (IMF Country Report 14/218), on page 19, presents the key measures of this tax reform and their expected revenue. We utilized this information to build Table 2.3 (see below). Note that the expected revenue based on direct taxes (PIT of undistributed profits, increase in CIT rate, and real-estate related taxes) reaches almost 1.8% of GDP, corresponding to around 60% of the tax reform. In the same report, the statement made by Alvaro Rojas-Olmedo (Executive Director for Chile in the IMF) and Yan Carrière-Swallow (Advisor of the IMF) indicated that the reform focused on shifting the tax burden towards direct taxes.

Table 2.3: Tax Reform Key Measures for "Chile – 2014" entry

| **Measure** | **Category (direct or indirect tax)** | **Impact (in % of GDP)[a]** |
|---|---|---|
| **PIT of undistributed profits[b]** | Direct | 0.80 |
| **Increase in CIT rate** | Direct | 0.59 |
| **Measures to reduce evasion and avoidance** | Other | 0.52 |
| **Real-estate related taxes** | Direct | 0.39 |
| **Diesel vehicles' import tax and emission tax** | Indirect | 0.17 |
| **Increase in stamp tax** | Indirect | 0.15 |
| **Alcoholic and low nutritional value beverages tax** | Indirect | 0.15 |
| **Other measures** | Other | 0.25 |
| **Total** | | 3.02 |

Source: Box 2 of IMF Country Report 14/218, on page 19, based on Ministry of Finance data
a: steady state level
b: includes reduction of maximum personal income tax rate (-0.1% of GDP)

The *Informe Financiero de la Reforma Tributaria* (2014) estimated additional revenues of 0.29% of GDP in 2014, 0.53% in 2015, 0.94% in 2016, 0.68% in 2017, and 0.73% in 2018. These would be generated by the tax reform. As only 1/3 of these reform-related revenues were associated with the motivation to reduce the deficit and other long-run

considerations, the values assigned for this fiscal consolidation episode in the narrative dataset were the following (David and Leigh 2018, 17): 0.1% of GDP for 2014 (0.3% divided by three); 0.18 percent of GDP for 2015 (0.53% divided by three); 0.31 percent of GDP for 2016 (0.94% divided by three).

Considering the tax measures implemented in this package and their respective impacts, we defined this episode as a direct tax-based fiscal adjustment of 0.1% of GDP.

**Chile – 2015**

The fiscal consolidation implemented in 2014 continued in 2015, aiming to close the structural deficit and the rest to finance additional expenditures linked to the structural reform agenda (education and health). As indicated in the "Chile – 2014" entry, we classified this episode as a direct tax-based fiscal adjustment of 0.18% of GDP.

The fiscal consolidation implemented in 2014 continued in 2016, aiming to close the structural deficit and the rest to finance additional expenditures linked to the structural reform agenda (education and health). As indicated in the "Chile – 2014" entry, we categorized this episode as a direct tax-based fiscal consolidation of 0.31% of GDP.

### 2.4.5 Colombia

**Colombia – 2003**

According to David and Leigh (2018), this fiscal consolidation package was implemented as aiming to reduce the deficit and public debt, with tax measures amounting to 1.6% of GDP, offset by higher capital expenditures (0.5% of GDP). Thus, the net effect of the tax hikes corresponded to 1.1% of GDP. On page 6, box 1 of the 2003 First Stand-by Arrangement review report (IMF Country Report 03/181) presented the key elements of the fiscal package: "*The economic program for 2003-04 seeks to strengthen fiscal policy to ease the public debt burden and to advance structural reforms, with a view to reducing the economy's vulnerability and promoting more rapid economic growth.*"

On page 8, the same report listed the expected revenue of the tax reform approved in late 2002, 1.6% of GDP in 2003, and the following measures: i) a one-time wealth tax; ii) an income tax surcharge; iii) broadening of the VAT base. As highlighted by David and Leigh (2018) on page 19, table 4 of the 2004 Third Stand-By Arrangement review report (IMF Country Report 04/199) on page 26 indicates that capital expenditures increased by 0.5% of GDP, offsetting the impact of the tax measures.

To estimate the effect of these tax measures, we relied on revenue data from CEPALSTAT for 2002 and 2003 (in % of GDP), elasticities of tax to the output gap for Colombia estimated by Fricke and Süssmuth (2014) and Ardanaz et al. (2015), and a measure of the output gap from Carrière-Swallow, David and Leigh (2021) for Latin-American economies. Table 2.4 presents details of the calculations of our estimates.

Table 2.4: Impact of the tax measures for "Colombia – 2003" entry (in % of GDP)

| **Current revenue (in % of GDP)** | **2002** | **2003** | **A: 2002 (adjusted)** | **B: 2003 (adjusted)** | **B – A: Impact (in % of GDP)** | **Adjustment to David and Leigh's (2018) calculations** |
|---|---|---|---|---|---|---|
| One-time wealth tax[a] | 1.6 | 1.6 | 1.6 | 1.6 | 0 | 0 |
| Income tax surcharge[b] | 4.1 | 4.3 | 4.18 | 4.38 | 0.2 | 0.27 |
| Value-added tax[c] | 4.9 | 5.5 | 5.01 | 5.61 | 0.6 | 0.83 |
| Total impact | | | | | 0.8 | 1.1 |

Source: Own calculations based on CEPALSTAT data.
The adjusted values for 2002 and 2003 are the cyclically adjusted tax revenues in % of GDP. For 2002, the output gap is -0.01111, and for 2003 it is -0.00982.
a: other taxes elasticity = 0 (Ardanaz et al. 2015).
b: income tax elasticity = 1.841 (Fricke and Süssmuth 2014).
c: VAT elasticity = 1.957 (Fricke and Süssmuth 2014).

From Table 2.4 and the information presented in this entry, we classified this episode as an indirect tax-based fiscal consolidation of 1.1% of GDP.

**Colombia – 2011**

A tax reform motivated by long-term considerations and to ensure fiscal sustainability was implemented in 2011 with expected revenues of 0.4% of GDP. On page 4, the 2011 Article IV Consultation staff report (IMF Country Report 14/218) explained that: "*Elections took place in May and June 2010, and a new administration (of President Santos) took office in early August. The central bank governor remained in his position (as stipulated by the central bank law), and the new Minister of Finance launched initiatives that supported his predecessor's efforts to strengthen the fiscal framework (e.g., by adopting a fiscal package that included rationalizing tax incentives and submitting to congress important structural fiscal reforms).*" The 2011 *Marco Fiscal de Mediano Plazo* also presented some of the objectives of this reform, such as the formalization of firms and labor relations, improvements in productivity and competitiveness of the local economy,

and ensuring fiscal sustainability.

David and Leigh (2018) presented the tax measures implemented in this fiscal consolidation package, amounting to 0.4% of GDP: i) financial transactions tax (*Gravamen a los Movimientos Financieros* - GMF); ii) eliminated tax credits (in 2012); iii) increases in net wealth tax. The authors also cited that revenue losses would result from (iv) a reduction of import tariffs (*Gravamen Arancelario*) and (v) electricity surcharges. The last one was not considered for the estimations because, as shown on page 52 of the *2011 Marco Fiscal de Mediano Plazo*, it only generated effects from 2012.[33]

On page 109 of the same report, Table 2.9 (*Cuadro 2.9 – Ingresos tributarios del Gobierno Nacional Central*) showed that closing loopholes in the financial transaction tax would generate an estimated impact of approximately 0.25% of GDP. The reduction of import tariffs would decrease revenues by 0.3% of GDP. Regarding the changes in net wealth tax, a report from a Colombian institution dedicated to the control of public finances (*Contraloría General de la Republica*), entitled "*FUENTES Y USOS DEL IMPUESTO DE PATRIMONIO 2011-2014*," presented on page 5 an estimated revenue of $ 10441.87 bi in LCU from 2011 to 2014. Considering the average of $ 2610.46/year, this represented around 0.4% of the Colombian GDP in 2011.[34][35] Finally, as shown on page 6 of the IMF Country Report 14/218, the tax credit elimination occurred only in 2012: "*President Santos used flood-related state of emergency powers to adopt reforms that broadened the tax base (by eliminating the fixed asset tax credit in 2012...).*"

From the information presented in this entry, note that the tax measures related to net wealth tax were predominant. Therefore, we categorized this episode as a direct tax-based fiscal consolidation of 0.4% of GDP.

**Colombia – 2012**

The fiscal consolidation implemented in 2011 continued in 2012, motivated by long-run considerations and to ensure fiscal sustainability, with an expected revenue of 0.8% of GDP (David and Leigh 2018, 20).

The footnote of Table 3a on page 3a of the 2011 Article IV Consultation staff report (IMF Country Report 14/218) presented the expected revenue raised from the elimination

[33] *"Adicionalmente, la ley elimina la sobretasa de 20% al consumo de energía de los usuarios del sector industrial a partir de 2012."*

[34] According to the World Bank Database: $ 684.630 bi.

[35] To match value presented by David and Leigh (2018) for this episode (0.4% of GDP), we assumed a net wealth tax impact of 0.45% of GDP.

of the fixed asset tax credit: "*The increase in revenue of 0.8 percent of GDP in 2012 reflects almost entirely the elimination of the fixed asset tax credit, which was part of the end-2010 tax reform.*" The *2011 Marco Fiscal de Mediano Plazo* on page 198 presented more details of this measure, stating that it was related to a reduction in the part of investment in fixed assets that may be utilized as a tax credit in the deduction of the income tax.[36]

The authors also mentioned a revenue-neutral tax reform approved at the end of 2012, motivated by long-run considerations. According to Box 5 on page 27 of the 2015 Article IV Consultation staff report (IMF Country Report 15/142): "*The 2012 reform aimed to improve progressivity and reduce the tax burden on labor which was hindering formality and competitiveness while being revenue neutral.*" Because it is revenue neutral, it is assigned as a zero value.

Therefore, eliminating the fixed asset tax credit is the only measure in this episode, so we classified this entry as a direct tax-based fiscal consolidation of 0.8% of GDP.

### 2.4.6 Costa Rica

**Costa Rica – 1990**

David and Leigh (2018) estimated an increase of 1.5% of GDP in revenues generated from tax measures implemented in the 1990 fiscal consolidation episode in Costa Rica, motivated by the need to reduce the deficit and ease balance of payments pressures.

On pages 8 and 9, the 1990 Article IV consultation staff report (EBS/91/40) lists the revenue measures implemented in June 1990: i) an increase to 10% in minimum import duties on raw materials and intermediate and capital goods; ii) an 80% increase in the tax on banana exports; iii) an increase in the range of 17-22% in the prices of basic grains sold by the CNP (*Consejo Nacional de Producción*); iv) adjustments in the range of 20-32% in the prices of petroleum products, electricity, and telephone tariffs; v) in response to increase in international fuel prices, there were further

[36]Los beneficios en el impuesto sobre la renta están determinados de acuerdo con la afectación de la obligación tributaria de los declarantes y según la Ley tributaria están clasificados en: Deducciones, Exenciones y Descuentos. Como principales beneficios se encuentran la deducción del 40% por inversión en activos fijos reales productivos, las rentas exentas y los descuentos tributarios. Los dos primeros, afectan la base o ingreso gravable del contribuyente, mientras que los descuentos tributarios, disminuyen el impuesto reconocido directamente.Con la Ley 1370 el porcentaje de la Deducción desciende al 30% de la inversión realizada. A partir del año gravable 2011 la Deducción desaparecerá con excepción de las empresas que hayan firmado contratos de estabilidad jurídica y entre las normas estabilizadas se incluye la de la Deducción.

increases of around 40% in petroleum product prices during the period August-December.

Given that all measures were based on indirect taxes, we categorized this episode as an indirect tax-based fiscal consolidation of 1.5% of GDP.

**Costa Rica – 1991**

This fiscal consolidation episode consisted of tax measures with an expected net revenue impact of 3.1% of GDP, motivated by reducing the deficit as a continuation of the 1990 program (David and Leigh 2018, 23).

The 1990 Article IV consultation staff report (EBS/91/40), on page 15, and the 1992 Article IV consultation staff report (EBS/92/5), on page 7, presented the measures that were implemented in this revenue package: i) broadening of the base of the sales tax to cover electricity charges and petroleum sales and a temporary increase in the tax rate from 10 to 13%, with an estimated impact of 0.8% of GDP[37] in 1991; ii) an annual impact of 0.2% of GDP (0.1% in 1991 and 0.1% in 1992) generated by the implementation of a progressive tax on pensions paid by the public sector, an increase in the level of presumptive income of professionals for tax purposes, and steps to improve tax collections; iii) in 1991, central government revenue was also boosted by the full-year impact of the measures introduced in mid-1990, amounting to 1.5% of GDP; iv) an imposition of a 10% temporary import surcharge with an estimated impact of 0.7% of GDP from January to July 1991.

Considering the above information, we categorized this episode as an indirect tax-based fiscal consolidation of 3.1% of GDP.

**Costa Rica – 1992**

On pages 24 and 25, David and Leigh (2018) stated, "*Fiscal consolidation consisted of tax increases amounting to 0.5 percent of GDP on a net basis. The measures were taken with the objective of reducing the deficit as a continuation of the program that started in 1990.*"

The authors also presented the tax measures they identified from IMF reports:

1. Reduction of the sales tax rate from 13 to 12 percent.

[37]Initially, the estimated impact was 1.2% of GDP. However, there were shortfalls in the collections amounting to 0.4% of GDP due to delays in implementing the temporary increase in the tax rate from 10 to 13%.

2. Extension of the sales tax to fuel imports, construction materials, and industrial and commercial electricity purchases.

3. Reduction of about 50% in income tax exemptions.

4. Elimination of the temporary 10% import surcharge.

5. Reduction of about 50% in import duty exemptions.

6. Consumption duties on selected items were increased by 5-10 percent, and the import duty on motor vehicles has been restructured to reduce the incidence of tax evasion.

They also mentioned that fines and penalties for tax evasion were introduced in 1992. As we could not identify the tax categories involved in these measures, we assumed them as neutral. We did not consider them in the calculation presented below.

To estimate the effect of these revenue measures, we based on data from CEPALSTAT for 1991 and 1992 (in % of GDP), elasticities of tax to the output gap for Costa Rica estimated by Ardanaz et al. (2015), and output gap obtained from Carrière-Swallow, David and Leigh (2021) for Latin-American economies. Table 2.5 presents detailed our estimates.

Table 2.5: Impact of the tax measures for "Costa Rica – 1992" entry (in % of GDP)

| **Current revenue (in % of GDP)** | **1991** | **1992** | **A: 1991 (adjusted)** | **B: 1992 (adjusted)** | **B – A: Impact (in % of GDP)** | **Adjustment to David and Leigh's (2018) calculations** |
|---|---|---|---|---|---|---|
| Net effect of sales taxes[a] | 4.00 | 4.43 | 4.10 | 4.42 | 0.32 | 0.30 |
| Net effect of taxes on international trade[a] | 2.54 | 2.83 | 2.60 | 2.82 | 0.22 | 0.20 |
| Reduction in income tax exemptions[b] | 1.66 | 1.66 | 1.66 | 1.66 | 0 | 0 |
| Total impact | | | | | 0.54 | 0.50 |

Source: Own calculations based on CEPALSTAT data.
The adjusted values for 1991 and 1992 are the cyclically adjusted tax revenues in % of GDP. For 1991, the output gap is -0.0312, and for 1992 it is 0.00234.
a: indirect tax elasticity = 0.8 (Ardanaz et al. 2015).
b: other taxes elasticity = 0 (Ardanaz et al. 2015).

From Table 2.5 and the information presented in this entry, we classified this episode as

an indirect tax-based fiscal consolidation of 0.5% of GDP.

**Costa Rica – 1993**

Sales taxes were increased temporarily as part of the 1991-92 revenue package. These taxes were reduced in 1993 (David and Leigh 2018, 25).

The 1993 Article IV consultation staff report (EBS/93/45), on pages 5 and 6, listed the measures of this revenue package: i) reduction of the sales tax rate from 12 to 11% with effect from January 1993 (-0.5% of GDP); ii) cuts in the banana export tax (-0.1% of GDP); iii) full-year impact of the 1992 revenue package (0.2% of GDP); iv) increase in consumption duties on selected items (0.1% of GDP).

Considering the category of the measures included in the tax cuts, we defined this episode as an indirect tax-based fiscal expansion of 0.3% of GDP.

**Costa Rica – 1994**

Sales taxes were increased temporarily as part of the 1991-92 revenue package. These taxes were reduced in 1994 (David and Leigh 2018, 26).

On page 2, the 1994 Article IV consultation staff report (SM/94/273) states that the sales tax rate was reduced from 13 percent in 1991 to 10 percent in January 1994, amounting to a revenue of around 1.5% of GDP by the end of 1994.

Considering the one-year impact of the reduction in sales tax rate, we assigned this entry as an indirect tax-based fiscal expansion of 0.5% of GDP.

**Costa Rica – 1995**

The fiscal adjustment consisted of tax hikes amounting to 1% of GDP. David and Leigh (2018), on page 26, stated that these measures were taken to reduce the deficit and for long-run considerations. According to the 1998 Recent Economic Developments Report on Costa Rica (IMF Country Report 98/45), a major step was the approval of a new tax code (*Ley de Justicia Tributaria*, Law No. 7535 of 1 August 1995) in September 1995, which was able to improve efficiency and equity in the tax system. WTO (2001), on page 72, stated that the Tax Adjustment Act (*Ley de Ajuste Tributario*, Law No. 7543 of 14 September 1995) introduced a series of amendments to the Income Tax Act and the General Sales Tax Act.

These reforms restructured the prevailing tax system. David and Leigh (2018), based on IMF reports, presented the revenue measures of these packages:

1. An increase in the sales tax rate from 10 to 15%
2. A new export tax structure for coffee which captures part of the windfall from higher coffee prices.
3. A one-percent tax on the gross assets of corporations.
4. Introduction of a series of amendments to the Income Tax Act.
5. Unification of the tax rate on company profits.

Because the 1995 fiscal consolidation package continued in 1996, we estimated the joint effect of the 1995-96 tax measures based on revenue data from the Ministry of Finance of Costa Rica and IMF estimates for 1994 and 1996 (in % of GDP), elasticities of tax to the output gap for Costa Rica estimated by Ardanaz et al. (2015), and output gap obtained from Carrière-Swallow, David and Leigh (2021) for Latin-American economies. Table 2.6 presents details of the calculations of our estimates.

Table 2.6: Impact of the tax measures for "Costa Rica – 1995" and "Costa Rica – 1996" entries (in % of GDP)

| **Current revenue (in % of GDP)** | **1994** | **1996** | **A: 1994 (adjusted)** | **B: 1996 (adjusted)** | **B – A: Impact (in % of GDP)** | **Adjustment to David and Leigh's (2018) calculations[d]** |
|---|---|---|---|---|---|---|
| Sales taxes[a] | 5.1 | 7.1 | 5.05 | 7.23 | 0.31 | 1.095 |
| Taxes on international trade (exports)[a] | 0.3 | 0.3 | 0.30 | 0.31 | 0.01 | 0.004 |
| Tax on gross assets of corporations[b] | 0.1 | 0.1 | 0.10 | 0.10 | 0.00 | 0.000 |
| Income and profit taxes[c] | 2.7 | 2.9 | 2.63 | 3.03 | 0.40 | 0.201 |
| Total impact | | | | | 2.59 | 1.30 |

Source: Own calculations based on the Ministry of Finance of Costa Rica data and IMF estimates.
The adjusted values for 1994 and 1996 are the cyclically adjusted tax revenues, in % of GDP. For 1994, the output gap is 0.013076, and for 1996 it is -0.02167.
a: indirect tax elasticity = 0.8 (Ardanaz et al. 2015).
b: we employed "property tax" data as a proxy; other taxes elasticity = 0 (Ardanaz et al. 2015).
c: average of the PIT and CIT elasticities = [(2.1+1.9)/2] = 2 (Ardanaz et al. 2015).
d: impact of 1% of GDP in 1995 and 0.3% in 1996.

From Table 2.6 and the information presented in this entry, we classified this episode as a fiscal consolidation mostly based on indirect taxes of 1% of GDP.

**Costa Rica – 1996**

The fiscal consolidation package of 1995 continued in 1996, motivated by maintaining sound public finances, with tax measures totaling 0.3 percent of GDP. As indicated in the "Costa Rica - 1995" entry, this episode is categorized as an indirect tax-based fiscal adjustment of 0.3% of GDP.

**Costa Rica – 2016**

Tax hikes of 0.2% of GDP were implemented to reduce debt (David and Leigh 2018, 28). On page 15, the IMF Country Report 16/131 stated: "*Indeed, the authorities are pursuing a sizable reduction in the deficit in 2016 as part of a gradual path toward fiscal sustainability.*"

On page 19, the 2016 Article IV consultation staff report on Costa Rica (IMF Country Report 16/131) presented a box with the revenue measures of the fiscal consolidation package submitted to Congress, including VAT and income taxes and anti-tax evasion measures. However, David and Leigh (2018), on page 29, stated: "(...) *the government was not able to obtain support in Congress to pass the VAT and income tax reform. As a result, most of the consolidation efforts focused on the containment in the wage bill growth and efforts to combat tax evasion.*" According to page 9 of the 2017 Article IV consultation staff report on Costa Rica (IMF Country Report 17/156): "(...) *the government's determination to contain wage bill growth and lower personal income tax evasion allowed a reduction in the primary deficit of about ½ percent of GDP to 2½ percent of GDP last year, imparting an equivalent negative fiscal impulse.*"

Because the only tax measure of the 2016 fiscal consolidation package was the effort to lower PIT tax evasion, amounting to 0.2% of GDP (according to IMF Country Report 16/131, page 19), we categorized this entry as a direct tax-based fiscal consolidation of 0.2% of GDP.

### 2.4.7 Dominican Republic

**Dominican Republic – 2004**

This fiscal consolidation package was implemented to reduce the debt level in the

long-run, with tax measures amounting to 0.5% of GDP (David and Leigh 2018, 30). According to the 2009 Article IV consultation staff report on Dominican Republic (IMF Country Report 10/135), on Box 4 of page 26, "*process of fiscal consolidation began after the 2003 crisis, aimed at reducing the consolidated public debt-to-GDP ratio from close to 60 percent of GDP to its pre-crisis level of 25 percent of GDP.*"

The 2004 Letter of Intent of the government of Dominican Republic [38] stated that: "*To achieve the fiscal objective for 2004, the government has put in place a policy package equivalent to 2$\frac{1}{2}$ percent of GDP, consisting of about $\frac{1}{2}$ percent of GDP of tax measures and 2 percent of GDP of spending cuts.*"

The same document listed the revenue measures of this fiscal adjustment package:

1. Increases in excise tax rates on alcohol, tobacco, and other products.
2. Elimination of income tax exemptions for interest accruing to corporations on central certificates and income of savings and loan associations.
3. Regularization of tax measures established by decree earlier in 2003, including a five percent tax on exports of goods and services for six months, a two percent import surcharge, and an increase in the airport exit tax.

To estimate the effect of these tax measures, we based on revenue data from CEPALSTAT for 2003 and 2004 (in % of GDP), elasticities of taxes to the output gap for Dominican Republic estimated by Ardanaz et al. (2015), and output gap obtained from Carrière-Swallow, David and Leigh (2021) for Latin-American economies. Table 2.7 details the calculations of our estimates.

[38] Accessed on 6/16/2023: https://www.imf.org/external/np/loi/2004/dom/01/index.htm.

Table 2.7: Impact of the tax measures for "Dominican Republic – 2004" entry (in % of GDP)

| **Current revenue (in % of GDP)** | **2003** | **2004** | **A: 2003 (adjusted)** | **B: 2004 (adjusted)** | **B – A: Impact (in % of GDP)** | **Adjustment to David and Leigh's (2018) calculations** |
|---|---|---|---|---|---|---|
| Excise taxes[a] | 2.3 | 2.3 | 2.39 | 2.46 | 0.07 | 0.025 |
| Taxes on international trade[a] | 2.7 | 3.8 | 2.82 | 4.07 | 1.25 | 0.475 |
| Elimination of income tax exemptions to corporations[b] | 1.4 | 1.2 | 1.48 | 1.31 | -0.17[c] | 0 |
| Total impact | | | | | 1.32 | 0.5 |

Source: Own calculations based on CEPALSTAT data.
The adjusted values for 2003 and 2004 are the cyclically adjusted tax revenues in % of GDP. For 2003, the output gap is -0.0299; for 2004, it is -0.048.
a: indirect tax elasticity = 1.4 (Ardanaz et al. 2015).
b: CIT elasticity = 1.8 (Ardanaz et al. 2015).
c: The proxy employed to calculate the changes generated by "the elimination of income tax exemptions for interest accruing to corporations on central certificates and income of savings and loan associations" was "taxes on income, profits and capital gains (corporations and enterprises)." However, as it is a more comprehensive measure and has not been able to capture these changes, indicating a fiscal expansion, we assigned a zero value to this entry for the total calculation of the fiscal adjustment.

From Table 2.7 and the information presented in this entry, we defined this episode as an indirect-tax-based fiscal consolidation of 0.5% of GDP.

### Dominican Republic – 2006

A tax reform motivated by long-run considerations and approved in December 2005 generated a fiscal expansion of 0.8% of GDP in 2006 on a net basis (David and Leigh 2018, 31).

The authors listed the tax measures and their impact, in percentage of GDP, on page 31:

1. Ratification of a free trade agreement DR-CAFTA (-0.3%).
2. Elimination of the foreign exchange commission (-2.7%).
3. Elimination of some VAT exemptions (0.4%).
4. New and higher excise taxes (1.3%).
5. Temporary increase in CIT and PIT rates (0.8%).

Given the above information, we categorized this episode as an indirect tax-based fiscal expansion of 0.8% of GDP.

**Dominican Republic – 2007**

According to David and Leigh (2018), the fiscal consolidation consisted of tax hikes amounting to 0.9% of GDP, introduced to improve the primary balance in the context of an IMF supported program.

BCRP (2007a), on page 4, listed the revenue measures approved by the Congress in December 2006: i) rationalizing excises to reduce distortions and increase tax rates on alcohol, cigarettes, and some fuels; ii) including excises in the VAT base, in line with best international practices; iii) tax administration measures, with an expected revenue of 0.6% of GDP.[39]

Measures "i" and "ii" listed above were expected to raise 0.9% of GDP in revenues. However, due to the June 2007 tax package, excise tax measures amounted to 0.3% of GDP. David and Leigh (2018), on page 31, presented details regarding these changes: "*(...) in June 2007 the President submitted to congress tax measures that reduced excise and income tax rates and established a limited tax amnesty. (...) As far as the reduction in income tax rates is concerned, the report indicates that it was not expected to have a significant impact on revenues in 2007. (...) Table 6b on page 25 of the report for the 5th and 6th SBA reviews (EBS/07/12) presents the revenue forecasts as of February 2007 incorporating the impact of the end-2006 tax measures. It indicates that excise tax revenue would increase by 0.9 percent of GDP in 2007. Table 4b on page 21 of the 7th SBA review report (EBS/07/79) suggests a milder increase of 0.3 percent of GDP, implying a difference of 0.6 percent of GDP, which we attribute to the June 2007 tax package.*"

Considering the category of the measures included in the tax hikes, we classified this episode as an indirect tax-based fiscal adjustment of 0.9% of GDP.

**Dominican Republic – 2011**

Tax measures implemented in this fiscal consolidation episode were motivated to reduce

[39]BCRP (2007b), on page 1, stated that most of the tax administration measures affected ITBIS (i.e., VAT) collection, indicating that it impacted mainly indirect taxes: *"El mejor desempeño de los ingresos fiscales reflejan principalmente un aumento de la recaudación asociada a los mayores precios del níquel (del cual el país es exportador neto), y en menor medida, las mejoras en la administración tributaria, especialmente del ITBIS, como consecuencia de la implementación del sistema de comprobantes fiscales."*

the public debt and amounted to 0.44% of GDP. According to Article IV consultation staff report on Dominican Republic (IMF Country Report 10/135), on pages 24 and 25: "*The program's objectives are to pursue a countercyclical policy at the beginning of the program and then to switch focus to sustainability and structural issues in the remaining period of the program as laid out during the surveillance discussions. (...) Broadly speaking, the program will cover 10 quarters (from 2009:Q4 to 2010:Q1). Countercyclical policies will be the main policy issue in about 30 percent of the time covered by the program (Q4-2009 to Q2-2010), whereas sustainability issues will be the main policy concern in the remaining 70 percent of the time (Q3-2009 to Q1-2012).*"

David and Leigh (2018), on page 33, listed the revenue measures and their respective impact in % of GDP. We adjusted the impact of these taxes considering World Bank (2011), Annex 7:

1. Introduction of a tax on banks' financial assets, yielding about 0.1 percent of GDP (adjusted to 0.113%).

2. Income tax on free trade zone sales in the local market, generating about 0.03 percent of GDP in revenues (adjusted to 0.034%).

3. Increase in presumptive income taxation on gambling, amounting to 0.1 percent of GDP (adjusted to 0.113%).

4. Tax administration measures such as the indexation of the excise tax on fuels, improved control on tax exemptions, and the indexation of excise tax on motor vehicles (0.18% of GDP).

Considering the information presented in this entry, we categorized this episode as a direct tax-based fiscal consolidation of 0.44% of GDP.

**Dominican Republic – 2013**

A tax package of about 1.8% of GDP was motivated by the need to reduce the deficit and for long-run considerations. DIGEPRES (2013), on page 9, stated that: "*El comportamiento de los ingresos tributarios para el próximo año se explican principalmente por el impacto de las medidas contenidas en la Ley No. 253-12 para el Fortalecimiento de la Capacidad Recaudatoria del Estado para la Sostenibilidad Fiscal y el Desarrollo Sostenible, de fecha 9 de noviembre 2012. (...) Esta ley tiene por objetivo recaudar ingresos adicionales mediante el aumento de algunas tasas impositivas, la racionalización de gastos tributarios; así como la implementación de medidas para mejorar la eficiencia, transparencia y equidad del sistema tributario. (...) Con este conjunto de medidas se*

*pretende elevar la presión tributaria gradualmente, para viabilizar el logro de los objetivos de desarrollo sostenible formulados en la Estrategia Nacional de Desarrollo (END).*"

The measures of this tax package include[40] (DIGEPRES 2013, pg. 10): i) introduction of a dual taxation regime for personal income; ii) strengthening of international taxation; iii) changes in the tax on real estate property; iv) increases in tax on vehicles; v) changes in excise taxes on fuel; vi) increases in excise taxes on alcohol and tobacco; vii) increases in VAT and broadening of its base, as well as the elimination of some exemptions.

As stated on page 9 of DIGEPRES (2013), this tax reform intended to expand the participation of direct taxes and make the tax structure more progressive. Therefore, we categorized this episode as a direct tax-based fiscal consolidation of 1.8% of GDP.

### 2.4.8 Ecuador

**Ecuador – 1990**

This fiscal consolidation episode consisted of tax measures with an expected net revenue impact of 0.33% of GDP, motivated by fiscal sustainability and medium-run considerations (David and Leigh 2018, 35). On page 11 of the 1990 Stand-By Arrangement review report (EBS/90/43): "*The authorities' program for 1990 aims to achieve a further reduction in external and internal imbalances so as to improve the medium-term prospects for sustained economic growth and external viability.*"

The tax measures related to the fiscal package are also explained in the same report: i) policy of monthly adjustments of domestic petroleum products with expected revenues of 1.1% of GDP (this measure was halted in September 1990 because of Congressional opposition); ii) 0.5% of GDP drop on revenues from the introduction of tax reform of income and indirect taxes and decreases in import tariff rates.

As stated by David and Leigh (2018) on page 36: "... *we assign a budgetary impact for the measures amounting to 0.33 percent of GDP in 1990.* This *corresponds to 0.83 percent of GDP, which is given by* $\frac{3}{4}$ *of the estimated annual impact of the monthly adjust-*

[40] *Implementación de las medidas tributarias contenidas en la Ley No. 253-12 para el Fortalecimiento de la Capacidad Recaudatoria del Estado, entre las cuales se destacan: i) el establecimiento de un régimen dual de tributación para las rentas de las personas físicas; ii) fortalecimiento de la fiscalidad internacional: cláusula de subcapitalización, limitación de intereses, precios de transferencia; iii) modificación del impuesto a la propiedad inmobiliaria; iv) aumento de los impuestos a los vehículos; v) sustitución de la exención directa de los impuestos selectivos sobre combustibles por un mecanismo de reembolso; vi) incremento de los impuestos selectivos a las bebidas alcohólicas y cigarrillos; vii) aumento de la tasa de ITBIS y ampliación de su base, así como la eliminación del tratamiento de tasa cero a bienes exentos.*

*ments in petroleum product prices that was halted after September (i.e. 0.75∗1.1 percent of GDP) minus the revenue losses of associated with the tax reform (0.5 percent of GDP).*"

Note, from the information we presented, that the monthly adjustments in petroleum product prices were the measures that generated increases in the expected revenue. Thus, we defined it as an indirect tax-based fiscal consolidation of 0.33% of GDP.

**Ecuador – 1993**

David and Leigh (2018) estimated an increase of 1.7% of GDP in revenues generated from tax measures implemented in the 1993 fiscal consolidation episode in Ecuador, motivated by the intention of reducing the deficit. On page 3, the 1992 Article IV Consultation staff report (SM/92/220) presented that: "*President Duran-Ballen was elected in July 1992 for a four-year term on a platform that stressed the need for economic adjustment, reliance on market forces, and structural reforms to scale down the public sector, deregulate the economy, and improve resource allocation. The Administration took office on August 10 and in early September announced measures in the fiscal, monetary, and foreign exchange areas.*"

On page 36, David and Leigh (2018) listed the tax measures implemented in the 1993 fiscal consolidation package for Ecuador: i) adjustments in fuel prices; ii) increase in electricity tariffs; iii) onetime levy in the range of 0.2-0.7 percent on company assets.

The IMF Country Report 95/96, on page 3, stated that: "*The ratio of public sector revenue to GDP rose slightly in 1993, despite a sharp drop in world oil prices, owing to the full-year effect of public sector tariff increases in late 1992 and further adjustment of electricity tariffs in May 1993.*" Table 3 in the same report presents an increase from 1.7% of GDP in 1992 to 3.4 in 1993 in revenues from domestic petroleum product sales, while real GDP growth decreased from 3.5% in 1992 to 1.7% in 1993. As pointed out by David and Leigh (2018) on page 36: *"In that context, it is likely that the bulk of the observed increase in revenues from domestic petroleum product sales was due to the tariff increase.*"

From the information presented in this entry, note that this fiscal consolidation of 1.7% of GDP was mostly based on indirect taxes.

**Ecuador – 2000**

According to David and Leigh (2018), the Ecuadorian government implemented a fiscal consolidation package of 0.5% of GDP in 2000, with expected revenues of 1.3% partly offset by expenditure increases of 0.8%. The 2000 Stand-By Arrangement review report

(EBS/00/06), on page 19, highlighted the objective of the tax hikes (i.e., medium-term fiscal sustainability): "*The fiscal program aims at adapting the fiscal position to the realities of a dollarized regime and at setting the basis for moving toward medium-term viability. It also seeks to ensure that the programmed fiscal deficit can be financed after incorporating feasible exceptional financing, while avoiding, to the extent possible, major fiscal contraction in an economy where demand has already collapsed.*"

On page 37, the authors mentioned that the main tax measure was a significant increase in domestic prices for petroleum products (reduction of subsidies), expected to yield 1.3% of GDP of additional revenue in 2000. Table 2 on page 27 of the 2003 Article IV Consultation staff report (IMF Country Report 03/90) presented that increases in primary expenditures for the non-financial public sector offset the revenue impact. Thus, the net effect amounted to 0.5% of GDP.

Therefore, we classified this entry as an indirect tax-based fiscal consolidation of 0.5% of GDP.

### 2.4.9 Guatemala

**Guatemala – 1995**

1995 fiscal consolidation was based on tax hikes, motivated by the need to reduce the deficit, amounting to 0.8% of GDP (David and Leigh 2018, 38).

IMF Country Report 98/72, on page 19, listed the revenue measures that were implemented: i) changes in VAT (revision of the system of tax credit returns and an increase in the rate from 7 to 10 percent, which became effective in January 1996); ii) income tax measures;[41] iii) tax administration measure (changes in the penal code to make tax violations subject to imprisonment). On the same page, the Report also presented the tax measures suspended by the Constitutional Court: i) income tax measures (income tax withholdings on certain activities and tax on gross assets); ii) tax administration measures.

Because VAT measures only became effective in 1996 and the Constitutional Court suspended the modifications to the penal code, we have only considered some of the income tax measures that were part of the 1995 package:

[41] i) widening of the tax bracket limits for individuals and an increase in the maximum rate from 25 to 30 percent; ii) increase in the rate for firms to 30 percent; iii) reinstatement of quarterly tax payments; iv) changes in the rates applied to tax withholdings, including those on interest income from certain financial assets; v) a minimum tax of 1.5 percent on gross assets.

1. Widening of the tax bracket limits for individuals and an increase in the maximum rate from 25 to 30 percent.

2. Increase in the rate for firms to 30 percent.

3. Reinstatement of quarterly tax payments.

As David and Leigh (2018) stated on page 38: "*The original set of measures would have a revenue yield of 1.1 percent of GDP. Subsequently, Congress approved legislation that would in part compensate for some of the revenue loss from the legal challenge, but a shortfall of 0.3 percent of GDP would remain.*"

From the information presented in this entry, we categorized this episode as a direct tax-based fiscal consolidation of 0.8% of GDP.

**Guatemala – 1996**

This fiscal consolidation episode consisted of tax measures with an expected net revenue impact of 0.7% of GDP, motivated by the need to reduce the deficit (David and Leigh 2018, 39).

David and Leigh (2018), on pages 38 and 39, presented the revenue measures of this package:

1. Introduction in mid-1996 of a temporary tax of one percent on the gross income of individuals and corporations (ISET).

2. Increase in the VAT rate in January from 7 to 10 percent.

3. Elimination of certain VAT exemptions.

4. A decline in revenues from import duties generated by the lower common external tariff.

From Table 9 of the IMF Country Report 98/71, on page 43, we assigned an impact of 0.5% of GDP to tax measure "1" (ISET). Because this entire episode accounts for a fiscal adjustment of 0.7% of GDP, we assumed that indirect taxes (tax measures "2", "3", and "4") represented an impact of 0.2 percent of GDP. Thus, we classified this entry as a direct tax-based fiscal consolidation of 0.7% of GDP.

**Guatemala – 2000**

According to David and Leigh (2018), this fiscal consolidation package was implemented to restore macroeconomic stability, including a reduction in the fiscal imbalance, with tax measures amounting to 0.3% of GDP.

IMF Country Report 02/80, on page 25, listed the tax measures of this package: i) an increase in the top income tax rate from 25 percent to 31 percent; ii) the government widened the base of the VAT to include customs duties. Cabrera (2011), on page 4, stated that improvements in the tax burden that occurred during the 1990s and 2000s were due to changes in VAT and income tax. Moreover, it demonstrated that the VAT and income tax changes from 1999 to 2000, in percent of GDP, were about 0.2% and 0.1%, respectively.

Based on the information of the references presented in this entry, we categorized this episode as an indirect tax-based fiscal consolidation of 0.3% of GDP.

**Guatemala – 2002**

The government of Guatemala implemented tax hikes of 1% of GDP to reduce the deficit. On page 5, the IMF Country Report 02/80 explained that: "*The authorities have framed an economic program for 2002 aimed at strengthening the fiscal position, while helping to achieve the revenue and social expenditure targets of the Peace Accords, and to begin addressing the weaknesses of the financial system.*"

The 2002 IMF Memorandum of Economic and Financial Policies on Guatemala listed the tax measures of this package. Table 2.2 of World Bank (2013), on page 31, presented their impact in % of GDP:

1. Increase in the VAT rate from 10 to 12 percent (0.559%).
2. Increase in income tax rates on commercial and agricultural enterprises (0.567%).
3. Excise taxes on fuel oil, cigarettes, beer, alcoholic beverages, and soft drinks (0.117%).
4. Custom duties on gasoline and import duties on used cars (0.057%).

As these revenues amounted to 1.3% of GDP, and David and Leigh (2018) estimated this as 1% of GDP, we adjusted the impact to consider this proportionality. Therefore, measures "1", "2", "3", and "4" accounted for 0.43%, 0.436%, 0.09%, and 0.044% of GDP, respectively.

From the information presented above, note that this fiscal consolidation of 1% of GDP was mostly based on indirect taxes.

**Guatemala – 2013**

This fiscal consolidation episode consisted of tax hikes with an expected net revenue impact of 1% of GDP, motivated by the need to reduce an inherited deficit (David and Leigh 2018, 40).

The 2013 Article IV consultation staff report on Guatemala (IMF Country Report 12/146), on page 14, stated that the revenue package comprised a reform to the CIT[42] with an expected revenue of 0.6% of GDP, a reform to the PIT[43] that amounted to 0.2% of GDP, and an increase in the annual tax rate for vehicles in circulation and other excise taxes with an estimated impact around 0.2% of GDP.

Therefore, we categorized this episode as a direct tax-based fiscal adjustment of 1% of GDP.

### 2.4.10 Jamaica

**Jamaica – 1992**

A fiscal consolidation plan implemented in the first quarter of 1992 amounting to 2.1% of GDP aimed to reduce a large inherited deficit (David and Leigh 2018, 42).

David and Leigh (2018), on page 42, listed the tax measures and expected additional revenue: i) increases domestic taxes (0.3% of GDP); ii) increases public sector prices (1.8% of GDP). Since the bulk of the observed increase in revenues was due to increases in public sector prices, this entry was categorized as an indirect tax-based fiscal consolidation of 2.1% of GDP.

**Jamaica – 2003**

Tax hikes of 1.5% of GDP were implemented to reduce the deficit and restore policy

[42]Measures of the reform to the CIT: a) an increase in the tax rate on gross income over Q30,000 from 5% to 7%; b) a reduction in the tax rate on net income from 31% to 25%; c) introduction of a thin capitalization and transfer pricing rules and defined more precisely sources of income.

[43]Measures of the reform to the PIT: a) a reduction in the VAT payments that can be credited against income tax and introduced a 5 percent tax on dividends; b) lowered from 31% to 10% the top marginal rate for individuals and from 15% to 5% the lowest marginal rate.

credibility (David and Leigh 2018, 44). On page 4, the 2003 Article IV consultation staff report on Jamaica (IMF Country Report 04/76) stated, "*The authorities are aiming at strong upfront fiscal adjustment to restore policy credibility and help stabilize the foreign exchange market.*"

On page 14, IMF Country Report 04/76 also presented the tax measures of this revenue package: i) new 4 percent surcharges on all imports; ii) a widening of the general consumption tax base; iii) higher duty on vehicle imports.

On page 7, the 2004 Article IV consultation staff report on Jamaica (IMF Country Report 04/263) estimated an impact of 2% of GDP generated by the implementation of these revenue measures. Given the timing of the implementation of the tax package and Jamaica's fiscal year, David and Leigh (2018) assigned $\frac{3}{4}$ of the budgetary impact to calendar year 2003 and the other $\frac{1}{4}$ to calendar year 2004.

Therefore, we classified this episode as an indirect tax-based fiscal adjustment of 1.5% of GDP.

**Jamaica – 2004**

The 2003 fiscal consolidation continued in 2004, with tax revenues amounting to 0.5% of GDP. As stated in the previous entry, this package aimed at reducing the deficit to restore policy credibility, and it was categorized as an indirect tax-based fiscal adjustment of 0.5% of GDP.

**Jamaica – 2012**

David and Leigh (2018), on page 45, estimated an increase of 0.8% of GDP in revenues generated from tax measures implemented in the 2012 fiscal consolidation episode in Jamaica, motivated by the intention of reducing the deficit.

On page 4, the 2013 Extended Fund Facility report on Jamaica (IMF Country Report 13/126) stated, "*The 2011 Article IV Consultation, completed in May 2012, presented a comprehensive package of measures to promote growth and lower fiscal imbalances. It advocated strong and upfront fiscal adjustment to put debt on a decisive downward trajectory. To support growth, it called for measures to boost competitiveness, including structural reforms as well as greater exchange rate flexibility.*"

The report PwC (2013), on page 3, listed the tax measures and the respective impact in

current J$ billions. We summarized this information in Table 2.8, as shown below.[44]

[44]PwC (2013) also listed "curtailment of discretionary waivers" as a revenue measure of the 2012/13 Jamaican fiscal package, amounting to J$ 1.88 billion (or 0.078% of GDP for each year). As we could not categorize this measure as direct or indirect, we did not include it in Table 2.8.

Table 2.8: Tax measures impact (in current J$ billions) for "Jamaica - 2012" and "Jamaica – 2013" entries

| **Increases in direct taxes** | **Decreases in direct taxes** | **Increases in indirect taxes** | **Decreases in indirect taxes** |
|---|---|---|---|
| Introduction of a Minimum Income Tax of $60,000 per annum: $ **0.66** | Corporate Income Tax (CIT): Reduction in rate from 33.33% to 25% - except for 'regulated' entities which will initially remain at 33.33%: $ **0.45** | Partially widen General Consumption Tax Base: $ **4.2** | Reduction of standard General Consumption Tax (GCT) rate from 17.5% to 16.5%: $ **2.4** |
| Re-imposition of Dividend Tax at the rate of 5%: $ **0.3** | Personal Income Tax: Increase in annual personal income tax threshold to $507,312 from $441,168: $ **0.1** | Increase in threshold on which GCT is applied to electricity bills and increase in rate to 16.5%: $ **0.43** | |
| Modification of Asset tax regime: $ **1.95** | | Overhaul of GCT Regime on Tourism Activities: $ **2.53** | |
| Increase in tax on winnings – Betting, Gaming, Horse Racing and Lotteries: $ **0.38** | | Imposition of specific rate of Special Consumption Tax (SCT) on overproof rum: $ **0.75** | |
| Increase in Motor Vehicle Licenses and Fees Modification of Asset Tax regime: $ **0.6** | | Widening of tax base on tobacco products: $ **0.38** | |
| | | Imposition of SCT on denatured ethanol: $ **0.54** | |
| | | Ten percentage point increase in Common External Tariff (CET) on certain consumer items: $ **1.95** | |
| | | Charges on termination cost of telephone calls: $ **5.25** | |
| | | Modification of taxation of alcoholic beverages bought by the tourism sector: $ **0.53** | |
| **Sum:** $ **3.89** | **Sum:** $ **0.55** | **Sum:** $ **16.56** | **Sum:** $ **2.4** |
| **Net effect of direct taxes:** + $ **3.34** | | **Net effect of indirect taxes:** + $ **14.16** | |

Source: 2012 Jamaica PwC Budget Newsletter, on page 3.

Given that the entire impact of the 2012/13 tax package was 1.6% of GDP, representing J$ 19.38 billion when we include the neutral measure "curtailment of discretionary

waivers" (J$ 1.88 billion), the net effect of this episode is the following: direct taxes (J$ 3.34 bn., or 0.2262% of GDP); indirect taxes (J$ 14.16 bn., or 1.2186% of GDP); neutral measures (J$ 1.88 bn., or 0.156% of GDP). Considering these tax categories and their impacts, we assigned half of the 2012/13 package for each year (2012 and 2013).

Therefore, from Table 2.8, we classified this entry as an indirect tax-based fiscal consolidation of 0.8% of GDP.

**Jamaica – 2013**

Tax hikes amounting to 2% of GDP were part of this fiscal consolidation package, motivated by the need to restore debt sustainability and public finances (David and Leigh 2018, 46).

On page 3, the 2013 Extended Fund Facility report on Jamaica (IMF Country Report 13/126) stated, "*The fiscal reforms are essential for a sustained fiscal consolidation effort to put debt on a downward trajectory. Structural reforms to achieve higher and sustained growth are pivotal to long-term macroeconomic stability and increased welfare of the population.*"

Part of the impact in 2013 is linked to the 2012/13 tax package. Decomposing the impact of 0.8% of GDP related to these measures, we assigned 0.1131% to direct taxes, 0.6093% to indirect taxes, and 0.0776% to neutral measures (see entry "Jamaica – 2012").

Moreover, based on the Text Table 1 of the IMF Country Report 13/126, on page 64, we summarized the information on Jamaica's 2013/14 tax package in Table 2.9. The only measure we did not include in the table was the "financial support from the National Housing Trust (NHT) for fiscal consolidation" because it was categorized as a neutral measure.[45]

[45]Government of Jamaica (2013), on page 52, stated that: "Non-tax revenue is projected at $34,553.2 MM, which is $15,769.6 MM (84.0%) above collections in FY 2012/13. This estimate for non-tax revenue amounts to 2.3% of GDP, compared to 1.4% of GDP in FY 2012/13. The most significant contributor to this expected increase is a programmed transfer of $11,400.0 MM from the NHT to the Consolidated Fund. Non-tax revenue in FY 2013/14 is also expected to be bolstered by increased receipts from the telecommunications sector." Because the "financial support from the National Housing Trust (NHT) for fiscal consolidation" amounted to J$ 11.4 billion both in 2013 and 2014, we assigned that it accounted to 0.501% and 0.167% of GDP, respectively. Notice that we followed the proportionality of the total impact of the 2013/14 fiscal adjustment estimated by David and Leigh (2018) (i.e., 1.2% of GDP for 2013 and 0.4% for 2014).

Table 2.9: Tax measures impact (in current J$ billions) for "Jamaica - 2013" and "Jamaica – 2014" entries

| **Increases in direct taxes** | **Increases in indirect taxes** |
|---|---|
| Amendment to the fee structure and gross profit tax of betting, gaming, and lottery sector: $ **1.5** | Apply a customs administration fee (CAF) on all imports except for charitable organizations and the bauxite sector: $ **1.2** |
| Increase property tax rates to take effect for fiscal year 2013/14 and initiate measures to improve the relatively low property tax compliance rate: $ **3.4** | Include the special telephone call tax (TCT) as part of the GCT base: $ **1.3** |
| Increase the Education tax rate by 0.5 percentage points for employers and 0.25 percentage points for employees: $ **2.8** | Telecom providers should account for GCT on the face value of prepaid vouchers/airtime: $ **0.2** |
| Increase the tax on dividends to 15 percent: $ **0.8** | Increase the Stamp duty and transfer tax rates (for properties) up from the current 3 and 4 percent rates to 4 and 5 percent, respectively: $ **2** |
| Impose a surtax of 5 percent on large unregulated companies: $ **1.2** | |
| | Include all fees and taxes paid at the port (environmental level and customs administration fee) as part of the GCT base: $ **1.5** |
| **Net effect: J$ 9.7 billion** | **Net effect: J$ 6.2 billion** |
| **Total: J$ 15.9 billion** | |

Source: Based on Text Table 1 of the IMF Country Report 13/126, page 64.

Given that the entire impact of the 2013/14 tax package was 1.6% of GDP, representing J$ 27.3 billion when we include the neutral measure "financial support from the National Housing Trust (NHT) for fiscal consolidation" (J$ 11.4 billion), the net effect of this episode is the following: direct taxes (J$ 9.7 bn., or 0.5685% of GDP); indirect taxes (J$ 6.2 bn., or 0.3634% of GDP); neutral measures (J$ 11.4 bn., or 0.6681% of GDP).

Since David and Leigh (2018) assigned $\frac{3}{4}$ of the 2013/14 package to 2013 and $\frac{1}{4}$ to 2014, the net effects of these tax measures in 2013 were: direct taxes (J$ 7.275 bn., or 0.4264% of GDP); indirect taxes (J$ 4.65 bn., or 0.2726% of GDP); neutral measures (J$ 8.55 bn., or 0.5010% of GDP).

Finally, analyzing the total impact of the measures linked to the 2012/13 and 2013/14 fiscal packages, direct taxes amounted to 0.5395% of GDP (0.1131% + 0.4264%), indirect taxes accounted for 0.8819% of GDP (0.6093% + 0.2726%), and neutral measures represented 0.5786% of GDP (0.0776% + 0.501%).

Therefore, considering the information presented in this entry, we categorized this episode as an indirect tax-based fiscal consolidation of 2% of GDP.

**Jamaica – 2014**

As indicated in the previous entry, the 2013/14 tax package was implemented in 2013 and continued in 2014, motivated by the need to restore debt sustainability and strengthen public finances (David and Leigh 2018, 46).

On page 46, David and Leigh (2018) assigned $\frac{1}{4}$ of the 2013/14 package effect to the 2014 year. Therefore, we estimated that the impacts were the following (see "Jamaica – 2013" entry): direct taxes (J$ 2.425 bn., or 0.142% of GDP); indirect taxes (J$ 1.55 bn., or 0.091% of GDP); neutral measures (J$ 2.85 bn., or 0.167% of GDP).

Considering the above information, we categorized this entry as a direct tax-based fiscal adjustment of 0.4% of GDP.

### 2.4.11 Mexico

**Mexico – 1989**

According to David and Leigh (2018), fiscal consolidation consisted of tax hikes of 0.9% of GDP, introduced to reduce the fiscal deficit.

David and Leigh (2018), on page 47, listed the revenue measures of this package, which included changes in income taxes and an increase in the minimum tariff on imports. In sum, changes in income involved:

1. Abolishment of the system of dividend deduction that was replaced by a tax on corporate dividends at the source aiming to prevent tax evasion and to encourage investment.

2. A reduction of the CIT rate from 39.2 percent to 37 percent.

3. Introduction of a property tax[46] (a minimum 2 percent tax introduced on firms' assets, which can be credited against income tax liabilities).

4. Reduction in the number of PIT brackets from 12 to 6 and in marginal tax rates.

[46]Because this is credited against income tax liabilities, this tax was accounted for the "ISR – Impuesto sobre la Renta" item of Table 3 on page 72 of RCE (1989). Therefore, we assigned this entry as an income tax measure.

Also, there was an increase in the minimum tariff for most items to 10 percent, except for some medicines and basic foodstuffs, and the maximum rate was maintained at 10 percent.

On page 72, Table 3 of RCE (1989) presented an expected impact of 0.2% of GDP for changes in income taxes, while for taxes on imports, it was 0.7% of GDP in 1989. Therefore, this fiscal adjustment was mostly based on indirect taxes, amounting to 0.9% of GDP.

**Mexico – 2010**

Tax hikes of 0.6% of GDP motivated by long-run considerations because of a structural decline in oil production were implemented in this fiscal consolidation episode (David and Leigh 2018, 48).

The 2010 Article IV consultation staff report (IMF Country Report 10/71), on page 16, stated, "*Fiscal policy design in 2010 has had to balance the concern to avoid undue withdrawal of stimulus, while providing assurances on medium term sustainability. (...) The 2010 budget includes an important tax package of about 1 percent of GDP to offset the deterioration in the structural revenue position linked to the decline in oil production.*"

On page 48, David and Leigh (2018) listed the measures of the 2010 tax package: i) an increase by one percentage point in the standard VAT rate to 16 percent; ii) increases in excise taxes; iii) changes in the tax treatment of loss-carry forwards;
[47][48] iv) a temporary increase in income tax rates. On page 1, CEFP (2009) presented the impact of this tax reform. Based on David and Leigh's (2018) and WorldBank dataset, we adjusted these estimates in Table 2.10.

[47] *"Por lo que toca al Impuesto Empresarial a Tasa Única (IETU), la propuesta del Ejecutivo planteaba modificar el esquema actual del crédito fiscal que aplica este impuesto sobre el ISR para eliminar la posibilidad de aplicar el crédito por exceso de deducciones sobre ingresos de IETU contra ISR durante el ejercicio que se genera; con la propuesta se estiman ingresos por 3,269.8 mdp, propuesta aprobada por la Cámara de Diputados y posteriormente por el Senado de la República"* (CEFP 2009, 3).

[48] A tax loss carryforward (or carryover) is a provision that allows a taxpayer to move a tax loss to future years to offset a profit. Therefore, we assumed this entry as an income tax fiscal measure.

Table 2.10: Summary of the 2010 Mexican tax package

| **Fiscal measure** | **Impact, in millions of pesos** | **Impact, in % of GDP (CEFP estimates)** | **Impact, in % of GDP (David and Leigh's estimates)** | **GDP, current LCU (World Bank estimate)** |
|---|---|---|---|---|
| **Income tax measure** | $ 62,781.70 | 0.470% | 0.332% | $ 13,370,000.00 |
| **Changes in loss-carry forwards** | $ 3,269.80 | 0.024% | 0.017% | |
| **VAT changes** | $ 33,548.50 | 0.251% | 0.177% | |
| **Excise tax measures** | $ 13,810.30 | 0.103% | 0.073% | |
| **Total** | $ 113,410.30 | 0.848% | 0.600% | |

Source: Estimates based on Table 1 of CEFP (2009) and David and Leigh (2018).

From Table 2.10 and the information presented in this entry, we categorized this episode as a direct tax-based fiscal consolidation of 0.6% of GDP.

### Mexico – 2014

Fiscal consolidation consisted of tax hikes amounting to 0.6 percent of GDP, motivated by the long-run goal of reducing dependency on oil revenues. According to the 2013 Article IV consultation staff report (IMF Country Report 13/334), on page 16: "*Congress also approved a tax reform that moderately raised non-oil tax revenue and phased out subsidies on domestic sales of gasoline to try to reduce the dependence on oil revenues.*"

Hacienda (2015), on pages 74-83, detailed the tax measures of this fiscal package: i) changes in VAT[49] (*IVA – Impuesto al Valor Agregado*); ii) changes in CIT[50] (*ISR - Impuesto a la Renta Empresarial*); iii) changes in PIT[51] (*ISR Personal*); iv) changes in CIT to incorporate firms to formal sector[52] (*Creación del Régimen de Incorporación Fiscal*); v) introduction of excise taxes (*IEPS - Impuestos Especiales sobre Producción y*

[49] *"Las modificaciones realizadas al IVA acotaron los regímenes excepcionales que no contaban con una justificación sólida de política pública. Los principales cambios realizados fueron la homologación de la tasa de frontera y la eliminación de la exención a las importaciones temporales"* (Hacienda 2015, pg. 15).

[50] *"Con el fin de avanzar en la simplificación del pago de impuestos, la Reforma eliminó el Impuesto Empresarial a Tasa Única (IETU) y el Impuesto a los Depósitos en Efectivo (IDE), con lo cual se reduce a la mitad el número de cálculos que las empresas deben realizar para pagar sus impuestos. Adicionalmente, se creó una nueva Ley del Impuesto Sobre la Renta, que elimina la mayoría de los regímenes preferenciales y de los tratamientos especiales, por lo que amplía la base de este impuesto y simplifica el pago. De esta manera, la Reforma nos deja con un solo impuesto al ingreso corporativo, pero con el mismo poder recaudatorio que los tres impuestos que existían en 2013"* (Hacienda 2015, pg. 76).

[51] *"Los cambios realizados al ISR personal estuvieron orientados a garantizar que paguen más los que más ganan, eliminar los tratamientos excepcionales y aumentar la recaudación"* (Hacienda 2015, pg. 76).

[52] *"La Reforma Hacendaria creó el RIF (Régimen de Incorporación Fiscal), que establece un punto de entrada para las pequeñas y medianas empresas a la formalidad, con un diseño que atiende la problemática generada por el REPECO (Régimen de Pequeños Contribuyentes)"* (Hacienda 2015, pg. 79).

*Servicios*) (see page 80 of Hacienda 2015).

Based on page 192 of Hacienda (2015), we estimated the impact of these revenue measures in % of GDP: i) changes in income taxes (-0.3%); ii) changes in VAT (0.3%); iii) introduction of excises taxes (0.6%). Assessing these effects, we categorized this episode as an indirect tax-based fiscal consolidation of 0.6% of GDP.

### 2.4.12 Paraguay

**Paraguay – 1989**

Tax hikes of 2% of GDP were part of the fiscal consolidation package proposed in 1989, aiming to reduce the fiscal deficit (David and Leigh 2018, 49). Page 10 of the 1989 Article IV Consultation staff report (SM/89/274) describes the motivation of this episode: "*The authorities explained that they attach high priority to the correction of existing fiscal imbalances.*"

In the same report, pages 3 and 5 presented the tax measures that the new government implemented: "*The ratio of tax revenue to GDP would rise from 7 percent of GDP in 1988 to an estimated 9 percent of GDP in 1989, owing to the adjustment of the exchange rate used to compute taxes on imports and foreign exchange transactions, the introduction of temporary export taxes, and the increase in property tax collections.*"

The impacts of these tax measures were estimated using data from Tables 1 and 2 of the *1988 Memoria Anual – Banco Central del Paraguay*, on pages 32 and 33, and Table 1 of Richards (2001), on page 30, presenting the revenue for 1988 and 1989,[53] respectively. We also used elasticities of taxes to the output gap for Paraguay from Ardanaz et al. (2015), output gap data from Carrière-Swallow, David and Leigh (2021) for Latin-American economies, and GDP data (current LCU) from the World Bank dataset. Table 2.11 detailed the estimates.

[53]For the measures of this episode, we assumed that the variations in "foreign trade taxes" and "property taxes" were generated by variations in the measures "taxes on imports and export taxes" and "property taxes," respectively.

Table 2.11: Impact of the tax measures for "Paraguay – 1989" entry (in % of GDP)

| **Current revenue (in % of GDP)** | **1988** | **1989** | **A: 1988 (adjusted)** | **B: 1989 (adjusted)** | **B – A: Impact (in % of GDP)** | **Adjustment to David and Leigh's (2018) calculations** |
|---|---|---|---|---|---|---|
| Taxes on imports and exports[a] | 0.85 | 2.2 | 0.85 | 2.14 | 1.29 | 1.22 |
| Property taxes[b] | 0.22 | 1.04 | 0.22 | 1.04 | 0.82 | 0.78 |
| Total impact | | | | | 2.11 | 2 |

Source: Own calculations based on data from *1988 Memoria Anual –Banco Central do Paraguay*, and Richards (2001).
The adjusted values for 1988 and 1989 are the cyclically adjusted tax revenues, in % of GDP. For 1988, the output gap is 0.000581; for 1989 it is 0.01395.
a: indirect taxes elasticity = 2.1 (Ardanaz et al. 2015).
b: other taxes elasticity = 0 (Ardanaz et al. 2015).

From Table 2.11 and the information presented in this entry, we defined this episode as an indirect tax-based fiscal consolidation of 2% of GDP.

**Paraguay – 2001**

According to David and Leigh (2018), this fiscal consolidation package aimed to reduce the deficit, with tax measures amounting to 0.5% of GDP. On page 10, the 2001 Article IV Consultation staff report (IMF Country Report 01/87) described the motivation of this episode:
"*The government intends to reduce the central administration's deficit in 2001 to about half the nominal level registered in 2000, which is consistent with the noninflationary financing that would be available. This is equivalent to a reduction from 4.5 percent of GDP to 2,0 percent of GDP, to be achieved primarily through adjustments in the expenditure of the central government, which would decrease by around 2.2 percentage points of GDP, and to a lesser extent through revenue measures.*"

The same report presented the expected revenue that would be raised from the fiscal package, 0.5% of GDP, and the following tax measures:

1. Elimination of a facility that permitted banks to deduct increases in their required capital from profits.

2. Increases to the excise tax on diesel.

3. Inclusion of transport and personal services in the VAT tax base.

4. Elimination of VAT exemptions on goods in the re-export trade.

The impacts of these tax measures were estimated using data from Table 5 of the 2004 Stand-By Arrangement review report (IMF Country Report 04/66),[54] on page 25, presenting the revenue for 1988 and 1989 (in % of GDP), respectively.[55] We also utilized elasticities of taxes to the output gap for Paraguay from Fricke and Süssmuth (2014) and Ardanaz et al. (2015), along with output gap data from Carrière-Swallow, David and Leigh (2021) for Latin-American economies. Table 2.12 presents details of our estimates.[56]

[54]The report is based on data and information from the Ministry of Finance and the Central Bank of Paraguay.

[55]For the measures of this episode, we assumed that the variations in "income taxes," "excise taxes," "VAT," and "import duties" were generated by variations in the measures "Elimination of a facility that permitted banks to deduct increases in their required capital from profits," "excise tax on diesel," "inclusion of transport and personal services in the VAT tax base," and "elimination of VAT exemption on goods in re-export trade," respectively.

[56]Given that the calculation presented a negative impact of the measure "elimination of a specific exemption on CIT" and based on page 17 of the 2001 Recent Economic Development report on Paraguay (IMF Country Report 01/88), we assumed a zero value for the government's effort to eliminate a specific exemption on CIT: "Paraguay has no personal income tax. Social security contributions and other taxes on labor amount to 23 percent, but are widely evaded. The tax system contains therefore few redistributive elements, and the government must rely on expenditure to improve income distribution. The corporate income tax has a relatively high core rate of 30 percent, but numerous exemptions—especially if profits are re-invested (Ley 60/90)—diminish its returns and encourage evasion and informal activities."

Table 2.12: Impact of the tax measures for "Paraguay – 2001" entry (in % of GDP)

| **Current revenue (in % of GDP)** | **2000** | **2001** | **A: 2000 (adjusted)** | **B: 2001 (adjusted)** | **B – A: Impact (in % of GDP)** | **Adjustment to David and Leigh's (2018) calculations** |
|---|---|---|---|---|---|---|
| Elimination of a specific exemption on CIT[a] | 1.8 | 1.7 | 1.82 | 1.73 | -0.09 | 0 |
| Excise tax and changes in VAT[b] | 5.9 | 6.3 | 6.03 | 6.54 | 0.51 | 0.47 |
| Eliminating exemptions in the re-export trade[b] | 1.8 | 1.8 | 1.84 | 1.87 | 0.03 | 0.03 |
| Total impact (without the CIT measure) | | | | | 0.54 | 0.5 |

Source: Own calculations based on data from IMF reports.
The adjusted values for 2000 and 2001 are the cyclically adjusted tax revenues, in % of GDP. For 2000, the output gap is -0.01068, and for 2001 it is -0.01786.
a: CIT elasticity = 0.9 (Ardanaz et al. 2015).
b: indirect taxes elasticity = 2.1 (Ardanaz et al. 2015).
From Table 2.12 and the information presented in this entry, we classified this episode as an indirect tax-based fiscal consolidation of 0.5% of GDP.

### Paraguay – 2003

The tax hikes implemented by the fiscal consolidation were motivated by the intention of reducing public debt, with an estimated impact of 1.25% of GDP (David and Leigh 2018, 51). On page 8, the 2004 Stand-By Arrangement review report (IMF Country Report 04/66) stated that: "*The authorities explained that the size and timing of the fiscal adjustment was determined by several factors: (i) the need to reduce public debt to a more sustainable level; (ii) the authorities' desire to take advantage of the momentum of the new government's post-election support to front-load the adjustment process; and (iii) the need to close the substantial financing gaps in 2003 and 2004 and eliminate arrears.*"

On the same page, the IMF Country Report 04/66 presented details related to the tax measures implemented in this package: "*On the revenue side, the government's fiscal strategy is to raise revenues while minimizing increases in tax rates. The authorities have already begun a major overhaul of tax and customs administration (Box 1) which will yield around 1 percent of GDP in 2003; further reforms will be implemented in 2004 to assure the sustainability of this improvement. The government also raised excise taxes*

*on fuels from 14 to 20 percent in August, generating an estimated 0.5 percent of GDP annually.*"

Regarding the "program to revamp tax and customs administrations," Box 1 of the IMF Country Report 04/66, on page 17, describes the actions taken by the government related to this measure: "*i) On site inspections of almost 8,000 businesses to verify compliance with VAT procedures; ii) All auditing officials (125) of the Large Taxpayer unit were removed and will be replaced; iii) Large taxpayers' statements are more intensively scrutinized, with full audits for those where irregularities appear; iv) Some corrupt officials are being prosecuted; v) Auditing and collection processes were streamlined; vi) A tax amnesty was instituted until the end of 2003 to encourage firms to pay back taxes; vii) Intermediate customs checkpoints were eliminated and access to main entry points was restricted to essential personnel; viii) A pilot program for ex-post verification and risk-based examination of imports was initiated; ix) Spot checks of customs officials have been instituted to ensure they are properly performing their duties—12 have been dismissed so far.*"

Note that actions to combat tax evasion and indirect taxes were predominant in the "program to revamp tax and customs administrations," with an impact of 1% of GDP. Moreover, the increase in excise taxes on fuels is also an indirect tax-based measure with an impact of 0.25% of GDP.[57]

Therefore, considering the information presented in this entry, we categorized this episode as an indirect tax-based fiscal consolidation of 1.25% of GDP.

**Paraguay – 2004**

The 2004 tax reform (*Ley de Reordenamiento Administrativo y de Adecuación Fiscal* – 2421/04) and other tax measures presented an estimated impact of 0.8% of GDP, aiming to reduce the deficit and increase efficiency. On page 6, the 2004 Stand-By Arrangement review report (IMF Country Report 04/66) stated, "*The government seeks to create conditions for sustained economic growth and poverty reduction and address long-standing governance problems by improving the efficiency and transparency of government operations. In keeping with these overarching objectives, the economic program aims to stabilize the fiscal situation and the banking system and to initiate needed structural reforms. The program will require a sizable fiscal effort to reduce the deficit and clear arrears ....*"

Among the measures considered in this fiscal consolidation episode, David and Leigh

[57]It was implemented in the second half of 2003, with the rest of the effects occurring in 2004.

(2018), on page 52, cited an increase of 6 percentage points in the excise tax on diesel and a tax of 2 percent on soy exports (billed as a temporary measure), with expected revenues of 0.25 and 0.2% of GDP, respectively.

The 2004 Article IV Consultation staff report (IMF Country Report 05/59), on page 13, explained the content of the *Ley de Reordenamiento Administrativo y de Adecuación Fiscal*: "*On June 25, Congress approved the Administrative Reorganization and Fiscal Adjustment Law, a performance criterion under the SBA, and a crucial piece of legislation for assuring the continuity of responsible fiscal policy... The potential revenue yield of the law (if all tax were placed at their legal maxima) has been reduced from 2½ percent of GDP to 1½ percent of GDP, but the actual expected yield (based on the authorities' intended tax rates) will be near original estimates. The law eliminates most exemptions to the corporate income tax while reducing the rate, broadens the base of the VAT, institutes a new personal income tax (to be phased in over time), and institutes a new agricultural income tax to replace the previous IMAGRO tax. It also adjusts some excise tax rates, and strengthens legal authority for tax administration.*"

From table 16 of the IMF country report 05/59, on page 42, we obtained that the total impact of the *Ley de Reordenamiento Administrativo y de Adecuación Fiscal*for 2004 comes from VAT changes, amounting to 0.1% of GDP. The same table stated that the new agricultural income tax came into effect only in 2005 and the new PIT in 2006.

Therefore, the measures implemented in this fiscal package for 2004 were based on the following taxes with the respective impact (in % of GDP):

1. Excise tax on diesel (0.25% of GDP).
2. Temporary tax on soy exports (0.2% of GDP).
3. VAT changes because of the *Ley de Reordenamiento Administrativo y de Adecuación Fiscal*(0.1% of GDP).
4. Increase in excise duties that were implemented in 2003 and continued in 2004 (0.25% of GDP).

Considering the above information, we categorized this episode as an indirect tax-based fiscal consolidation of 0.8% of GDP.

**Paraguay – 2005**

Tax cuts of 0.6% of GDP, part of the *2004 Ley de Reordenamiento Administrativo y de Adecuación Fiscal*, were motivated by long-run considerations (see entry "Paraguay –

2004").

On page 53, David and Leigh (2018) present the tax cuts that were implemented in 2005 in Paraguay and their expected impact: i) elimination of the export tax on soy (-0.2% of GDP); ii) reduction of the CIT rate from 30 to 20 percent (-0.4% of GDP).

As the impact of the change in the CIT rate is predominant in this episode, we classify it as a direct tax-based fiscal expansion of 0.6% of GDP.

**Paraguay – 2006**

Tax cuts of 0.7% of GDP, part of the *2004 Ley de Reordenamiento Administrativo y de Adecuación Fiscal*, were motivated by long-run considerations (see entry "Paraguay – 2004").

On page 5 of the Sixth Review under the Stand-By Arrangement review report (IMF Country Report 06/100), footnote two detailed the tax measures that were implemented in 2006: "*The fiscal adjustment law (2004), a key measure under the program, anticipates a reduction in the corporate income tax rate (due the following year) from 30 to 20 percent in 2005 and 10 percent in 2006. With the August reduction in advance payments (applicable to the tax obligations of the same year), the average rate on 2005 advance payments will be 20 percent (as some payments were made at 30 percent and others at 10 percent), which is the de jure 2005 rate. Similarly, the average rate on 2006 advance payments will be 10 percent, which is the de jure 2006 rate.*"

Table 16 of IMF Country Report 05/59 presents the estimated revenue impact of the CIT rate change, amounting to 0.7% of GDP. Therefore, we categorized this episode as a direct tax-based fiscal expansion of 0.7% of GDP.

**Paraguay – 2014**

A tax reform motivated by long-run considerations was implemented in Paraguay in 2014, with an estimated revenue yield of 0.24% of GDP. According to David and Leigh (2018), the *2015 Informe de Finanzas Publicas de la Republica del Paraguay*, on page 61, states that: "*These measures seek to increase the formalization of the agriculture and livestock sectors, to integrate the agricultural value chains in the tax system, to allow primary producers to deduct the VAT from their costs, to give further incentives to the formation of value chains, to level the playing field between agricultural incomes taxes and general corporate income taxes, and to broaden the tax base.*"

Table 1 of the 2013 Article IV Consultation staff report (IMF Country Report 14/60) describes the tax measures that were implemented: i) extension of the VAT (at a reduced rate of 5 percent) to primary production; ii) introduction of a new agricultural income tax (IRAGRO) of up to 10 percent.

Borda and Caballero (2017) describe the changes in the agricultural tax with the reform. The IRAGRO gradually replaces the IMAGRO,[58] and the tax base that was the size of the farms turns to be (also gradually) the income of the productive units. The authors, based on data from the Ministry of Finance, indicated that the revenue obtained from changes in the agricultural tax increased from 0.06% of GDP in 2013 to 0.2% in 2014.[59]

Therefore, we considered that the new agricultural income tax generated an impact of 0.14% of GDP. As the total impact for this episode is 0.24% of GDP, we assumed that VAT changes amounted to 0.1% of GDP. Considering this information, we categorized this episode as a direct tax-based fiscal consolidation of 0.24% of GDP.

### 2.4.13 Peru

**Peru – 1992**

According to David and Leigh (2018), fiscal consolidation consisted of tax hikes amounting to 1% of GDP, introduced to reduce the domestic financing needs of the public sector. This motivation is stated on pages 2 and 3 of the 1992 Article IV Consultation staff report (EBS 93/12): "*Government that took office in August 1990 immediately moved to stabilize the economy. It adopted measures to eliminate the domestic financing requirement of the public sector, remove distortions, and open the economy to foreign competition.*"

The same report listed the tax measures that would be implemented in this fiscal package:

1. An increase in the rate of the VAT from 16 percent to 18 percent and a broadening of its base.

2. Increases in the rates of several excise taxes.

3. Elimination of certain deductions to the CIT.

[58] Borda and Caballero 2017, pg. 67: "El Iragro, que entró a regir en 2014 en sustitución del Imagro, reemplazó el concepto del tamaño de finca por el de los ingresos de las unidades productivas como base de la tributación."

[59] See Table 6 on page 67 of Borda and Caballero (2017).

The impacts of these tax measures were estimated using data from CEPALSTAT and Table 20 of the Recent Economic Developments report on Peru (IMF Staff Country Report 96/3), on page 59,[60] respectively. We also utilized elasticities of taxes to the output gap for Peru from Ardanaz et al. (2015) and output gap data from Carrière-Swallow, David and Leigh (2021) for Latin-American economies. Table 2.13 presents the details of the calculations.

Table 2.13: Impact of the tax measures for "Peru – 1992" entry (in % of GDP)

| **Current revenue (in % of GDP)** | **1991** | **1992** | **A: 1991 (adjusted)** | **B: 1992 (adjusted)** | **B – A: Impact (in % of GDP)** | **Adjustment to David and Leigh's (2018) calculations** |
|---|---|---|---|---|---|---|
| Changes in VAT and excise tax measures[a] | 5.6 | 6.1 | 5.92 | 6.68 | 0.76 | 0.61 |
| CIT[b] | 0.72 | 1.14 | 0.76 | 1.25 | 0.49 | 0.39 |
| Total impact | | | | | 1.25 | 1 |

Source: Own calculations based on data from CEPALSTAT and IMF reports.
The adjusted values for 1991 and 1992 are the cyclically adjusted tax revenues in % of GDP. For 1991, the output gap is -0.03058; for 1992, it is -0.04902.
a: indirect taxes elasticity = 1.8 (Ardanaz et al. 2015).
b: CIT elasticity = 1.8 (Ardanaz et al. 2015).

From Table 2.13 and the information presented in this entry, we defined this episode as an indirect tax-based fiscal consolidation of 1% of GDP.

**Peru – 2002**

A tax reform was implemented in the second half of 2002 with several measures taking effect in 2003, aiming to reduce public debt. In 2002, the expected impact of the tax hikes was 0.2% of GDP. The 2004 Article IV Consultation staff report (IMF Country Report 04/155), on page 4, stated, "*Ongoing fiscal consolidation aims at ensuring sustainable debt dynamics under robust assumptions.*"

The 2002 Article IV Consultation staff report (IMF Country Report 03/72), on page 62, detailed the measures applied in this fiscal consolidation episode: "*The tax reform in 2002 included tax policy and tax administration measures. Tax policy measures were intended to improve the neutrality of the tax system and increase tax bases. Measures*

[60]For the measures of this episode, we assumed that the variations in "goods and services taxes" and "taxes on income, profits and capital gains of the corporations and enterprises" were generated by variations in the measures "changes in VAT and excise tax measures", and "elimination of certain deductions to CIT," respectively.

*concentrated on: (i) income taxes (which will take effect in 2003); (ii) elimination (or restriction) of some VAT exemptions; and (iii) increase in the kerosene excise. On tax administration, measures aimed at reducing tax evasion by: (i) introducing various systems of VAT withholding; (ii) intensifying the control of tax collection, refunds and rebates; and (iii) ensuring the collection of tax debts from government's suppliers and private companies. As a result of the measures implemented, tax revenue is expected to increase by 0.2 percent of GDP in the second half of 2002 and 0.8 percent of GDP in 2003.*"

In the same report, Appendix VI on page 64 presents the impact of the measures on millions of New Soles. We converted it to a percentage of GDP in 2002, as follows: i) changes in VAT increasing the revenue in S/. 25 million (0.0133%); ii) increase in fuel excises with an impact of S/. 25 million (0.0133%); iii) withholding mechanisms and tax debt collection[61] that would generate S/. 259 million (0.1385%); iv) other measures with an expected additional revenue of S/. 65 million (0.033%).

As the impact of withholding mechanisms and tax debt collection is predominant in the fiscal adjustment in 2002, and we classified it as indirect tax (see footnote in this entry), we assign this episode as an indirect tax-based fiscal consolidation of 0.2% of GDP.

**Peru – 2003**

According to David and Leigh (2018), fiscal consolidation initiated in 2002 continued in 2003, with an expected impact of 0.8% of GDP, aiming to reduce public debt.

Appendix VI, on page 64 of the IMF Country Report 03/72, presented the expected revenues of the measures in millions of New Soles. From this information, we list these tax measures and their respective impact in 2003 (in % of GDP): i) increase in income tax with an impact of S/. 645 million (0.33%); ii) changes in VAT increasing the revenue in

[61]We classified this as an indirect tax because of the content of this measure. As shown in IMF Country Report 03/72, on page 63: "Various VAT withholding mechanisms are being established to reduce the evasion on VAT collection. Specifically, a portion of the VAT will be withheld by: i) Large buyers in transactions of agricultural products characterized by a high level of informality (rice, sugar and alcohol). Suppliers are to open a bank account—exclusively used for tax payments—in the state-owned Banco de la Nation. Prior to delivery, buyers must deposit 10 percent of the sale price into these accounts (products cannot be delivered without the bank deposit receipt); ii) Large taxpayers (1,200 in total) in transactions with their suppliers. These large taxpayers must withhold 6 percent at the payment stage of every purchase, when transactions exceed a minimum amount (of around US$200). The system applies to suppliers not classified as "good taxpayers" by SUNAT. Suppliers can ask for a tax refund only after having withholdings in excess of their tax obligations during six consecutive months; iii) Central government spending units (linked to the Financial Management Information System—SIAF) will withhold taxes for government purchases; iv) Large fuel sellers in transactions with fuel retailers would withhold 1 percent of the sale price." The total impact of this tax measure is $259 million of new soles, and $185 out of this is related to "large taxpayers in transactions with their suppliers", explained in "ii."

S/. 110 million (0.0564%); iii) fuel excises that would generate S/. 140 million (0.0717%); iv) withholding mechanisms and tax debt collection with an expected impact of S/. 600 million (0.307%); v) other measures increasing the revenue in S/. 65 million (0.033%).

As "withholding mechanisms and tax debt collection" is assigned as indirect tax-based (see footnote in "Peru – 2002" entry), we categorized this episode as an indirect tax-based fiscal consolidation of 0.8% of GDP.

**Peru – 2011**

Tax cuts, motivated by long-run considerations, partly offset by the impact of a new mining taxation regime and tax administration measures, generated a decrease in revenue of 0.37% of GDP (David and Leigh 2018, 52).

On the one hand, on pages 67 and 68, the *2012-2014 Marco Macroeconomico Multianual* report published by the MoF of Peru presents the tax cuts, the motivations behind them, and their respective impacts in 2011 (in % of GDP): i) tariff reductions, aimed to improve consumer welfare and increase the efficiency of resource allocation, decreasing the revenue in S/. 700 million (0.15%); ii) reduction in the general sales tax by one percentage point, intended to decrease disincentive to formalization, reducing the revenue in S/. 1600 million (0.34%); iii) decrease in the financial transactions tax, aiming to minimize the adverse effects of this tax on financial inclusion and on the competitiveness of firms, with an estimated revenue loss of S/. 700 million (0.15%). Note that all these measures are categorized as indirect taxes.

On the other hand, the 2011 Article IV Consultation staff (IMF Country Report 12/26) on page 14 and the *2012-2014 Marco Macroeconomico Multianual* report on page 68 present the tax measures intended to offset the negative impact on revenues and their respective impacts (in % of GDP): i) tax administration measures intended to improve tax collections efficiently would increase revenue collections by S/. 570 million (0.12%); ii) mining taxation reform with an expected additional revenue of USD 1 billion annually (about 0.5% of GDP) or 0.13% in 2011, as it was implemented in September. Because of the characteristics of the mining taxation reform, we assign it as a direct tax measure.[62]

[62]On page 14 of the 2011 Article consultation staff (IMF Country Report 12/26), Box 2 stated that: "The mining taxation reform, approved in September 2011, would increase progressiveness and public revenues, while preserving competitiveness of the sector. Peru's mineral taxation regime comprised mainly of corporate income tax and royalties based on sales value (1– 3 percent) introduced under the 2004 Mining Royalties Law. The new reforms include: (i) new royalties based on operating profits of 1 to 12 percent to replace the sales–based royalties, for companies with no stability contracts with the government; (ii) a new special mining tax (IEM)—as revenue for the central government—levied on a sliding scale between 2 to 8.4 percent of operating margins applicable to companies with no tax stability

Considering the category of the measures included in the tax cuts, we defined this episode as an indirect tax-based fiscal expansion of 0.385% of GDP.

**Peru – 2012**

Tax increases initiated in 2011 as part of the mining taxation reform continued in 2012, corresponding to an impact of 0.38% of GDP. Approved in September 2011, this reform would increase progressiveness and public revenues while preserving the sector's competitiveness.

As mentioned in the footnote of the entry above, the measures of the new mining taxation regime are predominantly based on the profits of the sector (i.e., direct taxes). Therefore, we categorized this episode as a direct tax-based fiscal consolidation of 0.38% of GDP.

### 2.4.14 Uruguay

**Uruguay – 1990**

According to David and Leigh (2018), the fiscal consolidation consisted of tax hikes amounting to 1.7% of GDP, aiming to reduce the deficit. The motivation for this episode is explained in the 1991 Article IV Consultation staff report (SM/91/168): "*(...) the administration that took office in March 1990 was confronted with a combined public sector deficit that had risen from 5 percent of GDP in 1988 to over 7.5 percent of GDP in 1989 and the first quarter of 1990. (...) Upon assuming office, the authorities adopted corrective measures, including a sharp increase in public sector tariffs and a fiscal package with increases in many tax rates and the introduction of new taxes.*"

Rial and Vicente (2003), on page 21, listed the main tax measures of this fiscal adjustment:[63] i) increase in the basic IVA rate from 21% to 22% (VAT changes); ii) increase in the IRIC, IRA, and IMAGRO rates from 30% to 40% (CIT measures); iii) increase in IMESI tax rate (excise tax); iv) increase in IRP tax rate (PIT measure). In addition to

contracts; and (iii) a special (voluntary) levy (GEM) of 4 to 13 percent of profits on the extraction of mineral resources targeting companies holding stability contracts." Note that the measures of the mining taxation reform are predominantly based on the profits of the sector.

[63] "El ajuste fiscal, plasmado en la ley 16.107 del 3/3/90, se basó en un aumento de tasas y bases imponibles de los principales impuestos. Las medidas más importantes fueron: aumento de la tasa básica del IVA de 21% a 22%, aumento por un año exclusivamente de las tasas de IRIC, IRA e IMAGRO de 30% a 40%, aumento de algunas tasas del IMESI y del IMABA (la tasa aplicable pasa de 0.75% al máximo legal, 1.75%). Por otra parte, aumentan las tasas del IRP, tanto patronales (de 1% a 4.5%) como personales (las tasas máximas pasan de 2% a 7.5%), acompañadas por una diversificación de franjas."

these measures, the 1991 Recent Economic Developments report (SM/91/183) also lists the following: v) temporary surcharge on certain imports (*impuesto a las importaciones*); vi) efforts to reduce smuggling and tax evasion and to improve the efficiency of collections, and the creation of a tax on real estate transfers (*otros*).

The impacts of these tax measures were estimated using data from Table 3 of Licandro and Vicente (2006) on page 42. We also utilized elasticities of taxes to the output gap for Uruguay from Fricke and Süssmuth (2014) and Ardanaz et al. (2015) and output gap data from Carrière-Swallow, David and Leigh (2021) for Latin-American economies. Table 2.14 detailed these estimates.

Table 2.14: Impact of the tax measures for "Uruguay – 1990" entry (in % of GDP)

| **Current revenue (in % of GDP)** | **1989** | **1990** | **A: 1989 (adjusted)** | **B: 1990 (adjusted)** | **B – A: Impact (in % of GDP)** | **Adjustment to David and Leigh's (2018) calculations** |
|---|---|---|---|---|---|---|
| Changes in VAT[a] | 6.4 | 6.7 | 6.34 | 6.99 | 0.65 | 0.58 |
| CIT[b] | 1.1 | 1.1 | 1.09 | 1.16 | 0.07 | 0.06 |
| Excise taxes[c] | 3.4 | 3.6 | 3.33 | 3.94 | 0.61 | 0.54 |
| PIT[d] | 0.5 | 0.5 | 0.49 | 0.53 | 0.04 | 0.04 |
| Taxes on imports[e] | 1.8 | 2.1 | 1.78 | 2.22 | 0.44 | 0.39 |
| Other[f] | 0.9 | 1 | 0.9 | 1 | 0.1 | 0.09 |
| Total impact | | | | | 1.91 | 1.7 |

Source: Own calculations based on data from Licandro and Vicente (2006).
The adjusted values for 1989 and 1990 are the cyclically adjusted tax revenues in % of GDP. For 1989, the output gap is 0.0055104; for 1990, it is -0.02374.
a: VAT elasticity = 1.783 (Fricke and Süssmuth 2014).
b: CIT elasticity = 2.2 (Ardanaz et al. 2015).
c: indirect taxes elasticity = 3.8 (Ardanaz et al. 2015).
d: PIT elasticity = 2.7 (Ardanaz et al. 2015).
e: external VAT elasticity = 2.311 (Fricke and Süssmuth 2014).
f: other taxes elasticity = 0.01 (Ardanaz et al. 2015).

From Table 2.14 and the information presented in this entry, we classified this episode as an indirect tax-based fiscal consolidation of 1.7% of GDP.

### Uruguay – 1995

In 1995, the Uruguayan government implemented tax hikes of 0.75% of GDP to reduce the deficit. On page 5, the 1995 Article IV Consultation staff report (SM/95/126) explains that: "*In the near term, the authorities are implementing a program based on a substantial reduction in the public sector deficit, together with monetary and wage*

*restraint, to bring down inflation to 30 percent during 1995/96 (i.e., the year ending in March 1996), consistent with the maintenance of the current exchange rate policy.*"

On the one hand, the same report on page 6 and the 1996 Article IV Consultation staff report (EBS/96/115) on page 2 listed the tax measures included in this fiscal adjustment program to increase revenues: i) changes in the VAT;[64] ii) increase in the rates of the tax on wages and retirement pensions (IRP); iii) changes in the CIT, agricultural and sales taxes to enhance collections; iv) public enterprise tariffs and prices were increased significantly during the year. On the other hand, they pointed out that these measures were partly offset by a reduction of 6 percentage points of the employer social security contribution rates for the manufacturing sector and an increase in family allowances for low-income families.

To evaluate which category of tax measure is predominant in this episode, we highlighted two excerpts of the Recent Economic Developments report on Uruguay (IMF Staff Country Report 96/94). Regarding the indirect taxes, on page 5: "*In 1995, despite a sharp fall in domestic demand, indirect tax collection on domestic transactions increased by 1/3 percentage point of GDP as VAT rates were increased (from 22 percent to 23 percent the basic rate, and from 12 percent to 14 percent the lower rate) in the middle of the year.*" Considering the revenue of direct taxes, on pages 5 and 6: "*In 1995, direct taxes fell slightly relative to GDP as the regularization of corporate income tax payments of two public companies (the electricity company, and the water and sewage company) were not sufficient to offset the adverse effects of the economic recession.*"

Although we were not able to calculate the impact in % of GDP for each one of the tax measures in this fiscal consolidation episode, we noted, from the analysis carried out in the IMF Staff Country Report 96/94, that the impact of the indirect taxes implemented on the collection exceeded that of the direct taxes. For this entry, as the tax measures were expected to impact around 1% of GDP over the program year (up to March 1996), David and Leigh (2018) assign a revenue increase of 0.75% of GDP in 1995 and 0.25% in 1996.

Therefore, we categorized this episode as an indirect tax-based fiscal consolidation of 0.75% of GDP.

**Uruguay – 1996**

[64]Increase in the basic rate of the value added tax (VAT) from 22 percent to 23 percent and in the lower VAT rate from 12 percent to 14 percent, while reducing VAT exemptions.

The fiscal consolidation implemented in 1995 continued in 1996, aiming to reduce the deficit. As indicated in the "Uruguay – 1995" entry, this is an indirect tax-based fiscal consolidation episode of 0.25% of GDP.

**Uruguay – 2002**

Tax hikes of 1.6% of GDP were part of the fiscal consolidation package proposed in 2002, aiming to reduce the public debt in the context of a recession with a banking and balance of payment crisis (David and Leigh 2018, 61). The June 2002 Memorandum of Economic and Financial Policies demonstrates the intention of this episode:[65] "*The government is determined to ensure the sustainability of the public debt over the medium term and is taking steps to strengthen the public finances in spite of the more difficult conditions being faced by Uruguay. As envisaged in the original program, the government is seeking a permanent increase in the primary surplus, raising it from 1 percent of GDP in 2001 to around 4 percent by 2004 and beyond. This target should be adequate to begin to reduce the public debt to GDP ratio from 2004 onwards, even in the eventuality of higher interest rates, a more depreciated peso, and additional debt to assist the banking system.*"

On page 4, the 2003 Second Stand-By Arrangement review report (IMF Country Report 03/116) listed the tax measures of this fiscal package: i) increase in taxes on wages and pensions (IRP); ii) new excise taxes on the tariffs charged by public utilities (IMESI); iii) broadening of the VAT base (IVA). On page 61, David and Leigh (2018) stated that: "*The full year effect of these measures was estimated to be about 2.1 percent of GDP (see paragraph 9 of the June 2002 Memorandum of Economic and Financial Policies). But some of the measures were only temporary and due to expire at the end of 2003, with an expected revenue loss of 1.2 percent of GDP (see paragraph 11 of the June 2002 Memorandum of Economic and Financial Policies). Due to the timing of the implementation of the tax packages, we assign a revenue effect of about 1.6 percent of GDP to 2002 (0.75∗2.1) and of 0.5 percent of GDP to 2003.*"

We estimated the impacts of these tax measures using data from Table 3 of Licandro and Vicente (2006) on page 43. We also used elasticities of taxes to the output gap for Uruguay from Fricke and Süssmuth (2014) and Ardanaz et al. (2015) and output gap data from Carrière-Swallow, David and Leigh (2021) for Latin-American economies. Table 2.15 detailed the estimates.

[65] Uruguay - Letter of Intent, Memorandum of Economic Policies, and Technical Memorandum of Understanding. Montevideo, June 18, 2002. Accessed on 04/13/2023: https://www.imf.org/external/np/loi/2002/ury/02/index.htm.

Table 2.15: Impact of the tax measures for "Uruguay – 2002" entry (in % of GDP)

| **Current revenue (in % of GDP)** | **2001** | **2002** | **A: 2001 (adjusted)** | **B: 2002 (adjusted)** | **B – A: Impact (in % of GDP)** | **Adjustment to David and Leigh's (2018) calculations** |
|---|---|---|---|---|---|---|
| Taxes on wages and pensions[a] | 1.5 | 1.9 | 1.48 | 2.2 | 0.72 | 0.771 |
| Excise taxes[b] | 3.2 | 2.7 | 3.15 | 3.32 | 0.17 | 0.184 |
| VAT[c] | 8.3 | 8 | 8.24 | 8.82 | 0.58 | 0.62 |
| Total impact | | | | | 1.47 | 1.575 |

Source: Own calculations based on data from Licandro and Vicente (2006).
The adjusted values for 2001 and 2002 are the cyclically adjusted tax revenues in % of GDP. For 2001, the output gap is 0.003965; for 2002, it is -0.05322.
a: PIT elasticity = 2.7 (Ardanaz et al. 2015).
b: indirect taxes elasticity = 3.8 (Ardanaz et al. 2015).
c: VAT elasticity = 1.783 (Fricke and Süssmuth 2014).

From Table 2.15 and the information presented in this entry, we defined this episode as an indirect tax-based fiscal consolidation of 1.575% of GDP.

### Uruguay – 2003

Tax measures implemented in this fiscal consolidation episode were motivated by reducing the public debt. They consisted of 1.4% of GDP in revenue. On page 7, the 2003 Second Stand-By Arrangement review report (IMF Country Report 03/116) stated, "*The authorities' economic program seeks to credibly improve public finances in 2003, and to provide the basis for a sound medium-term fiscal position. The authorities are committed to raising the primary surplus of the combined public sector to 3.2 percent of GDP in 2003, consistent with a reduction in the overall deficit from 4.3 percent of GDP to 3.1 percent.*"

On page 8, Box 2 of the same report detailed the content of these tax measures: "*The fiscal program includes an increase in the operating surplus of public enterprises from 2.3 percent of GDP in 2002 to 3 percent in 2003. This improvement would return the operating surplus to the level registered in 2001, correcting for the weak performance observed in 2002 (mostly due to tariff adjustments that lagged behind the rise in operating costs). Two main factors will support the projected recovery: i) Tariff adjustments. The four main public enterprises increased their tariffs by 10-26 percent in January and February 2003, and are scheduled to implement two further adjustments in May and August, to reach cumulative increases of 23-49 percent by year-end. These adjustments*

*will help improve revenue by the equivalent of 1.5 percent of GDP; ii) Tight controls on operating expenditure. Total current outlays of public enterprises are expected to increase only by about 0.6 percent of GDP from 2002 to 2003, supported by wage restraint and implementation of early retirement programs.*"

Following David and Leigh's (2018) approach, the tariff adjustments are net of the growth in current outlays of public enterprises, amounting to 0.9% of GDP classified as indirect taxes. Moreover, as explained in the previous entry, there was a revenue effect in 2003 related to the 2002 fiscal consolidation package of about 0.5% of GDP (0.25∗2.1%) categorized as indirect taxes (see explanation in "Uruguay – 2002" entry).

Since tariff adjustments are predominant in this episode, we classified it as an indirect tax-based fiscal consolidation of 1.4% of GDP.

**Uruguay – 2004**

The unwinding of surcharges and taxes implemented in 2002[66] corresponded to a revenue reduction of 0.5% of GDP (David and Leigh 2018, 62). On page 8, the Fifth Stand-By Arrangement review report (IMF Country Report 04/327) details the impact of these measures: "*Fiscal performance has been stronger than programmed owing to robust revenue performance. The primary surplus of the consolidated public sector reached 1.1 percent of annual GDP in the first quarter, 0.6 percent of GDP higher than programmed, with a commensurate improvement in the overall deficit. The overperformance reflected better-than-expected revenue (0.6 percent of GDP), while expenditure was kept within the program limits and state-enterprise tariffs were adjusted in line with cost conditions. Preliminary second-quarter data indicate that revenue has continued to outperform the program, mainly due to buoyant corporate income tax receipts, and expenditure restraint has been maintained. In light of this performance, in May–July, the authorities eliminated emergency surcharges (on the wage tax and corporate income tax) and taxes (on commissions and public utilities), which will cost the budget about 0.5 percent of GDP in 2004 (1.4 percent of GDP on an annual basis).*"

From the information above, we noticed that this episode partially eliminated the tax measures implemented in 2002 and 2003 fiscal adjustments, amounting to a decrease in revenues of 0.5% of GDP in 2004.

See that "Uruguay – 2002" and "Uruguay – 2003" entries were categorized as indirect

[66]The effects of the 2002 fiscal package are extended to the 2003 year (see "Uruguay – 2002" and "Uruguay – 2003" entries).

tax-based fiscal consolidation episodes. Therefore, this episode assumes the opposite sign, and we assigned it as an indirect tax-based fiscal expansion of 0.5% of GDP.

**Uruguay – 2005**

Tax cuts implemented in 2004 continued in 2005, with a revenue reduction of 0.9% of GDP (David and Leigh 2018, 62). Considering this information and the indication in the "Uruguay – 2004" entry, we categorized this episode as an indirect tax-based fiscal expansion of 0.9 of GDP.

## 2.5 The narrative dataset for direct-tax-based and indirect-tax-based annual fiscal shocks

This section presents descriptive statistics of the dataset. Our data came from the decomposition of the tax-based fiscal packages presented by David and Leigh (2018) into direct- and indirect tax-based. Table 2.16 shows the impact, in % of GDP, and the category of each one of the annual fiscal shocks.

As described in this Chapter, the annual fiscal shocks were categorized as direct tax-based when direct taxes were predominant in implementing the fiscal consolidation (or fiscal expansion) and indirect tax-based when indirect taxes prevailed. Following other works for this literature (Guajardo, Leigh and Pescatori 2014; Jalles 2017; David and Leigh 2018), we assumed predominance when a tax category represented more than half of the impact, in % of GDP, for the episode.

Table 2.17 presents the descriptive statistics for this dataset. The average size for direct tax-based fiscal consolidations in this dataset was 0.73% of GDP, while for indirect tax-based fiscal adjustments it was 0.98%. However, the largest fiscal consolidation shock was based on direct taxes (see "Bolivia – 2005" entry). The average fiscal expansion size was -0.59%, with the "Uruguay – 2005" entry presenting the highest magnitude in absolute value (i.e., -0.9% of GDP).

Table 2.16: Impact, in % of GDP, of the Narrative Fiscal Packages

| **Country** | **Year** | **Direct-Tax-Based** | **Indirect-Tax-Based** |
|---|---|---|---|
| Argentina | 1996 | 0.00 | 0.25 |
| Argentina | 1997 | 0.00 | 0.75 |
| Bolivia | 1995 | 0.00 | 0.90 |

| | | | |
|---|---|---|---|
| Bolivia | 2004 | 0.00 | 2.00 |
| Bolivia | 2005 | 4.10 | 0.00 |
| Brazil | 2015 | 0.00 | 0.30 |
| Chile | 1990 | 0.50 | 0.00 |
| Chile | 1991 | 0.17 | 0.00 |
| Chile | 2003 | 0.00 | 0.20 |
| Chile | 2004 | 0.00 | 0.40 |
| Chile | 2014 | 0.10 | 0.00 |
| Chile | 2015 | 0.18 | 0.00 |
| Chile | 2016 | 0.31 | 0.00 |
| Colombia | 2003 | 0.00 | 1.10 |
| Colombia | 2011 | 0.40 | 0.00 |
| Colombia | 2012 | 0.80 | 0.00 |
| Costa Rica | 1990 | 0.00 | 1.50 |
| Costa Rica | 1991 | 0.00 | 3.10 |
| Costa Rica | 1992 | 0.00 | 0.50 |
| Costa Rica | 1993 | 0.00 | -0.30 |
| Costa Rica | 1994 | 0.00 | -0.50 |
| Costa Rica | 1995 | 0.00 | 1.00 |
| Costa Rica | 1996 | 0.00 | 0.30 |
| Costa Rica | 2016 | 0.20 | 0.00 |
| Dominican Republic | 2004 | 0.00 | 0.50 |
| Dominican Republic | 2006 | 0.00 | -0.80 |
| Dominican Republic | 2007 | 0.00 | 0.90 |
| Dominican Republic | 2011 | 0.44 | 0.00 |
| Dominican Republic | 2013 | 1.80 | 0.00 |
| Ecuador | 1990 | 0.00 | 0.32 |
| Ecuador | 1993 | 0.00 | 1.70 |
| Ecuador | 2000 | 0.00 | 0.50 |

| | | | |
|---|---|---|---|
| Guatemala | 1995 | 0.80 | 0.00 |
| Guatemala | 1996 | 0.70 | 0.00 |
| Guatemala | 2000 | 0.00 | 0.30 |
| Guatemala | 2002 | 0.00 | 1.00 |
| Guatemala | 2013 | 1.00 | 0.00 |
| Jamaica | 1992 | 0.00 | 2.10 |
| Jamaica | 2003 | 0.00 | 1.50 |
| Jamaica | 2004 | 0.00 | 0.50 |
| Jamaica | 2012 | 0.00 | 0.80 |
| Jamaica | 2013 | 0.00 | 2.00 |
| Jamaica | 2014 | 0.40 | 0.00 |
| Mexico | 1989 | 0.00 | 0.90 |
| Mexico | 2010 | 0.60 | 0.00 |
| Mexico | 2014 | 0.00 | 0.60 |
| Paraguay | 1989 | 0.00 | 2.00 |
| Paraguay | 2001 | 0.00 | 0.50 |
| Paraguay | 2003 | 0.00 | 1.25 |
| Paraguay | 2004 | 0.00 | 0.80 |
| Paraguay | 2005 | -0.60 | 0.00 |
| Paraguay | 2006 | -0.70 | 0.00 |
| Paraguay | 2014 | 0.24 | 0.00 |
| Peru | 1992 | 0.00 | 1.00 |
| Peru | 2002 | 0.00 | 0.20 |
| Peru | 2003 | 0.00 | 0.80 |
| Peru | 2011 | 0.00 | -0.38 |
| Peru | 2012 | 0.38 | 0.00 |
| Uruguay | 1990 | 0.00 | 1.70 |
| Uruguay | 1995 | 0.00 | 0.75 |
| Uruguay | 1996 | 0.00 | 0.25 |

| | | | |
|---|---|---|---|
| Uruguay | 2002 | 0.00 | 1.58 |
| Uruguay | 2003 | 0.00 | 1.42 |
| Uruguay | 2004 | 0.00 | -0.50 |
| Uruguay | 2005 | 0.00 | -0.90 |

Note: positive values indicate fiscal consolidations, while negative values indicate fiscal expansions.

Table 2.17: Narrative Fiscal Packages with Descriptive Statistics (1989 – 2016)

| | **Number of annual shocks** | **Average size (% do GDP)** | **Min size (% GDP)** | **Max size (% GDP)** |
|---|---|---|---|---|
| **Consolidations** | 57 | 0.9 | 0.1 | 4.1 |
| Direct-tax-based | 18 | 0.73 | 0.1 | 4.1 |
| Indirect-tax-based | 39 | 0.98 | 0.2 | 3.1 |
| **Fiscal expansions** | 8 | 0.59 | 0.3 | 0.9 |
| Direct-tax-based | 2 | 0.65 | 0.6 | 0.7 |
| Indirect-tax-based | 6 | 0.56 | 0.3 | 0.9 |
| **Total** | 65 | | | |

Note: fiscal expansions and consolidations, in % of GDP, are indicated in absolute values.

# Appendix

Table 2.18: Information on the direct tax-based episodes

| **Country** | **Year** | **Fiscal measure** | **Tax category** | **Impact of the measure (in % of GDP)** | **Impact of the episode (in % of GDP)** |
|---|---|---|---|---|---|
| Bolivia | 2005 | Fuel excise taxes | Indirect | 1 | 4.1 |
| | | Introduction of a new direct tax on hydrocarbons | Direct | 3.1 | |
| Chile | 1990 | Value Added Tax (VAT) | Indirect | 0.48 | 0.5 |
| | | Corporate Income Tax (CIT) | Direct | 0.18 | |
| | | Fuel tax | Direct | 0.30 | |
| | | Personal Income Taxes (PIT) | Direct | 0.09 | |
| | | Pension law | Direct | 0.05 | |
| | | Excise taxes | Indirect | -0.01 | |
| | | Agricultural taxes | Direct | 0.05 | |
| | | Mortgage dividends tax | Direct | -0.01 | |
| | | Change in tariffs | Indirect | -0.51 | |
| | | Income tax credit | Direct | -0.07 | |
| | | Real estate tax | Direct | -0.05 | |
| | | Change in taxes associated with tolls | Indirect | -0.01 | |
| Chile | 1991 | Continuation of the measures implemented in 1990. | | | 0.167 |

| | | | | | |
|---|---|---|---|---|---|
| Chile | 2014 | PIT of undistributed profits | Direct | 0.03 | 0.097 |
| | | Increase in CIT rate | Direct | 0.02 | |
| | | Measures to reduce evasion and avoidance | Not categorized | 0.02 | |
| | | Real-estate related taxes | Direct | 0.01 | |
| | | Diesel vehicles import tax and emission tax | Indirect | 0.01 | |
| | | Increase in stamp tax | Indirect | 0.005 | |
| | | Alcoholic and/or low nutritional value beverages tax | Indirect | 0.005 | |
| | | Other measures | Not categorized | 0.01 | |
| Chile | 2015 | Continuation of the measures implemented in 2014. | | | 0.177 |
| Chile | 2016 | Continuation of the measures implemented in 2014. | | | 0.3133 |
| Colombia | 2011 | Financial transaction tax (FTT) | Indirect | 0.25 | 0.4 |
| | | Net wealth tax | Direct | 0.45 | |
| | | Import tariffs | Indirect | -0.3 | |
| Colombia | 2012 | Elimination of the fixed asset tax credit | Direct | 0.8 | 0.8 |
| Costa Rica | 2016 | Effort to lower PIT evasion | Direct | 0.2 | 0.2 |
| Dominican Republic | 2011 | Introduction of a tax on banks' financial assets | Direct | 0.113 | 0.44 |

| | | | | | |
|---|---|---|---|---|---|
| | | Income tax on free trade zones sales in the local market | Direct | 0.034 | |
| | | Increase in presumptive income taxation on gambling | Direct | 0.113 | |
| | | Tax administration measures such as the indexation of the excise tax on fuels, improved control on tax exemptions and the indexation of excise tax on motor vehicles | Indirect | 0.21 | |
| Dominican Republic | 2013 | Introduction of a dual taxation regime for personal income. | Direct | | 1.8 |
| | | Strengthening of international taxation. | Not categorized | | |
| | | Changes in the tax on real estate property. | Direct | | |
| | | Increases in tax on vehicles. | Direct | | |
| | | Changes in excise taxes on fuel. | Indirect | | |

| | | | | | |
|---|---|---|---|---|---|
| | | Increases in excise taxes on alcohol and tobacco. | Indirect | | |
| | | Increases in VAT and broadening of its base, as well as the elimination of some exemptions. | Indirect | | |
| Guatemala | 1995 | Increase in the CIT | Direct | | 0.8 |
| | | Increase in the top rate for the PIT | Direct | | |
| Guatemala | 1996 | Temporary tax of 1% on the gross income of individuals and corporations (ISET) | Direct | 0.5 | 0.7 |
| | | Elimination of certain VAT exemptions | Indirect | 0.2 | |
| | | Increase in the VAT rate | Indirect | | |
| | | Reduction in the common external tariff | Indirect | | |
| Guatemala | 2013 | Reform to the CIT | Direct | 0.6 | 1 |
| | | Reform to the PIT | Direct | 0.2 | |
| | | Vehicle tax and excise taxes were increased | Indirect | 0.2 | |
| Jamaica | 2014 | Direct taxes from 2013/14 package | Direct | 0.142 | 0.4 |

| | | | | | |
|---|---|---|---|---|---|
| | | Indirect taxes from 2013/14 package | Indirect | 0.091 | |
| | | Not categorized measures from 2013/14 package | Not categorized | 0.167 | |
| Mexico | 2010 | VAT | Indirect | 0.177 | 0.6 |
| | | Excise taxes | Indirect | 0.073 | |
| | | Changes in the tax treatment of loss carry forwards | Direct | 0.017 | |
| | | Temporary increase in income tax rates | Direct | 0.332 | |
| Paraguay | 2005 | Elimination of the export tax on soy | Indirect | -0.2 | -0.6 |
| | | Reduction in the CIT rate | Direct | -0.4 | |
| Paraguay | 2006 | Further reduction in the CIT rate | Direct | -0.7 | -0.7 |
| Paraguay | 2014 | Extend the VAT to primary production | Indirect | 0.1 | 0.24 |
| | | Introduction of a new agricultural income tax (IRAGRO) | Direct | 0.14 | |
| Peru | 2012 | New mining taxation regime | Direct | 0.38 | 0.38 |

Note: A negative sign indicates a fiscal expansion.

Table 2.19: Information on the indirect tax-based episodes

| **Country** | **Year** | **Fiscal measure** | **Tax category** | **Impact of the measure (in % of GDP)** | **Impact of the episode (in % of GDP)** |
|---|---|---|---|---|---|
| Argentina | 1996 | Fuel excises | Indirect | | 0.25 |
| | | Elimination of CIT exemptions and loopholes | Direct | | |
| | | Increase in CIT rates | Direct | | |
| | | Increases in PIT rates | Direct | | |
| | | Tariff on imports of capital goods under Mercosur | Indirect | | |
| | | Tax on exporters (reduction of tax rebates) | Indirect | | |
| | | Social security contributions | Direct | | |
| | | Tax on domestic producers of capital goods (removal of subsidies) | Indirect | | |
| Argentina | 1997 | Continuation of the measures implemented in 1996. | | | 0.75 |
| Bolivia | 1995 | Increase in transaction tax rate | Indirect | 0.675 | 0.9 |
| | | Excise tax on vehicles | Indirect | 0.225 | |
| | | Beer taxes | Indirect | | |
| Bolivia | 2004 | New tax code (tax administration measure) | Not categorized | 0.3 | 2 |

| | | | | | |
|---|---|---|---|---|---|
| | | Broaden the base of hydrocarbon taxation | Direct | 0.3 | |
| | | Tax regularization scheme (tax administration measure) | Not categorized | 0.8 | |
| | | Introduction of a financial transaction tax | Indirect | 0.6 | |
| Brazil | 2015 | Tax on fuels | Indirect | | 0.3 |
| | | Tax on household credit operations | Indirect | | |
| | | Tax on car sales | Indirect | | |
| | | Tax on imports | Indirect | | |
| | | Tax on cosmetics | Indirect | | |
| | | Reinstatement of the IPI on several products | Indirect | | |
| | | Increase in financial transaction tax (IOF) on new loans for individuals | Indirect | | |
| Chile | 2003 | VAT | Indirect | 0.2 | 0.2 |
| Chile | 2004 | VAT | Indirect | 0.4 | 0.4 |
| Colombia | 2003 | One-time wealth tax | Direct | 0 | 1.1 |
| | | Income tax surcharge | Direct | 0.27 | |
| | | VAT | Indirect | 0.83 | |

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|---|---|---|---|---|---|
| Costa Rica | 1990 | Import duties on raw materials and on intermediate and capital goods | Indirect | | 1.5 |
| | | Tax on banana exports | Indirect | | |
| | | Increase in the prices of basic grains sold by the CNP | Indirect | | |
| | | Increase in the prices of petroleum products, electricity, and telephone tariffs | Indirect | | |
| Costa Rica | 1991 | Sales tax | Indirect | 0.8 | 3.1 |
| | | Tax on pensions paid by the public sector | Direct | 0.1 | |
| | | Temporary import surcharge | Indirect | 0.7 | |
| | | Linked to the revenue measures implemented in 1990 | Indirect | 1.5 | |
| Costa Rica | 1992 | Net effect of sales taxes | Indirect | 0.3 | 0.5 |
| | | Net effect of taxes on international trade | Indirect | 0.2 | |
| | | Reduction of about 50 percent in income tax exemptions | Direct | 0 | |
| Costa Rica | 1993 | Reduction on sales tax | Indirect | -0.5 | -0.3 |

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|---|---|---|---|---|---|
| | | Reduction on tax on banana exports | Indirect | -0.1 | |
| | | Full-year impact of the 1992 tax package | Indirect | 0.2 | |
| | | Increase in consumption duties on selected items | Indirect | 0.1 | |
| Costa Rica | 1994 | Reduction on sales tax | Indirect | -0.5 | -0.5 |
| Costa Rica | 1995 | Sales tax | Indirect | 0.495 | 1 |
| | | Taxes on international trade (others) | Indirect | ∼0 | |
| | | Tax on gross assets of corporations | Direct | ∼0 | |
| | | Changes in income taxes | Direct | 0.505 | |
| | | Unification of the tax rate on profits | Direct | | |
| Costa Rica | 1996 | Continuation of the measures implemented in 1995. | | | 0.3 |
| Dominican Republic | 2004 | Excise tax on alcohol, tobacco and other products | Indirect | 0.025 | 0.5 |
| | | Taxes on international trade | Indirect | 0.475 | |
| | | Elimination of income tax exemptions to corporations | Direct | ∼0 | |
| Dominican Republic | 2006 | Ratification of the free trade agreement DR-CAFTA | Indirect | -0.3 | -0.8 |

| | | | | | |
|---|---|---|---|---|---|
| | | Elimination of foreign exchange commission | Indirect | -2.7 | |
| | | Removal of the financial transaction tax | Indirect | -0.2 | |
| | | VAT | Indirect | 0.4 | |
| | | Excise taxes | Indirect | 1.3 | |
| | | CIT | Direct | 0.8 | |
| | | PIT | Direct | | |
| Dominican Republic | 2007 | Tax on alcohol, cigarettes, and some fuels | Indirect | 0.3 | 0.9 |
| | | Including excises in the VAT base | Indirect | | |
| | | Tax administration measures | Indirect | 0.6 | |
| Ecuador | 1990 | Monthly increases on domestic prices of petroleum products | Indirect | 0.825 | 0.325 |
| | | Income tax reform and changes in import tariff rates | Direct and Indirect | -0.5 | |
| Ecuador | 1993 | Increase in fuel prices | Indirect | | 1.7 |
| | | Increase in electricity tariffs | Indirect | | |
| | | One-time levy in the range of 0.2-0.7% on company assets | Direct | | |

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|---|---|---|---|---|---|
| Ecuador | 2000 | Increase in domestic price for petroleum products (reduction of subsidies) | Indirect | 0.5 | 0.5 |
| Guatemala | 2000 | Increase in the top income tax rate | Direct | 0.1 | 0.3 |
| | | Widening of the VAT base to include custom duties and phase out some exemptions | Indirect | 0.2 | |
| Guatemala | 2002 | Increase in the VAT rate from 10 to 12 percent | Indirect | 0.43 | 1 |
| | | Higher income tax rates on commercial and agricultural enterprises | Direct | 0.436 | |
| | | Excise taxes on fuel oil, cigarettes, beer, alcoholic beverages, and soft drinks | Indirect | 0.09 | |
| | | Custom duties on gasoline and import duties on used cars | Indirect | 0.044 | |
| Jamaica | 1992 | Increase in domestic taxes | Not categorized | 0.3 | 2.1 |
| | | Increase in the public sector prices | Indirect | 1.8 | |

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|---|---|---|---|---|---|
| Jamaica | 2003 | 4% surcharge on all imports | Indirect | | 1.5 |
| | | Widening of the tax base for the general consumption tax | Indirect | | |
| | | Higher duties on vehicle imports | Indirect | | |
| Jamaica | 2004 | Continuation of the measures implemented in 2003. | | | 0.5 |
| Jamaica | 2012 | Changes in General Consumptions Taxes (GCT) | Indirect | 0.196 | 0.8 |
| | | Changes in Special Consumptions Taxes (SCT) | Indirect | 0.069 | |
| | | Increase in Common External Tariff (CET) on certain consumer items | Indirect | 0.08 | |
| | | Changes in income taxes | Direct | 0.017 | |
| | | Increase in Motor Vehicle Licenses & Fees Modification of Asset Tax regime | Direct | 0.025 | |
| | | Modification of Asset tax regime | Direct | 0.08 | |
| | | Charges on termination cost of telephone calls | Indirect | 0.217 | |

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|---|---|---|---|---|---|
| | | Modification of taxation of alcoholic beverages bought by the tourism sector | Indirect | 0.022 | |
| | | Increase in tax on winnings – Betting, Gaming, Horse Racing and Lotteries | Direct | 0.016 | |
| | | Curtailment of Discretionary Waivers | Not categorized | 0.078 | |
| Jamaica | 2013 | Introduction of a customs administration fee (CAF) on imports | Indirect | 0.053 | 2 |
| | | Changes in income taxes | Direct | 0.101 | |
| | | Changes in property taxes | Direct | 0.149 | |
| | | Changes in general consumption taxes (GCT) | Indirect | 0.132 | |
| | | Changes in corporate taxes | Direct | 0.053 | |
| | | Changes in education tax (tax on income) | Direct | 0.123 | |
| | | Increase in the stamp duty and transfer tax rates (for properties) | Indirect | 0.088 | |

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|---|---|---|---|---|---|
| | | Financial support from the National Housing Trust (NHT) for fiscal consolidation | Not categorized | 0.501 | |
| Mexico | 1989 | Changes in CIT | Direct | 0.2 | 0.9 |
| | | Introduction of a property tax | Direct | | |
| | | Changes in PIT | Direct | | |
| | | Increase in the minimum tariff on imports | Indirect | 0.7 | |
| Mexico | 2014 | Changes in VAT | Indirect | 0.3 | 0.6 |
| | | Changes in CIT | Direct | -0.3 | |
| | | Changes in PIT | Direct | | |
| | | Introduction of excises taxes | Indirect | 0.6 | |
| Paraguay | 1989 | Taxes on imports and export taxes | Indirect | 1.22 | 2 |
| | | Property taxes | Direct | 0.78 | |
| Paraguay | 2001 | Elimination of a specific exemption on CIT | Direct | 0 | 0.5 |
| | | Excise tax and changes in VAT | Indirect | 0.47 | |
| | | Elimination of exemptions in the re-export trade | Indirect | 0.03 | |

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|---|---|---|---|---|---|
| Paraguay | 2003 | Program to revamp tax and customs administrations | Indirect | 1 | 1.25 |
| | | Excise tax on fuels | Indirect | 0.25 | |
| Paraguay | 2004 | Excise tax on diesel | Indirect | 0.25 | 0.8 |
| | | Temporary tax on soy exports | Indirect | 0.1 | |
| | | VAT changes engendered by the *Ley de Reordenamiento Administrativo y de Adecuación Fiscal* | Indirect | 0.2 | |
| | | Impact of the excise taxes implemented in 2003 and continued in 2004 | Indirect | 0.25 | |
| Peru | 1992 | Changes in VAT and excise tax measures | Indirect | 0.61 | 1 |
| | | CIT | Direct | 0.39 | |
| Peru | 2002 | Changes in VAT | Indirect | 0.013 | 2 |
| | | Increase in fuel excises | Indirect | 0.013 | |
| | | Withholding mechanisms and tax debt collection | Indirect | 0.14 | |
| | | Other measures | Not categorized | 0.033 | |
| Peru | 2003 | Increase in income tax | Direct | 0.33 | 0.8 |

| | | | | | |
|---|---|---|---|---|---|
| | | Changes in VAT | Indirect | 0.06 | |
| | | Fuel excises | Indirect | 0.07 | |
| | | Withholding mechanisms and tax debt collection | Indirect | 0.31 | |
| | | Other measures | Not categorized | 0.03 | |
| Peru | 2011 | Tariff reductions | Indirect | -0.15 | -0.385 |
| | | Reduction in the general sales tax | Indirect | -0.15 | |
| | | Decrease in the financial transactions tax | Indirect | -0.34 | |
| | | Tax administration measures | Not categorized | 0.12 | |
| | | New mining taxation regime | Direct | 0.13 | |
| Uruguay | 1990 | Changes in VAT | Indirect | 0.58 | 1.7 |
| | | CIT | Direct | 0.06 | |
| | | Excise taxes | Indirect | 0.54 | |
| | | PIT | Direct | 0.04 | |
| | | Taxes on imports | Indirect | 0.39 | |
| | | Other measures | Not categorized | 0.09 | |
| Uruguay | 1995 | Changes in VAT | Indirect | | 0.75 |
| | | Increase in the rates on wages and retirement pensions | Direct | | |

| | | | | | |
|---|---|---|---|---|---|
| | | Reduction of employer social security contribution rates in the manufacturing sector | Direct | | |
| | | Changes in CIT, agricultural and sales taxes to enhance collections | Direct and Indirect | | |
| | | Increase in public enterprise tariffs and prices | Indirect | | |
| Uruguay | 1996 | Continuation of the measures implemented in 1995. | | | 0.25 |
| Uruguay | 2002 | Increases in taxes on wages and pensions | Direct | 0.771 | 1.575 |
| | | New excise taxes | Indirect | 0.184 | |
| | | Broadening of the VAT base | Indirect | 0.62 | |
| Uruguay | 2003 | Tariff adjustments | Indirect | 0.9 | 1.4 |
| | | Revenue derived from the measures implemented in 2002 | Indirect | 0.5 | |
| Uruguay | 2004 | Partial elimination of the tax measures implemented since 2002. | Indirect | -0.5 | -0.5 |
| Uruguay | 2005 | Continuation of the measures implemented in 2004. | | | -0.9 |

Note: A negative sign indicates a fiscal expansion.

# 3 THE IMPACT OF DIRECT- AND INDIRECT TAX-BASED FISCAL POLICY SHOCKS ON INCOME INEQUALITY AND ECONOMIC ACTIVITY IN LAC AND OECD ECONOMIES

## 3.1 Introduction

Based on the decomposition of David and Leigh's (2018) database that we carried out in Chapter 2 by categorizing 76 fiscal actions for Latin American and Caribbean (LAC) economies from 1989 and 2016 with annual frequency, this Chapter intends to analyze the effects of direct- and indirect tax-based, spending-based, and tax-based austerity episodes on income inequality and economic activity. Even though the focus was on the effect of fiscal adjustments in 14 LAC countries, we also carried out econometric estimates for a sample of 16 countries from the Organization for Economic Cooperation and Development (OECD), aiming to compare these results.[67]

In the OECD sample, our results suggest that all categories of fiscal adjustment generate negative effects on GDP, with the most adverse impact coming from indirect tax-based policy shocks. As for the effects on income distribution, only indirect tax-based fiscal adjustments increase inequality with statistical significance in the medium run.

Our findings for LAC indicated that while fiscal adjustments based on taxes, expenditures, and indirect taxes reduced economic activity, direct tax-based fiscal policy shocks did not affect GDP with statistical significance, but reduced the Gini index for disposable income. The results of spending-based fiscal adjustments were more deleterious to income distribution and economic activity than the effects of tax-based policy shocks. Finally, even though austerity based on indirect taxes did not raise inequality with statistical significance, this occurred when we restricted the sample to South American economies.

In sum, differently from what we obtained for the OECD sample, our findings for LAC indicate that spending-based fiscal adjustments were more adverse to the GDP than the effects of tax-based policy shocks. Moreover, direct tax-based episodes did not affect GDP with statistical significance. Regarding indirect tax-based episodes, results were similar for both regions, with intensely negative impacts on economic activity .

On the impacts on income distribution, while direct tax-based (spending-based) fiscal

[67]We utilized Alesina et al.'s (2017) fiscal consolidation database for OECD.

consolidations decreased (increased) inequality with statistical significance for the LAC sample, they did not generate impacts statistically different from zero on the Gini index for disposable income for OECD economies. On the other hand, indirect tax-based fiscal consolidations deteriorated income distribution only for the OECD sample.

Section 3.2 explained these findings.[68] For LAC, the adverse effects of taxation on economic activity in episodes of fiscal adjustments may be neutralized by the direct tax-based redistributive effects, suggesting that a better income distribution generated positive impacts on economic activity. On the results for our OECD sample, a possible interpretation is that the adverse effects of taxation on economic activity may be enhanced by the indirect tax-based episodes distributive effects (i.e., a worse income distribution generated deleterious impacts on the GDP).

These findings were summarized in Tables 3.9 and 3.10 (see section 3.4.4). Regarding the impacts on economic activity, our results were similar to Guajardo, Leigh, and Pescatori (2014), Alesina et al. (2017), Alesina, Favero, and Giavassi (2019), and Carrière-Swallow, David, and Leigh (2021), showing that while tax-based fiscal consolidations were worse for GDP in OECD countries, Latin American economies were more affected by spending-based measures. On the distributive impacts of fiscal adjustments, expenditure cuts presented more deleterious effects in both regions (Woo et al. 2013; Furceri, Jalles, and Loungani 2016; Klein and Winkler 2019; Heimberger 2020), although our results for these categories of fiscal policy shocks did not present statistically significant effects for the OECD sample.

Our contribution to the empirical literature on the macroeconomic effects of fiscal adjustments lies in decomposing the tax-based episodes of David and Leigh's (2018) dataset into direct- and indirect tax-based fiscal consolidations (see Chapter 2) and conducting a study on the distributive and economic activity impacts of adjustments based on these categories of taxes for LAC and OECD economies, comparing these results with those of spending-based and tax-based fiscal policy shocks.

The rest of this Chapter is structured as follows. Section 3.2 presented a literature review on fiscal consolidations, tax progressivity, income inequality, and economic growth. Section 3.3 described our dataset and methodology. Section 3.4 discussed our results. Section 3.5 presented the conclusion.

[68] Because income inequality can adversely affect economic growth (Delbianco et al. 2014; Santiago et al. 2019), mainly in countries with lower GDP per capita, the direct distributive effects of fiscal adjustment may influence economic activity indirectly. Thus, these second-order impacts depend on tax progressivity, given that the more progressive a tax, the more it reduces inequality.

## 3.2 Literature review

This section summarized the empirical literature on fiscal consolidation, tax progressivity, income inequality, and economic growth.

### 3.2.1 Empirical evidence for the relationship between fiscal adjustments, economic growth and income inequality

Fiscal consolidation programs are usually associated with the need to face the effects of economic crises on the public budget. In particular, austerity measures are justified as aiming to reduce government deficits and stabilize the trajectory of public indebtedness (as a percentage of GDP).

Although episodes of fiscal adjustments are recurrent and motivated by several reasons, the experience of developed economies has brought the lens of the debate on the socioeconomic dimension of fiscal consolidation effects in the last decade. As is widely documented, the Great Financial Crisis pressured public finances in several of these economies, generating budget deficits and raising concerns about the debt-to-GDP ratio. In this context, the OECD's (2011) recommendation focused on implementing fiscal consolidation measures to ensure future paths of sustainable growth.

A few years later, however, these austerity packages produced negative results on economic growth, raising the debt-GDP ratio (De Long and Summers 2012; Fatás and Summers 2018). This situation has led to a reorientation of the international economic debate concerning the risks of budget deficits and public indebtedness, especially in a scenario of low economic growth and high levels of income inequality. (Summers 2014; Eichengreen 2019).

Given the importance of this debate, a growing literature has delved into estimating the effects of fiscal consolidation on economic growth and income inequality. The results showed that austerity packages were harmful to economic growth. When decomposing fiscal adjustments into tax- and spending-based consolidations, austerity based on tax hikes was more harmful to the output in OECD economies (Guajardo, Leigh, and Pescatori 2014; Alesina et al. 2017). For a sample of 14 LAC countries from 1989 to 2016, Carrière-Swallow, David, and Leigh (2021) obtained larger estimates of the contractionary effects of fiscal consolidations that relied on expenditure cuts in the short run (after two years) than those that were based on tax hikes. However, the bands of the IRFs were not statistically distinguishable. In Section 3.4.1, we show that, in the medium run, spending-based fiscal consolidations are more detrimental to the GDP than tax-based ones, with statistical significance for this difference. See Tables 3.8 and 3.9 for

a summary of these results.

When analyzing the distributive effects of fiscal adjustments, the expenditure cuts presented deleterious effects on OECD economies (Woo et al. 2013; Furceri, Jalles, and Loungani 2016; Klein and Winkler 2019; Heimberger 2020). This Chapter also indicates that spending-based fiscal consolidations raise income inequality more than austerity based on tax hikes for LAC countries. In Chapter 1, we showed that the detrimental impacts of the tax-based fiscal adjustments were robust to a series of checks.

Given that consolidations implemented via tax increases may be preferable for the Latin American and Caribbean economies, we discuss the relationship between taxation and income inequality in the next section. Later, we will also present the debate on income inequality and economic growth.

### 3.2.2 Tax Progressivity in Latin America and the Caribbean

Before analyzing the effects of direct and indirect tax-based fiscal consolidations on inequality in Latin America and the Caribbean, what would be the impacts of these categories of taxes, on average, in situations other than those involving the implementation of fiscal adjustments and considering the individual countries in the region? Based on the results of this Chapter, the literature review presented in this section allows assessing whether direct and indirect taxes, in specific situations of fiscal adjustments, have the same implications on inequality as in general situations.

Among the papers on tax incidence, Goñi, López, and Servén (2011) was a cornerstone in comparing Latin American tax systems with those of Western European countries. Despite the salient socioeconomic differences between the two regions, the inequality measured by the Gini index of market income is relatively similar, with the average value of the first group higher at 13.04%. Conversely, this difference was markedly higher when they analyzed the Gini index for disposable income (market income plus government transfers minus direct taxes). At this new stage, the average value of income inequality in Latin America was 61.29% higher than in Europe. According to the authors, this result came from the significant redistributive impact observed in European countries, which is more relevant than the Latin American case.

While government transfers decrease income inequality by 10 percentage points (p.p.) on average for the northern group, this value is reduced by 1 or 2 p.p. for the second group. They found a similar behavior for the impact of direct taxes, diminishing inequality by 5 and 1 p.p., respectively. Finally, indirect taxes increase inequality in both regions, almost

neutralizing the progressive effect of direct taxes in European countries and generating an increase of 1 p.p. in Latin America (Goñi, López, and Servén, 2011).

Lustig et al. (2012) found very similar results. In the group composed by Argentina, Bolivia, Brazil, Mexico, and Peru, the Gini has dropped 2 p.p. after the incidence of transfers and direct taxes. However, unlike Goñi, López, and Servén (2011), results presented a more redistributive profile for Argentina and Brazil, which may be related to changes in the fiscal structure over time or even methodological differences. Lastly, the indirect taxes showed heterogeneous effects for this sample - regressive in Argentina, Bolivia, and Brazil, neutral in Mexico, and slightly progressive in Peru.

These results support the evidence for our sample of fourteen Latin American and Caribbean countries. While direct tax-based fiscal adjustments decreased income inequality, indirect tax-based fiscal consolidations did not show statistically significant effects on the Gini index for disposable income.[69]

### 3.2.3 Income inequality and economic growth

Given the interest of this study in the relationship between fiscal progressivity and economic growth, we analyzed the literature that elucidates the relationship between income inequality and economic activity.

The paradigm of the second half of the 20th century on this relationship assumed a trade-off between efficiency and equity (Atkinson and Stiglitz 2015), associating redistribution policies with a decrease in economic growth. This tradition, which comes from Okun (1975), argued that interventions to reduce inequality could generate distortions harmful to economic efficiency. However, recent studies showed that income redistribution policies can benefit economic activity (Cingano 2014; Berg and Ostry 2011; Ostry et al. 2014; Carvalho and Rezai 2016).

Although there is heterogeneity in the results presented by the empirical literature (Alesina and Rodrik 1994; Persson and Tabellini 1994; Clarke 1995; Banerjee and Duflo 2003; Knowles 2005; Hezner and Vollmer 2012; Ostry et al. 2014; Cingano 2014; Gründler and Scheuermeyer 2018; Berg et al. 2018; Santiago et al. 2019; Aiyar and Ebeke 2020; Breunig and Majeed 2020), most recent studies indicated an inverse relationship between income disparity and economic growth. The earlier ones, such as Li and Zou (1998) and Forbes (2000), presented a directly proportional relationship between inequality

[69] When we restricted the sample to South American economies, indirect tax-based fiscal consolidations increased income inequality.

and the economic performance of countries. For instance, Berg et al. (2018) and Berg and Ostry (2011) pointed out that less unequal societies are associated with faster and longer-lasting economic growth.

For the Latin American case, there are few studies on the subject. Delbianco et al. (2014) explored this relationship for twenty countries from 1980 to 2010. They showed that while income inequality and GDP growth are directly proportional for higher-income countries, inequality is detrimental to economic activity for the less developed (i.e., redistributive policies favoring the poorest layers of the population can promote economic growth in the case of low-income economies). Santiago et al. (2019), considering a sample of nine Latin American countries between 1970 and 2015, presented a very adverse effect of unequal income distribution on GDP growth regardless of the country's stage of development.

Among the mechanisms that suggest that income inequality influences GDP growth in a harmful way, the literature listed unequal access to education, restrictions related to the availability of credit for the lowest-income population, inequalities in access to job market opportunities, and political and social instabilities (Gründler and Scheuermeyer 2018; Aiyar and Ebeke 2020; Berg et al. 2018; Alesina and Perotti 1996; Perotti 1996; Cingano 2014; Berg and Ostry 2011). In particular, human capital formation tends to be lower in countries with greater inequality, leading to reduced productivity (Berg and Ostry 2011; Akinci 2017; Perotti 1996).

The Kaleckian model (Kalecki 1942, 1952) offered another explanation for the negative relationship between income inequality and economic growth, formalizing that workers and capitalists have different marginal consumption propensities (Kaldor 1955). In an empirical study of the US economy from 1985 to 2010, Carvalho and Rezai (2016) estimated a 40% savings rate for the 20% richest. This rate dropped to less than 10% for the middle 20% of the distribution. For the poorest, this was negative, with a portion of consumption financed by loans. Therefore, an unequal distribution may have implied a weakening of aggregate demand due to the concentration of income in parts of the population with a lower marginal propensity to consume (Lavoie 2014; Carvalho and Rezai 2016), slowing down consumption and, consequently, investment, leading to a slowdown in the growth of the economy's output.

Finally, Voitchovsky (2005) and Cingano (2014) showed that decreases in inequality that occurred from a reduction in income disparities at the bottom of the distribution have a higher positive effect on economic growth than those that happened from decreases in income inequality at the top of the distribution, suggesting that income redistribution programs that benefit the poorest may be a tool to boost GDP growth via stimulus on

the aggregate demand.

Thus, even in a context of austerity policies, the adverse impacts on economic activity may be offset through the distributive effects of a more progressive tax policy based on direct taxes, inducing economic dynamism.

## 3.3 Data and Methodology

### 3.3.1 Identification of fiscal shocks: statistical vs. narrative approach

Throughout the 1990s and early 2000s, the empirical literature dealing with the macroeconomic effects of government budget adjustments was based on the statistical approach, deploying the Cyclically Adjusted Primary Balance (CAPB) to identify fiscal shocks. From the 2010s onwards, this approach has been questioned to the intrinsic correlation between the identified measures and economic fluctuations and the problems of the cyclical adjustment methods to deal with this endogeneity. Furthermore, this approach does not consider the motivation to categorize an episode as a fiscal consolidation, an important factor in the classification.

Considering the weaknesses of the CAPB, other authors have developed research based on the narrative approach, which seeks to reduce endogeneity problems in identifying fiscal shocks through an analysis of budget policy documents from governments, supranational institutions such as the IMF and the OECD, and other sources of historical records and academic works. This strategy intends to identify only policy actions that explicitly aim to reduce the budget deficit and exclude other political, economic, and institutional factors that may motivate fiscal consolidations. The narrative approach also facilitates decomposing fiscal adjustments, allowing for a more refined understanding of the different impacts of austerity.

For a detailed discussion on the identification of fiscal shocks, see section 1.2.1. On our baseline estimations, we have chosen to adopt a narrative approach.

### 3.3.2 Database

In this section, we analyze the data and descriptive statistics related to the series we used in the econometric estimations. In addition, as socioeconomic characteristics may condition the macroeconomic impacts of fiscal adjustments, we present the socioeconomic data for the regional samples of our study, illustrating inter and intra-regional differences

for the countries from LAC and OECD.

Table 3.1 presents data on GDP per capita and income inequality for our baseline sample. Based on these indicators, we observe a high heterogeneity in Latin American and Caribbean economies. Chile had the highest GDP per capita ($ 24,546.91) in 2017, and Bolivia had the lowest ($ 8,244.93). Considering the Gini index for disposable income as the indicator for income distribution, Brazil presents the highest inequality, and Uruguay has the lowest.

Table 3.1: GDP per capita and income inequality, descriptive statistics - LAC

| **Country** | **GDP per capita in 2017[a]** | **Gini index for market income in 2017** | **Gini index for disposable income in 2017** |
|---|---|---|---|
| Argentina | 23,597.12 | 38.8 | 37.4 |
| Bolivia | 8,244.93 | 42.1 | 42.2 |
| Brazil | 14,477.86 | 56 | 46.8 |
| Chile | 24,546.91 | 50.6 | 44.5 |
| Colombia | 14,334.91 | 47.8 | 46.1 |
| Costa Rica | 20,168.22 | 50 | 46 |
| Dominican Republic | 16,524.53 | 43 | 40.1 |
| Ecuador | 11,679.43 | 43.8 | 41.9 |
| Guatemala[b] | 8,322.21 | 44.7 | 43.4 |
| Jamaica | 9,984.57 | 45.3 | 42.7 |
| Mexico | 20,032.41 | 45.6 | 43.3 |
| Paraguay | 13,604.17 | 45.9 | 44.9 |
| Peru | 12,442.75 | 46.7 | 43.9 |
| Uruguay | 23,384.74 | 46 | 35.9 |

a: GDP per capita in purchasing power parity, denominated in US dollars at 2017 prices.
b: 2014 Gini index for Guatemala, because of missing data from 2015 to 2017.
Sources: World Development Indicators – World Bank; Standardized Income Inequality World Database (SWIID version 8.2, except for Dominican Republic, Jamaica, and Mexico, that we utilized v9.5).

Despite the disparities in these indicators, our efforts were oriented to build a harmonized dataset that allowed us to estimate the effects of fiscal consolidations on income inequality and economic activity. We present below a detailed explanation regarding the data we utilized for LAC and (also) for advanced economies.

As shown in the previous Chapter of this dissertation, we built a novel dataset by decomposing the tax-based fiscal adjustments of David and Leigh's (2018) into direct- and indirect tax-based fiscal adjustments for fourteen Latin American and Caribbean economies (Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Jamaica, Mexico, Paraguay, Peru, and Uruguay) from 1989 to 2016. In Tables

2.17 and 2.18, we listed the measures and impacts for each one of the fiscal consolidation episodes based on direct and indirect taxes. We have also included data from spending-based and tax-based consolidations. Table 3.2 presents the year that each fiscal package's category was implemented.[70]

[70]If expenditure (tax) measures were prevalent in the fiscal package, in absolute values, % of GDP, we categorized the episode as a spending-based (tax-based) shock. We have employed a similar strategy when classifying into direct and indirect tax-based fiscal shocks. If direct (indirect) taxes prevailed when compared to indirect (direct) taxes, it was categorized as a direct (indirect) tax-based package. If there was no predominance, the fiscal shocks were not classified in either category (Carrière-Swallow, David, and Leigh 2021). This approach followed other works on this literature (Guajardo, Leigh, and Pescatori 2014; Jalles 2017; David and Leigh 2018), and we also applied it to the advanced economies in our sample (see below).

Table 3.2: Annual fiscal shocks between 1989 and 2016 – LAC economies

| **Countries / Fiscal consolidations** | **Direct tax-based** | **Indirect tax-based** | **Spending-based** | **Tax-based** |
|---|---|---|---|---|
| Argentina | | 1996-97 | | 1996-97 |
| Bolivia | 2005 | 1995, 2004 | | 1995, 2004-05 |
| Brazil | | 2015 | 2015 | |
| Chile | 1990-91, 2014-16 | 2003-04 | 2003 | 1990-91, 2003-04, 2014-16 |
| Colombia | 2011-12 | 2003 | 2000, 2015-16 | 2003, 2011-12 |
| Costa Rica | 2016 | 1990-92, 1995-96 | | 1990-92, 1995-96 |
| Dominican Republic | 2011, 2013 | 2004, 2007 | 2004, 2013 | 2007, 2011 |
| Ecuador | | 1990, 1993, 2000 | | 1990, 1993, 2000 |
| Guatemala | 1995-96, 2013 | 2000, 2002 | 2000, 2012 | 1995-96, 2002, 2012-2013 |
| Jamaica | 2014 | 1992, 2003-04, 2012-13 | 1999-2000 | 1992, 2012-14 |
| Mexico | 2010 | 1989, 2014 | | 1989, 2010, 2014 |
| Paraguay | 2014 | 1989, 2001, 2003-04 | 2001, 2016 | 1989, 2003-04, 2014 |
| Peru | 2012 | 1992, 2002-03 | | 1992, 2002-03, 2012 |
| Uruguay | | 1990, 1995-96, 2002, 2003 | 1995, 2000, 2002, 2015 | 1996, 2003 |
| **Countries / Fiscal expansions** | **Direct tax-based** | **Indirect tax-based** | **Spending-based** | **Tax-based** |
| Chile | | | 2008 | |
| Costa Rica | | 1993-94 | | 1993-94 |
| Dominican Republic | | 2006 | | 2006 |
| Paraguay | 2005-06 | | | 2005-06 |
| Peru | | 2011 | | 2011 |
| Uruguay | | 2004-05 | | 2004-05 |

Note: year of implementation of the fiscal package.

Notice that an episode can be categorized as spending-based when the analysis focused on expenditures vs. taxes and direct tax-based when the verification was based on which type of tax predominated. It may happen because, for the latter case, we were only considering the impact of taxes on the episode, in % of GDP, excluding the effect of expenditures on the fiscal package.

Our database combined the dataset mentioned above with data on income inequality. Following the literature that studies the distributional impacts of fiscal shocks, we used the Standardized World Income Inequality Database (SWIID) (Solt 2019, 2020), which

provides information on the Gini index for market income and disposable income for a sample of 198 countries, maximizing the comparability of data while maintaining the widest possible coverage across countries and over time. Aiming to maximize the coverage for income inequality data in our sample, we employed SWIID 9.5 for the Dominican Republic, Jamaica, and Mexico, and for the rest of Latin American and Caribbean countries, we utilized SWIID 8.2.[71]

For the estimates in which we analyzed the impacts of fiscal consolidations for advanced economies, we relied on the Alesina et al. (2017) database. Based on Devries et al. (2011), which provided information on fiscal shocks from 1978 to 2009, the authors extended the narrative dataset until 2014. Relying on budget policy documents, they identified fiscal consolidation packages motivated by the intention of reducing the fiscal deficit and not as a response to prospective economic conditions for 16 OECD economies (Australia, Austria, Belgium, Canada, Denmark, France, Finland, Germany, Ireland, Italy, Japan, Portugal, Spain, Sweden, United Kingdom, and the United States). In our dataset, we relied on information regarding the impacts as a percentage of GDP of total taxes, direct and indirect taxes, and total government expenditure. Table 3.3 presents the year that each category of fiscal package was implemented.

Table 3.3: Annual fiscal shocks between 1978 and 2014 – OECD economies[a]

| **Countries / Fiscal consolidations** | **Direct tax-based** | **Indirect tax-based** | **Spending-based** | **Tax-based** |
|---|---|---|---|---|
| Australia | 1994-99 | | 1985-87, 1997 | 1994-96, 1998-99 |
| Austria | 1996-97, 2001, 2011-13 | 1984, 2014 | 1980-81, 1996-97, 2002, 2014 | 1984, 2001, 2011-13 |
| Belgium | 1984-85, 1987, 1990, 1992-94, 1996, 2010-14 | 1983 | 1982-85, 1987, 1993-94, 1997, 2010, 2012-14 | 1990, 1992, 1996, 2011 |
| Canada | 1984, 1986-87, 1990, 1994-96, 2010-14 | 1985, 1988-89, 1991-93 | 1989-97, 2010-14 | 1984-88 |
| Denmark | 1983, 1985, 1995, 2011, 2013 | | 1983-84, 1995, 2011-12 | 2013 |

[71]Since there were missing data in the Gini index for disposable income for Guatemala (2015-17), we utilized extrapolated data for these years to include this country in the sample. This strategy is similar to the interpolation method employed by Heimberger (2020).

| | | | | |
|---|---|---|---|---|
| Finland | 1994, 2013 | 2011-12, 2014 | 1992-97, 2012, 2014 | 2011, 2013 |
| France | 1979, 1997, 2011-13 | 1991, 1995-96 | 1987, 1991, 2011, 2014 | 1979, 1995-97, 2012-13 |
| Germany | 1982, 1991, 1994-95, 1997, 2000, 2003, 2011 | 1983, 1992-93, 1998, 2007 | 1982-84, 1993-94, 1997, 2000, 2004, 2006-07, 2012 | 1991-92, 1995, 1998, 2003, 2011 |
| Ireland | 2009-14 | 1982-87 | 1987-88, 2010-14 | 1982-86, 2009 |
| Italy | 1991-93, 1995, 1997, 2004, 2006-07, 2010, 2012-13 | 2005, 2011, 2014 | 1992-94, 1996-98, 2005-06, 2011, 2013-14 | 1991, 1995, 2004, 2007, 2010, 2012 |
| Japan | 1980-83, 2004-07 | 1979, 1997-98 | 1982-83, 2003-05 | 1979-81, 1997-98, 2006-07 |
| Portugal | 1983, 2002, 2010-11, 2013-14 | 2005-06, 2012 | 2000, 2006-07, 2011-12, 2014 | 1983, 2002, 2005, 2010, 2013 |
| Spain | 1989, 1993, 2012, 2014 | 1983-84, 1992, 1996-97, 2009-10, 2013 | 1984, 1992, 1994-97, 2010-11 | 1983, 1989, 1993, 2009, 2012-14 |
| Sweden | 1995-98 | 1993-94 | 1984, 1993-98 | |
| United Kingdom | 1997-99, 2013-14 | 1981-82, 1994-95, 2010-12 | 1979-80, 1996, 2010, 2012-14 | 1981-82, 1994-95, 1997-99, 2011 |
| United States | 1978, 1980, 1981, 1985-86, 1988, 1990, 1992, 1994-95, 1997 | 1991, 1993, 1996 | 1991-98, 2011-13 | 1978, 1980, 1981, 1985-86, 1988, 1990 |
| **Countries / Fiscal expansions** | **Direct tax-based** | **Indirect tax-based** | **Spending-based** | **Tax-based** |
| Australia | 1987, 1988 | | | 1988 |
| Canada | 1997 | | | |
| Denmark | 1984 | | | |
| Finland | 1995, 1997 | | | |

| | | |
|---|---|---|
| France | 1987, 1989, 1999-2000, 2014 | 1989, 1992, 1999-2000 |
| Germany | 1984, 2004, 2012-13 | 2013 |
| Italy | 1994 | |
| Spain | 1990 | 1990 |
| United Kingdom | 1979-80 | |
| United States | 1998 | |

Note: Year of implementation of the fiscal package.

a: Considering tax-based packages, five were excluded from the sample after decomposition. Based on the classification strategy presented in this section, although Australia (1986), Belgium (1997), and Italia (1998) entries were indicated as direct tax-based fiscal expansions, they were episodes of tax hikes (Alesina et al. 2017). Our criteria categorized Austria (2002) and Italy (1996) as direct and indirect tax-based fiscal consolidations. However, Alesina et al. (2017) classified them as tax reduction.

The database for the OECD sample included observations associated with fiscal shocks presented in Table 3.3 and information on income inequality from the Standardized World Income Inequality Database (SWIID), as in the case of the LAC sample. To maximize temporal coverage for advanced economies, while we have used SWIID 9.1 for Austria,[72] for the rest of the countries, we used version 9.5. Regarding the average income level, advanced economies showed less heterogeneity than Latin American and Caribbean countries when we use the coefficient of variation as a dispersion indicator. Table 3.4 presents the OECD sample's income inequality and GDP per capita indices. Table 3.5 compares these descriptive statistics with the sample for Latin America and the Caribbean economies.

[72]Since there were missing data in the Gini index for disposable income for Austria (1977-1982), we utilized extrapolated data for these years to include this country in the sample. This strategy is similar to the interpolation method employed by Heimberger (2020).

Table 3.4: GDP per capita and income inequality, descriptive statistics - OECD

| **Country** | **GDP per capita in 2017[a]** | **Gini index for market income in 2017** | **Gini index for disposable income in 2017** |
|---|---|---|---|
| Australia | 48,400.25 | 48.3 | 32.7 |
| Austria | 54,172.99 | 48.2 | 27.7 |
| Belgium | 50,442.27 | 48.7 | 26.2 |
| Canada | 48,317.17 | 48 | 31.1 |
| Denmark | 55,356.68 | 48.9 | 26.3 |
| Finland | 47,570.13 | 49.6 | 25.9 |
| France | 44,577.06 | 51.9 | 29.8 |
| Germany | 53,071.46 | 52.1 | 29.5 |
| Ireland | 77,968.63 | 53.1 | 29.4 |
| Italy | 41,581.12 | 52.6 | 33.7 |
| Japan | 41,444.22 | 48.9 | 32.5 |
| Portugal | 33,044.72 | 50.9 | 32.1 |
| Spain | 39,550.19 | 51.3 | 33.4 |
| Sweden | 51,947.95 | 49 | 28.5 |
| United Kingdom | 46,104.06 | 52.8 | 31.2 |
| United States | 59,907.75 | 52.4 | 38.4 |

a: GDP per capita in purchasing power parity, denominated in US dollars at 2017 prices.
Sources: World Development Indicators – World Bank; Standardized Income Inequality World Database (SWIID version 9.5, except for Austria, that we utilized v9.1).

Table 3.5: Socioeconomic indicators, descriptive statistics – LAC and OECD economies

| **Region / Indicator** | **GDP per capita in 2017[a]** | | **Gini index for market income in 2017** | | **Gini index for disposable income in 2017** | |
|---|---|---|---|---|---|---|
| | Average | CV[b] | Average | CV[b] | Average | CV[b] |
| LAC | 15,810.34 | 34.48% | 46.16 | 8.66% | 42.79 | 7.16% |
| OECD | 49,591.04 | 19.74% | 50.42 | 3.61% | 30.53 | 10.52% |

a: GDP per capita in purchasing power parity, denominated in US dollars at 2017 prices.
b: coefficient of variation.
Sources: based on Tables 3.1 and 3.4.

Additionally, when we estimated the impact of fiscal adjustments on economic activity, we used the real GDP and value of commodity exports series from Carrière-Swallow, David, and Leigh (2021) (see Table 3.6).

Table 3.6: Series of the dataset

| Variable | Description | Source |
|---|---|---|
| Value of commodity exports | Carrière-Swallow, David, and Leigh (2021) based the commodity export value series on Gruss (2014). | Carrière-Swallow, David, and Leigh (2021) |
| Real GDP | Carrière-Swallow, David, and Leigh (2021) based the real GDP data on the IMF's World Economic Outlook database (October 2017 vintage) | Carrière-Swallow, David, and Leigh (2021) |
| Fiscal consolidation measure | Fiscal shock measures (direct tax-based, indirect tax-based, tax-based, and spending-based) for 14 Latin American and Caribbean economies between 1989 and 2016 (David and Leigh 2018) and 16 OECD countries from 1978 to 2014 (Alesina et al. 2017) | Based on David and Leigh (2018) and Alesina et al. (2017) |
| Income inequality measure | Gini index for disposable income. | SWIID versions 8.2, 9.1, and 9.5 |

Note: This table presents the series utilized for econometric estimations.

Considering data availability, we built six panels for the different regions and estimations. Panels 1, 2, and 3 were used to estimate the impact of fiscal consolidations on economic activity, while Panels 4, 5, and 6 were used to analyze these effects on income inequality. Table 3.7 presents information related to these panels.[73] Tables 3.2 and 3.3 presents information related to our dataset on annual fiscal consolidation shocks.

Tables 3.11 and 3.12 in the appendix show the unit root tests[74] related to the series we utilized to estimate the impact of episodes of fiscal consolidation on economic activity and income inequality.[75]

[73]Aiming to check the robustness of the results for LAC, we restricted this sample to include only South American countries in panels 2 and 5.

[74]We implemented Levin-Lin-Chu (LLC) tests. It has an alternative hypothesis of stationarity. This test is suggested when "$(n/t) \rightarrow 0$" along with balanced panels, which is the case in our study.

[75]Söderbom et al. (2015, pg. 394): "(...) Unless the unit root analysis represents the sole objective of the empirical investigation (for example, in the analysis of purchasing power parity), it is perhaps best to adopt the working assumption, possibly informed by visual scrutiny of the graphs of a number of country series (...)".Therefore, even if we do not reject the null hypothesis of unit root for the variables "VAR1" of Panel 5 (p-value = 0.25), "VAR6" (p-value = 0.13) and "VAR8" (p-value = 0.19) of Panel 2, and "VAR8" of Panel 3 (p-value = 0.13) (see Tables 3.11 and 3.12 in the appendix), we assumed their stationarity from the analysis of Figures 3.4, 3.5, 3.6, and 3.7 in the appendix.

Table 3.7: Panels constructed for econometric estimations

| Panel | Region | Period | Obs. | Direct tax-based fiscal package | Indirect tax-based fiscal package | Tax-based fiscal package | Spending-based fiscal package |
|---|---|---|---|---|---|---|---|
| 1 | LAC | 1989-2016 | 392 | 20 | 45 | 55 | 18 |
| 2 | South America | 1989-2016 | 252 | 12 | 26 | 33 | 12 |
| 3 | OECD[a] | 1978-2016 | 624 | 136 | 56 | 87 | 126 |
| 4 | LAC | 1990-2017 | 392 | 20 | 43 | 53 | 18 |
| 5 | South America | 1990-2017 | 252 | 12 | 25 | 32 | 12 |
| 6 | OECD | 1978-2017 | 640 | 136 | 56 | 87 | 126 |

Note: This table presents the episodes of fiscal adjustments mostly or entirely based on direct or indirect taxes.

a: This sample included the years 2015-2016 in comparison to Carrière-Swallow, David, and Leigh (2021), so that the variables "$y_{t+6}$ - $y_{t-1}$" e "$y_{t+7}$ - $y_{t-1}$" assumed stationary behavior ("y" is the real GDP in log).

### 3.3.3 Econometric strategy

Section 1.2.3 discussed how the literature has evolved over the past few years in the usage of econometric methods to estimate the effects of fiscal adjustments, distinguishing between (i) static models, such as Seemingly Unrelated Regressions (SUR) or panel data with fixed effects estimators; and (ii) dynamic models, such as Autoregressive Distributed Lag (ARDL), or Panel Vector Autoregressive (PVAR), or Local Projections (LP) method (Jordà 2005) to estimate Impulse Response Functions (IRFs). Considering the advantages and the recent widespread use of Jordà's (2005) method (see Table 1.3), we have adopted Local Projections in our baseline estimations.

Based on panels with fixed effects for countries and time, and Driscoll-Kraay standard errors to account for heteroscedasticity, serial and spatial autocorrelation, generating OLS estimators consistent and unbiased, we estimated the macroeconomic effects of fiscal consolidations. We followed Carrière-Swallow, David, and Leigh (2021) to estimate the impacts on economic activity, and Ball et al. (2013), Furceri, Jalles, and Loungani (2016), Jalles (2017), Klein and Winkler (2019), Heimberger (2020), and Chapter 1 to the effects on income inequality.

Regarding the impacts of fiscal adjustments on GDP, we estimated the following equations for each period $h$.

1. Assessing the differential effects of spending-based versus tax-based consolidations:

$$y_{i,t+h} - y_{i,t-1} = \left(\beta^h_{EB} EB_{i,t} + \beta^h_{TB} TB_{i,t}\right) \left(\sum_{s=t}^{t+h} F_{i.s}\right) + \rho^h Z_{i,t} + \alpha^h_i + \gamma^h_t + \varepsilon_{i,t+h}. \quad (7)$$

2. Assessing the differential effects of direct tax-based versus indirect tax-based consolidations:

$$y_{i,t+h} - y_{i,t-1} = \left(\beta^h_{DB} DB_{i,t} + \beta^h_{IB} IB_{i,t}\right) \left(\sum_{s=t}^{t+h} T_{i.s}\right) + \rho^h Z_{i,t} + \alpha^h_i + \gamma^h_t + \varepsilon_{i,t+h}. \quad (8)$$

Where $h$ = -1, ..., 7; $y$ denotes the real GDP, in log; F is the narrative fiscal policy shock and T is the narrative tax-based fiscal policy shock, both in percent of GDP; $EB_{i,t}$, $TB_{i,t}$, $DB_{i.t}$, and $IB_{i,t}$ are dummy variables that take value equal 1 when a fiscal adjustment is spending-based, tax-based, direct tax-based, and indirect tax-based, respectively, and zero otherwise; $Z_{i,t}$ denotes a set of control variables, which includes two lags of the narrative fiscal shocks (in the case of specification "i") or two lags of the tax-based fiscal shocks (in the case of specification "ii"), and the contemporaneous growth rate of the commodity export value and its two lags. These equations include time ($\gamma^h{}_t$) and country ($\alpha^h{}_i$) fixed effects. Based on coefficients $\beta^h{}_{EB}$, $\beta^h{}_{TB}$, $\beta^h{}_{DB}$, and $\beta^h{}_{IB}$, which indicate the impact on the economic activity from a 1% of GDP fiscal consolidation over $h$ years, we built the Impulse Response Functions. Bands around the IRFs are the confidence intervals, and they are associated with the standard deviations from the estimated coefficients $\beta^h{}_{EB}$, $\beta^h{}_{TB}$, $\beta^h{}_{DB}$, and $\beta^h{}_{IB}$.

On the effects of fiscal adjustments on income inequality, the estimated equations were the following for each period $h$.

1. Following Ball et al. (2013), Furceri, Jalles, and Loungani (2016) and Heimberger (2020),[76] because our data allows us to distinguish between measures that are based on expenditure cuts and tax increases, in percent of GDP,[77] we assessed the differential effects of spending-based versus tax-based consolidations as presented below:

$$y_{i,t+h} - y_{i,t} = \sum_{k=0}^{2} \beta^h_k X_{i,t-k} + \sum_{j=0}^{1} \delta^h_j \Delta y_{i,t-j} + \rho^h Z_{i,t} + \alpha^h_i + \gamma^h_t + \varepsilon_{i,t+h}. \quad (9)$$

2. Regarding direct- and indirect tax-based fiscal adjustments, data did not allow us to distinguish the measures, in % of GDP, for LAC countries. Therefore, we followed

[76] These authors also estimated the equation separately for spending- and tax-based adjustments.

[77] As we identified the impact of expenditure and tax measures in percent of GDP, we have not followed the definition presented in section 3.3.2 of tax-based (spending-based) fiscal packages. I.e., tax hikes (expenditure cuts) representing more than half of total impact.

Jalles (2017) and Klein and Winkler (2019), assessing these differential effects based on the equation 10:

$$y_{i,t+h} - y_{i,t} = \sum_{k=0}^{2} \left[ \left( \beta_k^h DB_{i,t-k} + \theta_k^h IB_{i,t-k} \right) (T_{i,t-k}) \right] + \sum_{j=0}^{1} \delta_j^h \Delta y_{i,t-j} + \rho^h Z_{i,t} + \alpha_i^h + \gamma_t^h + \varepsilon_{i,t+h}. \tag{10}$$

Where $h = 0, \ldots, 8$ for specification; $y$ denotes the Gini index for disposable income, in log; X is the narrative fiscal policy shock, in percent of GDP (it can be tax-based or spending-based); T is the tax-based fiscal package (% of GDP); $DB_{i,t}$, and $IB_{i,t}$ are dummy variables that assume value equal 1 when a fiscal adjustment is direct tax-based or indirect tax-based, respectively, and zero otherwise; $Z$ is a vector of additional control variables that includes two lags of the change in the Gini index for disposable income. Time and country fixed effects are denoted by ${\gamma^h}_t$ and ${\alpha^h}_i$.

Note that ${\beta_0}^h$ and ${\theta_0}^h$ correspond to the cumulative response of income inequality to the fiscal shock in each horizon, i.e., the estimated multiplier. We constructed IRFs by plotting the estimated ${\beta_0}^h$ and ${\theta_0}^h$ for $h = 0, \ldots, 8$, with confidence intervals. Bands around the IRFs are associated with the standard deviations from these estimated coefficients.

In the next section, we present results for the estimated impact of fiscal consolidations on economic activity and income inequality for the six panels we have introduced in Table 3.7.

## 3.4 Results

Following the econometric strategy outlined in section 3.3, we estimated the macroeconomic effects of fiscal consolidations. For the estimations of the impacts on economic activity, we obtained IRFs based on local projections by plotting ${\beta^h}_{EB}$, ${\beta^h}_{TB}$, ${\beta^h}_{DB}$, and ${\beta^h}_{IB}$ for each time horizon $h$. We used a confidence interval of one standard deviation associated with these coefficients, indicated by the grey areas in the IRF plots. When analyzing the effects on income inequality, the IRFs were obtained from the estimated coefficients ${\beta_0}^h$ and ${\theta_0}^h$ and their one standard error bands (representing the confidence intervals).

Thus, IRFs show the estimated macroeconomic response to an annual fiscal consolidation shock of 1% of GDP. For Panels 1, 2, and 3, the local projection is presented from the

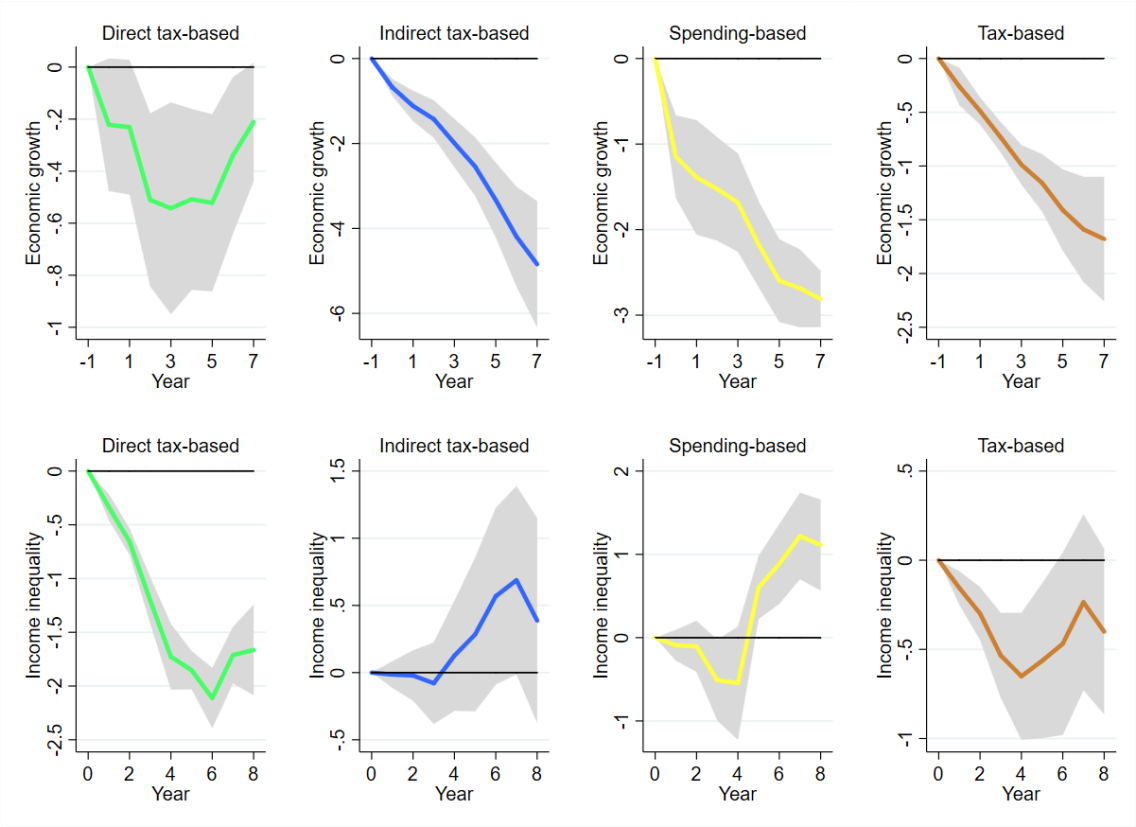
year before the implementation of the fiscal adjustment (i.e., $h$ = -1) to year seven (see top graphs of Figures 3.1, 3.2, and 3.3). Considering the effects on income inequality, the local projection is carried out from year zero to year eight (see bottom graphs of Figures 3.1, 3.2, and 3.3).

In this section, we present these results for the two samples of our study: i) 14 Latin American and Caribbean economies (Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Guatemala, Jamaica, Mexico, Paraguay, Peru, and Uruguay); ii) 16 OECD countries (Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, Portugal, Spain, Sweden, United Kingdom, and United States).

### 3.4.1 Results for LAC

From Figure 3.1 for our LAC sample, note that while spending-, tax-, and indirect tax-based fiscal consolidations have long-lasting contractionary effects on GDP, direct tax-based episodes did not show statistically significant impacts. Regarding the effects on income inequality, indirect tax-based and tax-based episodes did not present statistical significance, spending-based consolidations deteriorated income distribution, and direct tax-based fiscal policy shocks reduced income inequality. Tables 3.13, 3.14, 3.15, 3.16, and 3.17 in the Appendix presented more details on the magnitude of this impact, including the coefficients of the lagged dependent variable and their standard deviations.

Figure 3.1: Impulse Response Function – LAC sample




Note: Grey areas represent one standard error bands around the coefficients.

A tax-based fiscal adjustment of 1% of GDP generated a drop in economic activity of 0.26% in year 0 and a cumulative drop of 1.68% in year 7. However, it did not present statistically significant effects on income inequality. In comparison, spending-based fiscal consolidations of 1% of GDP reduced economic activity by 1.15% in the short run and 2.81% in the medium run and increased income inequality by 1.11% in year 8, with statistical significance.[78]

Fiscal adjustments of 1% of GDP based on indirect taxes generated a 0.68% drop in economic activity in year 0 and a 4.84% cumulative drop in year 7. As in the tax-based episodes, we could not observe statistically significant effects on income inequality. On the other hand, results for direct tax-based fiscal consolidations of 1% of GDP on economic activity were not statistically significant but decreased income inequality by 1.66% in the medium run with statistical significance.

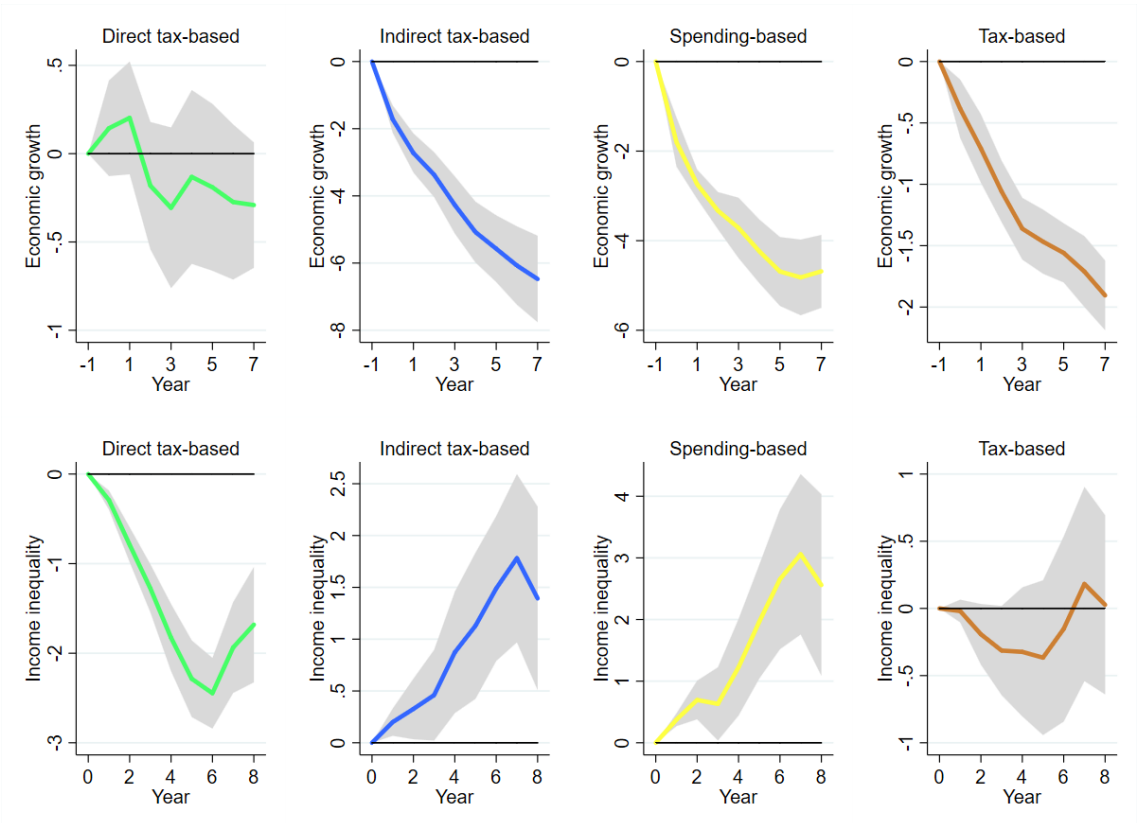
From our sample for Latin American and Caribbean economies, results suggest that the adverse effects of taxation on economic activity may be neutralized by the direct tax-

[78]The spending- and tax-based results for GDP were statistically distinguishable considering one standard error bands around the coefficients.

based episodes distributive effects, which eventually could indicate that a better income distribution can generate positive impacts on GDP. In the case of the tax-based and indirect tax-based fiscal adjustments, we could not observe effects on income inequality, but they were contractionary to economic activity.

As shown in Table 3.7, we also performed a robustness check restricting the sample to include only South American economies. As in the LAC case, spending-, tax-, and indirect tax-based fiscal consolidations had long-lasting contractionary effects on GDP, and direct tax-based episodes did not have statistically significant impacts. Regarding the effects on income inequality, estimations based on tax-based episodes did not present statistical significance, while spending-based and indirect tax-based consolidations deteriorated income distribution, and direct tax-based fiscal policy shocks reduced income inequality (see Figure 3.2).[79] However, even though austerity based on indirect taxes did not raise inequality with statistical significance for LAC, this occurred when we restricted the sample to South American economies.

Figure 3.2: Impulse Response Function – South American sample



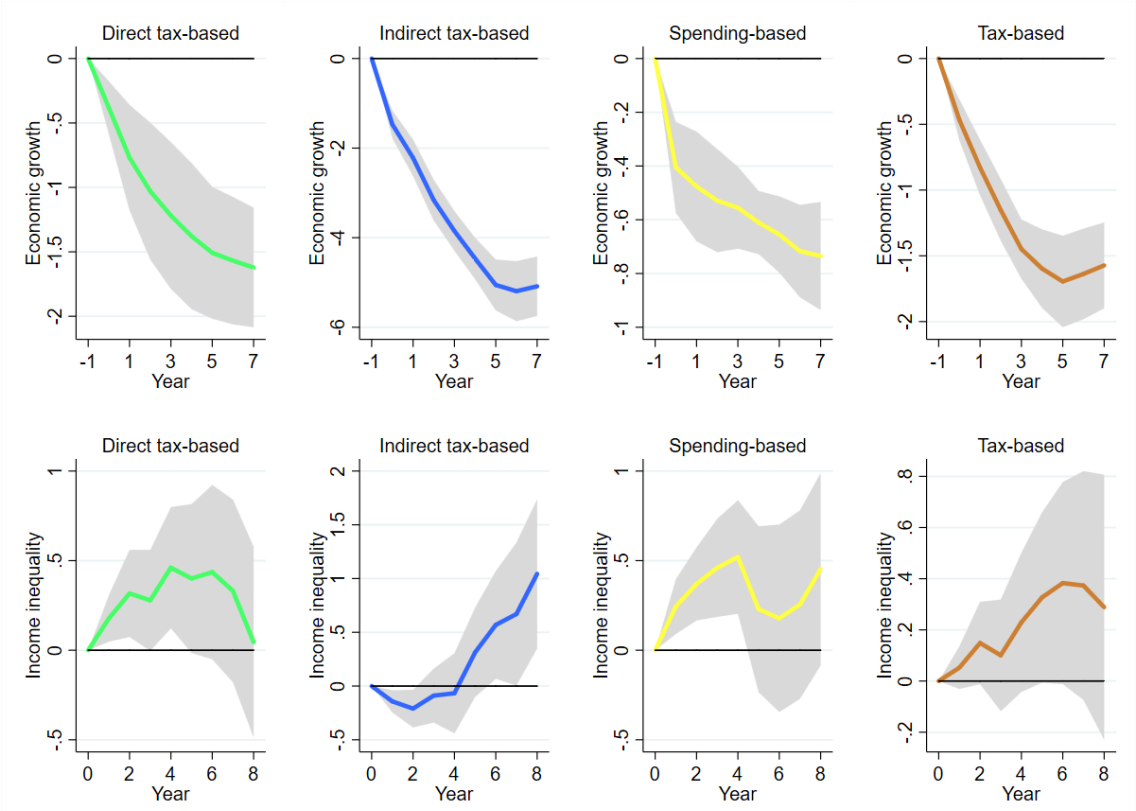

Note: Grey areas represent one standard error bands around the coefficients.

[79]Tables 3.18, 3.19, 3.20, 3.21, and 3.22 in the Appendix detailed the magnitude of these impacts, including the coefficients of the lagged dependent variable and their standard deviations.

### 3.4.2 Results for OECD

For our OECD sample, all categories of fiscal consolidations have long-lasting contractionary impacts on GDP, with more pronounced effects when done through indirect taxes. Tax-based, direct tax-based, and spending-based fiscal policy shocks did not affect income inequality with statistical significance in the medium run. In contrast, indirect tax-based consolidations appear to have increased inequality (see Figure 3.3). Tables 3.23, 3.24, 3.25, 3.26, and 3.27 in the Appendix detail the magnitude of these effects, including the coefficients of other variables utilized in the estimations and their standard deviations.

Figure 3.3: Impulse Response Function – OECD sample




Note: Grey areas represent one standard error bands around the coefficients.

A tax-based fiscal adjustment of 1% of GDP generated a drop in GDP of 0.47% in year 0 and a cumulative drop of 1.57% in year 7. In comparison, spending-based fiscal consolidations reduced the GDP by 0.40% in the short run and 0.73% in the medium run with statistical significance. For income inequality, both categories of fiscal policy shocks did not present statistically significant effects in the medium run

Fiscal adjustments of 1% of GDP based on indirect taxes generated a 1.47% drop in economic activity in year 0 and a 5.08% cumulative drop in year 7. Unlike the other categories of fiscal adjustments, there were statistically significant effects on inequality,

increasing the Gini by 1.04% in year 8. On the other hand, results for direct tax-based fiscal consolidations of 1% of GDP on income inequality were not statistically different from zero. However, economic activity decreased by 0.38% in the short run and by 1.62% in the medium run with statistical significance.

The results for economic activity are comparable to those of Carrière-Swallow, David, and Leigh (2021). From the Local Projection method and a sample of 17 OECD economies from 1978 to 2014,[80] the authors estimated that a 1% of GDP fiscal consolidation reduced real GDP by 0.3% on impact and by 0.7% after two years. Guajardo, Leigh, and Pescatori (2014), employing a Panel VAR for 17 OECD countries during the period 1978-2009, found more pronounced impacts for the adjustments based on tax, reducing GDP by 3.10% after two years, while the effects of spending-based consolidations lowered the GDP by 1.01%. Differently, Alesina et al. (2017), utilizing Seemingly Unrelated Regressions (SUR) in a panel of 16 OECD economies from 1978 to 2014, estimated that consumption and investment- and transfer-based plans exhaust their non-statistically significant contractionary effect two years after a plan is introduced. On the contrary, tax-based plans show a long-lasting effect on output by around 1.3 percentage points. Table 3.8 presents the summary of these results.

[80]Devries et al. (2011) dataset extended by Alesina et al. (2017).

Table 3.8: Empirical literature on the economic activity effects of fiscal consolidations for OECD countries

| **Authors** | **Method** | **Sample (period)** | **Results** |
|---|---|---|---|
| Alesina et al. (2017) | Seemingly Unrelated Regressions (SUR) | 16 OECD economies (1978 – 2014) | Consumption and Investment-based plans: negative impact, but with no statistical significance. Tax-based plans: decrease GDP by 1.3 ppt. after 4 years. |
| Carrière-Swallow, David, and Leigh (2021) | Local Projections method | 17 OECD economies (1978 – 2014) | Total fiscal consolidation: negative impact, 0.3% on year 0 and 0.7% after two years. |
| Guajardo, Leigh, and Pescatori (2014) | Panel VAR | 17 OECD economies (1978 – 2009) | Spending-based adjustments: negative impact, decrease GDP by 1% after 2 years. Tax-based adjustments: negative impact, decrease GDP by 3.1% after 2 years. |
| This study | Local Projections method | 16 OECD economies (1978 – 2014) | Impacts in year 0 and year 7: Direct tax-based (-0.4% and -1.6%); Indirect tax-based (-0.1% and -4.8%, with no statistical significance in year 0); Spending-based (-1.1% and -2.8%); Tax-based (-0.3% and -1.7%). |

Regarding the impacts on income distribution, our results were different from those presented by Ball et al. (2013), Woo et al. (2013), Furceri, Jalles, and Loungani (2016), and Heimberger (2020). These papers estimated that spending-based adjustments raised income inequality with statistical significance. Moreover, unlike Furceri, Jalles, and Loungani (2016) and Heimberger (2020), our tax-based fiscal consolidation effects findings were not statistically significant. Tables 1.3 and 1.5 show that these papers used a sample of 17 OECD economies from 1978 to 2009 (only Heimberger based on a sample extended to 2013). As we relied on the Alesina et al. (2017) dataset, our sample did not include the Netherlands, containing 16 OECD countries from 1978 to 2014. Therefore, one reason that justifies the differences between our results and those of other studies is the sample difference.[81]

For the OECD sample, the adverse effects of taxation on economic activity may have been

[81] Note that some studies also deployed a different method to estimate the effects of fiscal consolidations (see Table 1.3).

enhanced by the indirect tax-based episodes' distributive effects. Given the regressiveness of indirect taxes, fiscal adjustments based these measures tend to proportionally reduce the disposable income at the base of the distributive pyramid more than at the top, raising the Gini index for disposable income with statistical significance, as shown in our results. As discussed in Section 3.2.3, one of the explanations for the negative relationship between income inequality and economic activity is the weakening of aggregate demand due to the concentration of income at the top of the distribution, strata with a lower marginal propensity to consume (Lavoie 2014; Carvalho and Rezai 2016). Therefore, higher income inequality may negatively affect consumption, generating deleterious effects on aggregate demand and economic activity.

### 3.4.3 A comparative analysis

Following the databases and models specified in section 3.3, our econometric findings for LAC were robust when we restricted the sample to South American economies, except for indirect taxes. While fiscal adjustments based on indirect taxes did not raise inequality with statistical significance for Latin America and the Caribbean, this did occur for the South American subsample. When we analyzed the magnitudes of the adverse impacts of episodes based on indirect taxes, expenditures, and taxes on GDP and of direct tax-based and spending-based fiscal consolidations on income distribution, results were more pronounced in the robustness check.

Tables 3.9 and 3.10 compare the effects of fiscal adjustments on economic activity and income inequality for the OECD and LAC samples. Differently from what we obtained for the OECD countries, for the Latin American and Caribbean economies, our findings for spending-based fiscal adjustments were more adverse to economic activity than the effects of tax-based policy shocks, and direct tax-based episodes did not affect GDP with statistical significance. Regarding indirect tax-based effects, results were similar for both regions, with a deterioration of the economic activity.

When it comes to the impact on income distribution, on the one hand, cuts in expenditures and direct tax-based did not generate impacts statistically different from zero for OECD economies. On the other hand, in the medium run, spending-based fiscal adjustments increased the Gini index for disposable income by 1.11% for the LAC sample, and direct tax hikes reduced inequality by 1.66%. Indirect tax-based fiscal consolidations deteriorated income distribution only for the OECD sample.

Table 3.9: Coefficients for the initial and accumulated impact of fiscal adjustments on economic activity (LAC and OECD samples)

| **Region / Category and period** | **Direct tax-based** | | **Indirect tax-based** | | **Spending-based** | | **Tax-based** | |
|---|---|---|---|---|---|---|---|---|
| | SR | MR | SR | MR | SR | MR | SR | MR |
| LAC | -0.222 | -0.211 | -0.679 | -4.843 | -1.148 | -2.811 | -0.260 | -1.679 |
| | (0.255) | (0.227) | (0.199) | (1.484) | (0.485) | (0.329) | (0.175) | (0.580) |
| OECD | -0.382 | -1.621 | -1.470 | -5.085 | -0.405 | -0.735 | -0.466 | -1.573 |
| | (0.206) | (0.464) | (0.310) | (0.664) | (0.169) | (0.201) | (0.155) | (0.326) |

SR: Short run (year = 0).
MR: Medium run (year = 7).

Table 3.10: Coefficients for the initial and accumulated impact of fiscal adjustments on income inequality (LAC and OECD samples)

| **Region / Category and period** | **Direct tax-based** | | **Indirect tax-based** | | **Spending-based** | | **Tax-based** | |
|---|---|---|---|---|---|---|---|---|
| | SR | MR | SR | MR | SR | MR | SR | MR |
| LAC | -0.336 | -1.664 | -0.015 | 0.388 | -0.090 | 1.111 | -0.156 | -0.400 |
| | (0.121) | (0.421) | (0.099) | (0.763) | (0.092) | (0.463) | (0.094) | (0.464) |
| OECD | 0.177 | 0.045 | -0.143 | 1.044 | 0.244 | 0.453 | 0.052 | 0.289 |
| | (0.130) | (0.532) | (0.104) | (0.693) | (0.153) | (0.537) | (0.083) | (0.518) |

SR: Short run (year = 1).
MR: Medium run (year = 8).

## 3.5 Conclusion

This Chapter contributed to the empirical literature by estimating the impact of direct- and indirect-tax-based austerity shocks on income inequality and economic activity for OCDE and Latin American and Caribbean economies using the Local Projections method (Jordà 2005). We also compared these results with those obtained for spending-based and tax-based fiscal policy shocks. We relied for these estimations on the decomposition of David and Leigh's (2018) database that was carried out in Chapter 2 for LAC economies and Alesina et al.'s (2017) dataset for OECD countries.

For the OECD sample, unlike Ball et al. (2013), Woo et al. (2013), Furceri, Jalles, and Loungani (2016), and Heimberger (2020), our results did not show statistical significance for the impacts of fiscal consolidations on income distribution in the medium run, except when they were based on indirect taxes and have increased inequality, given the regressiveness of them in OECD's tax systems (Goñi, López, and Servén 2011). One of the reasons that may justify this contrast between our results and those of these other papers is the difference in the countries and periods contained in the samples (see Tables 1.3 and 1.5 and discussion in Section 3.4.2). For the Latin American and Caribbean economies, however, while spending-based fiscal adjustments increased income inequality

by 1.11% in the medium run, there was no statistically significant distributional impact when consolidations were based on tax increases. When we restrict the sample to South American countries, the result for cuts in expenditures was even more intense and robust to several robustness checks (see Chapter 1), increasing inequality by 2.48% after seven years. The distributional impacts of tax hikes become statistically significant when the adjustment is based on direct taxes, reducing income inequality by 0.34% in the short run and 1.66% in the medium. However, it was not statistically different from zero when tax-based fiscal consolidations were predominantly carried out from indirect taxes.

As in Guajardo, Leigh, and Pescatori (2014) and Alesina et al. (2017), our results for OECD economies suggest that tax-based fiscal adjustments adversely impacted GDP more than expenditure cuts. Our estimates complement these findings and indicate that indirect taxes were worse than direct taxes for economic activity. In the medium run, while indirect tax-based fiscal consolidations decreased the GDP by 5.08%, direct tax-based fiscal policy shocks generated a 1.62% drop. For the LAC countries, we based on Carrière-Swallow, David, and Leigh's (2021) paper to estimate IRFs for a seven-period horizon. Unlike the findings for the OECD sample, our evidence suggests that spending-based fiscal adjustments were worse for the economy, generating a 1.15% drop in GDP in the short run and 2.81% in the medium run. Tax-based fiscal policy shocks reduced the economic activity by 0.26% and 1.57%, respectively. When we decompose the adjustments on the revenue side, while increases in indirect taxes generated a 4.84% decrease in the GDP after seven years, direct tax-based consolidations did not impact economic activity with statistical significance.

Considering the LAC sample, results suggest that the adverse effects of taxation on economic activity in episodes of fiscal adjustments may be neutralized by the positive effect on GDP of the redistributive effects of direct taxes. When it comes to the OECD sample, a possible interpretation of the results relies on the adverse effects of taxation on economic activity being enhanced by the adverse distributional effects of indirect tax-based episodes. The explanation for this inverse relationship between income inequality and economic activity is based on the proposition that individuals at the base of the distributive pyramid have a greater propensity to consume than those at the top (Lavoie 2014; Carvalho and Rezai 2016). Therefore, measures that generate income redistribution to the top (or to the bottom) engender negative (positive) impacts on aggregate demand through consumption and, consequently, on economic activity. In line with these findings, Santiago et al. (2019) presented a very adverse effect of unequal income distribution on GDP growth regardless of the country's stage of development. Also, Berg and Ostry (2011) and Berg et al. (2018) pointed out that less unequal societies are associated with faster and longer-lasting economic growth.

Given that income distribution and economic output can interact virtuously, the effects of fiscal consolidation policies on income distribution and GDP could be taken into account jointly by policymakers, especially in highly unequal economies of Latin America and the Caribbean that have the urgent need for inclusive growth.

# Appendix

Table 3.11: Levin-Lin-Chu unit root tests – p-values (null hypothesis of unit root) – series utilized in economic activity estimations

| Panel | VAR1 | VAR2 | VAR3 | VAR4 | VAR5 | VAR6 | VAR7 | VAR8 | VAR9 |
|---|---|---|---|---|---|---|---|---|---|
| Panel 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.00 |
| Panel 2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.13 | 0.00 | 0.19 | 0.00 |
| Panel 3 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | 0.00 |

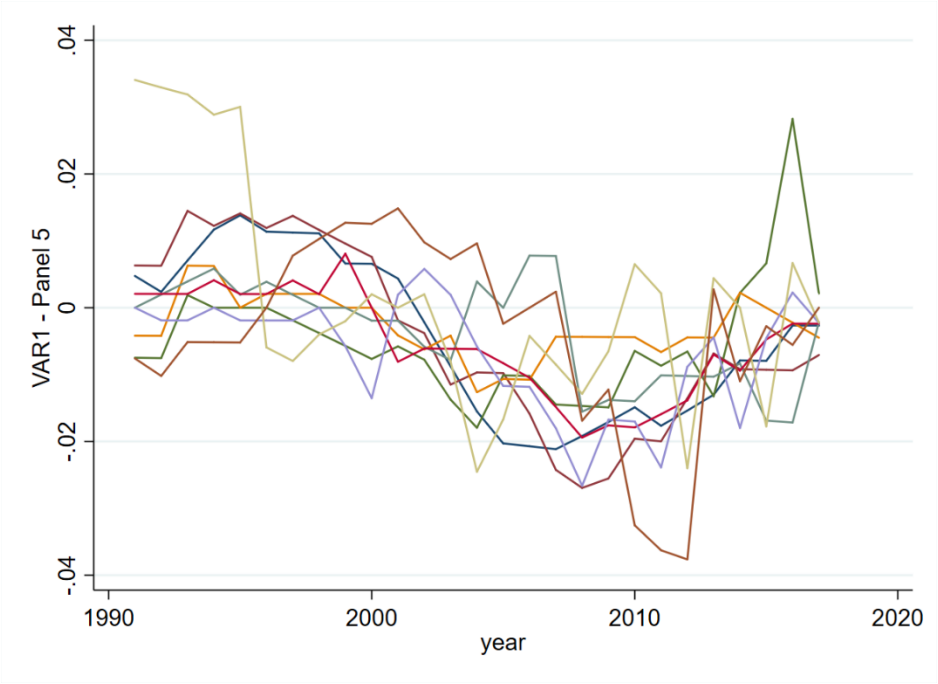
VAR1: $y_t$ - $y_{t-1}$.
VAR2: $y_{t+1}$ - $y_{t-1}$.
VAR3: $y_{t+2}$ - $y_{t-1}$.
VAR4: $y_{t+3}$ - $y_{t-1}$.
VAR5: $y_{t+4}$ - $y_{t-1}$.
VAR6: $y_{t+5}$ - $y_{t-1}$.
VAR7: $y_{t+6}$ - $y_{t-1}$.
VAR8: $y_{t+7}$ - $y_{t-1}$.
VAR9: Value of commodity exports (percentual change).
“y" = real GDP (in log).

Table 3.12: Levin-Lin-Chu unit root tests – p-values (null hypothesis of unit root) – series utilized in income inequality estimations

| Panel | VAR1 | VAR2 | VAR3 | VAR4 | VAR5 | VAR6 | VAR7 | VAR8 |
|---|---|---|---|---|---|---|---|---|
| Panel 4 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Panel 5 | 0.25 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Panel 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

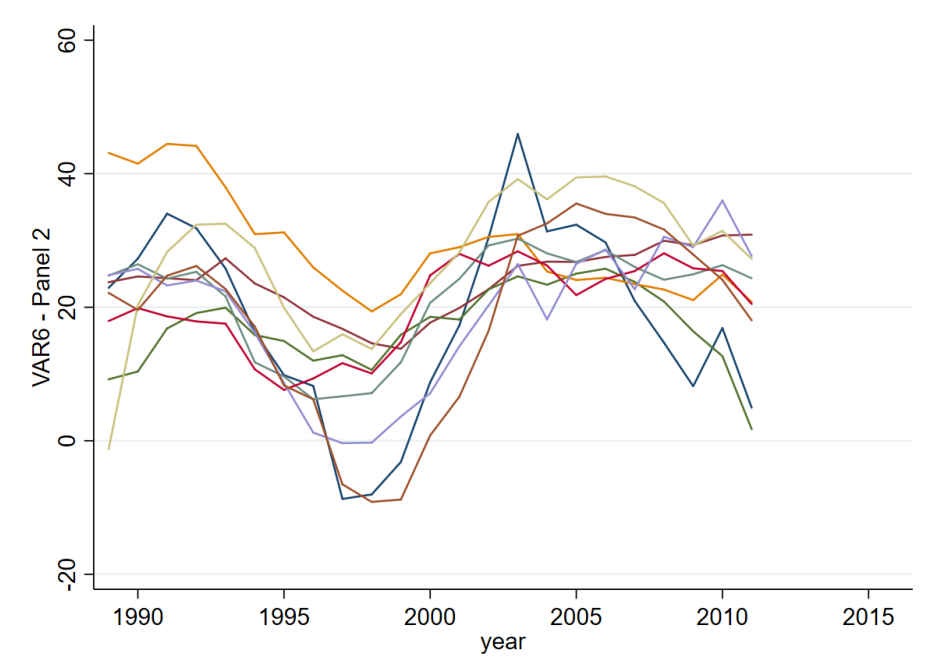
VAR1: $y_{t+1}$ - $y_t$.
VAR2: $y_{t+2}$ - $y_t$.
VAR3: $y_{t+3}$ - $y_t$.
VAR4: $y_{t+4}$ - $y_t$.
VAR5: $y_{t+5}$ - $y_t$.
VAR6: $y_{t+6}$ - $y_t$.
VAR7: $y_{t+7}$ - $y_t$.
VAR8: $y_{t+8}$ - $y_t$.
“y" = Gini index for disposable income (in log).

Figure 3.4: VAR1 of Panel 5 (countries of the South American sample)



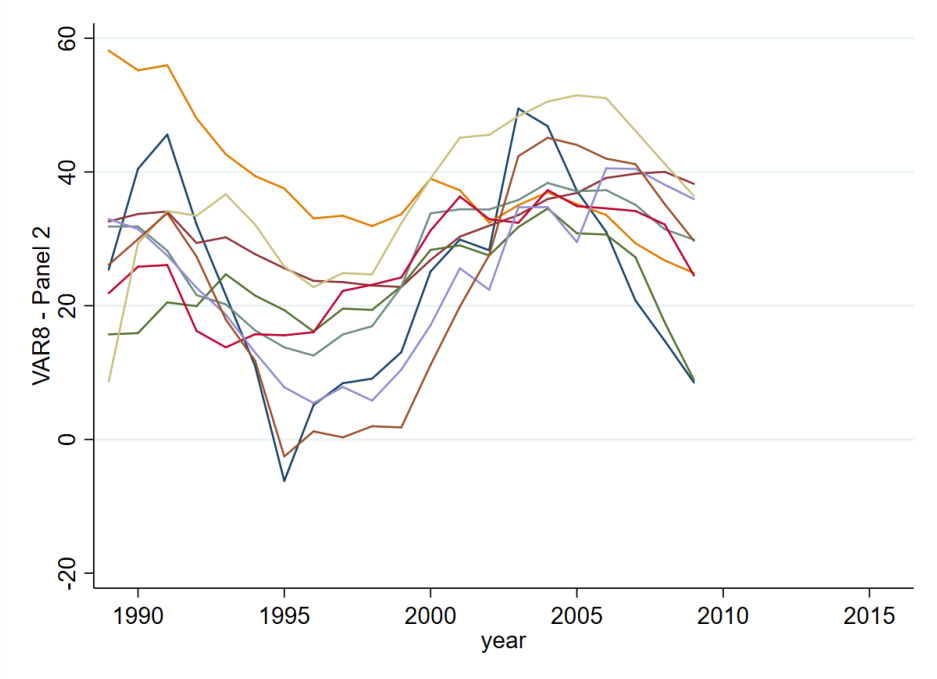

VAR1: $y_{t+1}$ - $y_t$.
"y" = Gini index for disposable income (in log).

Figure 3.5: VAR6 of Panel 2 (countries of the South American sample)



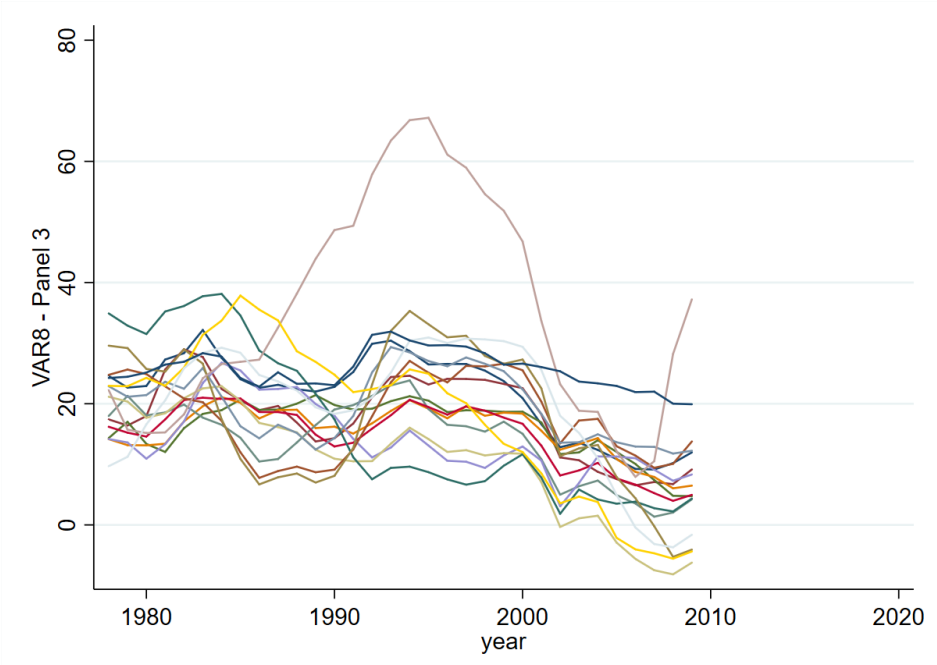

VAR6: $y_{t+5}$ - $y_{t-1}$.
"y" = real GDP (in log).

Figure 3.6: VAR8 of Panel 2 (countries of the South American sample)




VAR8: $y_{t+7}$ - $y_{t-1}$.
"y" = real GDP (in log).

Figure 3.7: VAR8 of Panel 3 (countries of the OECD sample)




VAR8: $y_{t+7}$ - $y_{t-1}$.
"y" = real GDP (in log).

Table 3.13: Effects on GDP – LAC sample – spending- vs. tax-based fiscal shocks

| | **Year 0 (h=0)** | **Year 1 (h=1)** | **Year 2 (h=2)** | **Year 3 (h=3)** | **Year 4 (h=4)** | **Year 5 (h=5)** | **Year 6 (h=6)** | **Year 7 (h=7)** |
|---|---|---|---|---|---|---|---|---|
| GDP growth (t-1) | 0.172 | 0.167 | 0.160 | 0.034 | -0.090 | -0.109 | -0.023 | -0.069 |
| | (0.087) | (0.135) | (0.174) | (0.176) | (0.200) | (0.224) | (0.231) | (0.254) |
| GDP growth (t-2) | -0.023 | -0.018 | -0.133 | -0.256 | -0.215 | -0.170 | -0.292 | -0.382* |
| | (0.039) | (0.089) | (0.103) | (0.149) | (0.176) | (0.160) | (0.148) | (0.166) |
| Commodities (t) | -0.012 | 0.208* | 0.244 | 0.011 | -0.105 | -0.087 | 0.061 | 0.220 |
| | (0.040) | (0.099) | (0.211) | (0.221) | (0.228) | (0.273) | (0.309) | (0.302) |
| Commodities (t - 1) | 0.217* | 0.270 | 0.0919 | -0.0453 | -0.173 | -0.0591 | 0.127 | 0.371 |
| | (0.092) | (0.213) | (0.245) | (0.234) | (0.231) | (0.317) | (0.336) | (0.668) |
| Commodities (t - 2) | -0.0170 | -0.101 | -0.189 | -0.319 | -0.287 | -0.027 | 0.188 | -0.348 |
| | (0.137) | (0.242) | (0.236) | (0.216) | (0.307) | (0.321) | (0.629) | (0.608) |
| Tax-based fiscal shock (h) | -0.260 | -0.488*** | -0.733*** | -0.988*** | -1.157*** | -1.410** | -1.589** | -1.679** |
| | (0.175) | (0.126) | (0.142) | (0.184) | (0.267) | (0.378) | (0.489) | (0.580) |
| Spending-based fiscal shock (h) | -1.148* | -1.389* | -1.525* | -1.684** | -2.171*** | -2.596*** | -2.686*** | -2.811*** |
| | (0.485) | (0.670) | (0.605) | (0.575) | (0.503) | (0.483) | (0.455) | (0.329) |
| Fiscal shock (t - 1) | 0.142 | 0.494 | 0.723 | 0.126 | -0.589 | -0.772 | -0.417 | -0.442 |
| | (0.209) | (0.482) | (0.610) | (0.663) | (0.579) | (0.648) | (0.793) | (1.041) |
| Fiscal shock (t - 2) | 0.243 | 0.303 | -0.160 | -0.738* | -0.818 | -0.514 | -0.530 | -0.207 |
| | (0.223) | (0.347) | (0.327) | (0.326) | (0.406) | (0.553) | (0.776) | (0.737) |
| Observations | 364 | 350 | 336 | 322 | 308 | 294 | 280 | 266 |

Note:

*$*p<0.05$;** $p<0.01$; ***$p<0.001$*; *Standard errors in parentheses*

Table 3.14: Effects on GDP – LAC sample – direct- vs. indirect tax-based episodes

| | **Year 0 (h=0)** | **Year 1 (h=1)** | **Year 2 (h=2)** | **Year 3 (h=3)** | **Year 4 (h=4)** | **Year 5 (h=5)** | **Year 6 (h=6)** | **Year 7 (h=7)** |
|---|---|---|---|---|---|---|---|---|
| GDP growth (t-1) | 0.179∗ | 0.191 | 0.182 | 0.0660 | -0.0496 | -0.107 | -0.0365 | -0.120 |
| | (0.086) | (0.134) | (0.179) | (0.181) | (0.198) | (0.226) | (0.237) | (0.246) |
| GDP growth (t-2) | -0.015 | -0.012 | -0.123 | -0.245 | -0.227 | -0.189 | -0.339∗ | -0.394∗ |
| | (0.041) | (0.089) | (0.097) | (0.141) | (0.176) | (0.167) | (0.145) | (0.165) |
| Commodities (t) | -0.003 | 0.229 | 0.275 | 0.051 | -0.101 | -0.115 | -0.043 | 0.087 |
| | (0.044) | (0.112) | (0.225) | (0.220) | (0.219) | (0.255) | (0.273) | (0.259) |
| Commodities (t - 1) | 0.213∗ | 0.274 | 0.102 | -0.060 | -0.196 | -0.147 | -0.021 | 0.147 |
| | (0.094) | (0.218) | (0.255) | (0.236) | (0.228) | (0.309) | (0.315) | (0.577) |
| Commodities (t - 2) | 0.003 | -0.070 | -0.168 | -0.302 | -0.329 | -0.128 | 0.002 | -0.471 |
| | (0.141) | (0.262) | (0.252) | (0.219) | (0.309) | (0.323) | (0.544) | (0.488) |
| Direct tax-based fiscal shock (h) | -0.222 | -0.231 | -0.510 | -0.543 | -0.508 | -0.522 | -0.340 | -0.211 |
| | (0.255) | (0.259) | (0.333) | (0.407) | (0.348) | (0.340) | (0.301) | (0.227) |
| Indirect tax-based fiscal shock (h) | -0.679∗∗ | -1.117∗∗ | -1.424∗∗ | -1.992∗∗ | -2.542∗∗ | -3.331∗∗ | -4.192∗∗ | -4.843∗∗ |
| | (0.199) | (0.358) | (0.442) | (0.568) | (0.688) | (0.882) | (1.174) | (1.484) |
| Tax-based fiscal shock (t - 1) | 0.115 | 0.432 | 0.594 | 0.151 | -0.735 | -1.042 | -0.501 | -0.445 |
| | (0.288) | (0.692) | (0.804) | (0.744) | (0.706) | (0.867) | (1.060) | (1.446) |
| Tax-based fiscal shock (t - 2) | 0.202 | 0.091 | -0.305 | -1.043∗ | -1.175∗ | -0.701 | -0.701 | -0.396 |
| | (0.296) | (0.398) | (0.327) | (0.417) | (0.519) | (0.604) | (0.830) | (0.818) |
| Observations | 364 | 350 | 336 | 322 | 308 | 294 | 280 | 266 |

Note:

∗*p<0.05;*∗∗ *p<0.01;* ∗∗∗*p<0.001*; *Standard errors in parentheses*

Table 3.15: Impact on inequality from spending-based consolidations – LAC sample

| | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **Year 5** | **Year 6** | **Year 7** | **Year 8** |
|---|---|---|---|---|---|---|---|---|
| | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** | **(6)** | **(7)** | **(8)** |
| Shock (t) | -0.091 | -0.104 | -0.510 | -0.546 | 0.602 | 0.885 | 1.221∗ | 1.111 |
| | (0.092) | (0.246) | (0.312) | (0.414) | (0.500) | (0.569) | (0.536) | (0.463) |
| Shock (t-1) | 0.079 | -0.197 | -0.206 | 0.442 | 0.650 | 0.986∗ | 0.856 | 0.869 |
| | (0.081) | (0.196) | (0.285) | (0.352) | (0.400) | (0.425) | (0.437) | (0.498) |
| Shock (t-2) | -0.324∗∗ | -0.362 | 0.232 | 0.462 | 0.757 | 0.695 | 0.719 | 0.393 |
| | (0.098) | (0.222) | (0.300) | (0.383) | (0.366) | (0.439) | (0.564) | (0.837) |
| Change in Gini (t) | 0.579∗∗∗ | 1.037∗∗∗ | 1.382∗∗∗ | 1.497∗∗∗ | 1.710∗∗∗ | 1.911∗∗∗ | 2.104∗∗∗ | 2.029∗∗ |
| | (0.102) | (0.188) | (0.263) | (0.335) | (0.310) | (0.340) | (0.441) | (0.556) |
| Change in Gini (t-1) | 0.066 | 0.084 | -0.066 | -0.204 | -0.563 | -0.810∗ | -1.199∗∗ | -1.463∗∗ |
| | (0.074) | (0.143) | (0.221) | (0.323) | (0.355) | (0.365) | (0.353) | (0.432) |
| Observations | 350 | 336 | 322 | 308 | 294 | 280 | 266 | 252 |

Note:

*$*p<0.05$;** $p<0.01$; *** $p<0.001$*; *Standard errors in parentheses*

Table 3.16: Impact on inequality from tax-based consolidations – LAC sample

| | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **Year 5** | **Year 6** | **Year 7** | **Year 8** |
|---|---|---|---|---|---|---|---|---|
| | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** | **(6)** | **(7)** | **(8)** |
| Shock (t) | -0.156 | -0.299 | -0.534∗ | -0.651 | -0.564 | -0.469 | -0.235 | -0.400 |
| | (0.094) | (0.148) | (0.239) | (0.357) | (0.434) | (0.512) | (0.493) | (0.464) |
| Shock (t-1) | -0.036 | -0.142 | -0.228 | -0.284 | -0.321 | -0.251 | -0.419 | -0.512 |
| | (0.065) | (0.089) | (0.147) | (0.218) | (0.260) | (0.297) | (0.284) | (0.276) |
| Shock (t-2) | -0.144∗ | -0.252∗ | -0.330∗ | -0.372 | -0.339 | -0.442 | -0.438 | -0.429 |
| | (0.059) | (0.106) | (0.149) | (0.237) | (0.318) | (0.366) | (0.418) | (0.460) |
| Change in Gini (t) | 0.559∗∗∗ | 1.003∗∗∗ | 1.341∗∗∗ | 1.447∗∗∗ | 1.673∗∗∗ | 1.861∗∗∗ | 2.042∗∗∗ | 1.922∗∗ |
| | (0.101) | (0.181) | (0.253) | (0.330) | (0.283) | (0.313) | (0.415) | (0.522) |
| Change in Gini (t-1) | 0.077 | 0.097 | -0.053 | -0.180 | -0.532 | -0.779∗ | -1.167∗∗ | -1.404∗∗ |
| | (0.076) | (0.137) | (0.216) | (0.319) | (0.329) | (0.328) | (0.320) | (0.415) |
| Observations | 350 | 336 | 322 | 308 | 294 | 280 | 266 | 252 |

Note:

*$*p<0.05$;** $p<0.01$; *** $p<0.001$*; *Standard errors in parentheses*

Table 3.17: Impact on inequality – direct- vs. indirect tax-based episodes – LAC sample

| | **Year 1** (1) | **Year 2** (2) | **Year 3** (3) | **Year 4** (4) | **Year 5** (5) | **Year 6** (6) | **Year 7** (7) | **Year 8** (8) |
|---|---|---|---|---|---|---|---|---|
| Direct tax-based shock (t) | -0.336* | -0.656*** | -1.203*** | -1.727*** | -1.852*** | -2.112*** | -1.712*** | -1.664** |
| | (0.121) | (0.122) | (0.216) | (0.305) | (0.178) | (0.280) | (0.264) | (0.421) |
| Direct tax-based shock (t-1) | -0.117 | -0.461*** | -0.903*** | -1.237*** | -1.400*** | -1.111*** | -1.022** | -0.959* |
| | (0.115) | (0.117) | (0.163) | (0.219) | (0.265) | (0.267) | (0.354) | (0.379) |
| Direct tax-based shock (t-2) | -0.261 | -0.606* | -0.772** | -0.964** | -0.862** | -0.824** | -0.735* | -0.780 |
| | (0.142) | (0.247) | (0.251) | (0.284) | (0.234) | (0.249) | (0.318) | (0.384) |
| Indirect tax-based shock (t) | -0.015 | -0.022 | -0.079 | 0.126 | 0.283 | 0.569 | 0.688 | 0.388 |
| | (0.099) | (0.187) | (0.304) | (0.410) | (0.572) | (0.658) | (0.701) | (0.763) |
| Indirect tax-based shock (t-1) | 0.017 | 0.026 | 0.186 | 0.288 | 0.394 | 0.443 | 0.125 | -0.094 |
| | (0.070) | (0.121) | (0.228) | (0.388) | (0.565) | (0.716) | (0.682) | (0.655) |
| Indirect tax-based shock (t-2) | -0.063 | -0.008 | -0.021 | 0.079 | 0.047 | -0.168 | -0.243 | -0.230 |
| | (0.055) | (0.136) | (0.270) | (0.474) | (0.627) | (0.627) | (0.642) | (0.698) |
| Change in Gini (t) | 0.558*** | 0.985*** | 1.301*** | 1.428*** | 1.635*** | 1.835*** | 2.025*** | 1.907** |
| | (0.099) | (0.182) | (0.251) | (0.320) | (0.281) | (0.325) | (0.414) | (0.499) |
| Change in Gini (t-1) | 0.072 | 0.094 | -0.039 | -0.182 | -0.492 | -0.742* | -1.138*** | -1.386** |
| | (0.070) | (0.127) | (0.197) | (0.275) | (0.279) | (0.279) | (0.279) | (0.372) |
| Observations | 350 | 336 | 322 | 308 | 294 | 280 | 266 | 252 |

Note:

*$*p<0.05$;** $p<0.01$; *** $p<0.001$; Standard errors in parentheses*

Table 3.18: Effects on GDP – South American sample – spending- vs. tax-based fiscal shocks

| | **Year 0 (h=0)** | **Year 1 (h=1)** | **Year 2 (h=2)** | **Year 3 (h=3)** | **Year 4 (h=4)** | **Year 5 (h=5)** | **Year 6 (h=6)** | **Year 7 (h=7)** |
|---|---|---|---|---|---|---|---|---|
| GDP growth (t-1) | 0.141 | 0.143 | 0.126 | -0.080 | -0.152 | -0.086 | 0.060 | 0.051 |
| | (0.098) | (0.154) | (0.169) | (0.158) | (0.224) | (0.266) | (0.251) | (0.306) |
| GDP growth (t-2) | -0.004 | -0.020 | -0.167 | -0.231 | -0.119 | -0.048 | -0.175 | -0.316* |
| | (0.040) | (0.100) | (0.102) | (0.153) | (0.177) | (0.127) | (0.125) | (0.114) |
| Commodities (t) | -0.167 | -0.030 | -0.055 | -0.339 | -0.570 | -0.649 | -0.561 | -0.402 |
| | (0.115) | (0.146) | (0.232) | (0.213) | (0.331) | (0.350) | (0.423) | (0.491) |
| Commodities (t - 1) | 0.174 | 0.218 | 0.019 | -0.198 | -0.361 | -0.432 | -0.403 | -0.190 |
| | (0.129) | (0.297) | (0.302) | (0.357) | (0.372) | (0.406) | (0.482) | (0.712) |
| Commodities (t - 2) | -0.083 | -0.226 | -0.415 | -0.608 | -0.766 | -0.832 | -0.462 | -1.041 |
| | (0.194) | (0.258) | (0.359) | (0.395) | (0.421) | (0.428) | (0.631) | (0.560) |
| Tax-based fiscal shock (h) | -0.385 | -0.708* | -1.059*** | -1.362*** | -1.467*** | -1.559*** | -1.711*** | -1.905*** |
| | (0.238) | (0.278) | (0.250) | (0.252) | (0.261) | (0.241) | (0.288) | (0.284) |
| Spending-based fiscal shock (h) | -1.798** | -2.739*** | -3.329*** | -3.715*** | -4.235*** | -4.688*** | -4.820*** | -4.684*** |
| | (0.548) | (0.328) | (0.415) | (0.674) | (0.710) | (0.769) | (0.845) | (0.813) |
| Fiscal shock (t - 1) | -0.176 | -0.182 | -0.407 | -0.799 | -1.465 | -1.666 | -0.977 | -1.137 |
| | (0.245) | (0.548) | (0.562) | (0.840) | (0.855) | (0.902) | (0.651) | (0.858) |
| Fiscal shock (t - 2) | -0.075 | -0.335 | -0.661 | -1.386** | -1.376* | -0.840 | -1.139 | -0.906 |
| | (0.257) | (0.250) | (0.333) | (0.487) | (0.623) | (0.447) | (0.576) | (0.550) |
| Observations | 234 | 225 | 216 | 207 | 198 | 189 | 180 | 171 |

Note:

*$*p<0.05$;** $p<0.01$; ***$p<0.001$; *Standard errors in parentheses*

Table 3.19: Effects on GDP – South American sample – direct- vs. indirect tax-based episodes

| | **Year 0 (h=0)** | **Year 1 (h=1)** | **Year 2 (h=2)** | **Year 3 (h=3)** | **Year 4 (h=4)** | **Year 5 (h=5)** | **Year 6 (h=6)** | **Year 7 (h=7)** |
|---|---|---|---|---|---|---|---|---|
| GDP growth (t-1) | 0.139 | 0.151 | 0.126 | -0.068 | -0.096 | -0.071 | 0.075 | 0.013 |
| | (0.097) | (0.151) | (0.164) | (0.151) | (0.209) | (0.259) | (0.254) | (0.291) |
| GDP growth (t-2) | -0.002 | -0.041 | -0.177 | -0.219 | -0.151 | -0.082 | -0.262 | -0.359∗ |
| | (0.038) | (0.096) | (0.099) | (0.146) | (0.170) | (0.149) | (0.141) | (0.138) |
| Commodities (t) | -0.167 | -0.030 | -0.055 | -0.339 | -0.570 | -0.649 | -0.561 | -0.402 |
| | (0.115) | (0.146) | (0.232) | (0.213) | (0.331) | (0.350) | (0.423) | (0.491) |
| Commodities (t - 1) | 0.174 | 0.218 | 0.019 | -0.198 | -0.361 | -0.432 | -0.403 | -0.190 |
| | (0.129) | (0.297) | (0.302) | (0.357) | (0.372) | (0.406) | (0.482) | (0.712) |
| Commodities (t - 2) | -0.083 | -0.226 | -0.415 | -0.608 | -0.766 | -0.832 | -0.462 | -1.041 |
| | (0.194) | (0.258) | (0.359) | (0.395) | (0.421) | (0.428) | (0.631) | (0.560) |
| Direct tax-based fiscal shock (h) | -0.385 | -0.708∗ | -1.059∗∗∗ | -1.362∗∗∗ | -1.467∗∗∗ | -1.559∗∗∗ | -1.711∗∗∗ | -1.905∗∗∗ |
| | (0.238) | (0.278) | (0.250) | (0.252) | (0.261) | (0.241) | (0.288) | (0.284) |
| Indirect tax-based fiscal shock (h) | -1.798∗∗ | -2.739∗∗∗ | -3.329∗∗∗ | -3.715∗∗∗ | -4.235∗∗∗ | -4.688∗∗∗ | -4.820∗∗∗ | -4.684∗∗∗ |
| | (0.548) | (0.328) | (0.415) | (0.674) | (0.710) | (0.769) | (0.845) | (0.813) |
| Tax-based fiscal shock (t - 1) | -0.176 | -0.182 | -0.407 | -0.799 | -1.465 | -1.666 | -0.977 | -1.137 |
| | (0.245) | (0.548) | (0.562) | (0.840) | (0.855) | (0.902) | (0.651) | (0.858) |
| Tax-based fiscal shock (t - 2) | -0.075 | -0.335 | -0.661 | -1.386∗∗ | -1.376∗ | -0.840 | -1.139 | -0.906 |
| | (0.257) | (0.250) | (0.333) | (0.487) | (0.623) | (0.447) | (0.576) | (0.550) |
| Observations | 234 | 225 | 216 | 207 | 198 | 189 | 180 | 171 |

Note:

∗*p<0.05;*∗∗ *p<0.01;* ∗∗∗*p<0.001*; *Standard errors in parentheses*

Table 3.20: Impact on inequality from spending-based consolidations – South American sample

| | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **Year 5** | **Year 6** | **Year 7** | **Year 8** |
|---|---|---|---|---|---|---|---|---|
| | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** | **(6)** | **(7)** | **(8)** |
| Shock (t) | 0.375** | 0.695* | 0.632 | 1.225 | 1.965* | 2.653* | 3.059* | 2.559 |
| | (0.104) | (0.313) | (0.594) | (0.784) | (0.923) | (1.135) | (1.301) | (1.473) |
| Shock (t-1) | 0.218 | 0.069 | 0.580 | 1.474 | 1.920 | 2.449 | 1.922 | 1.544 |
| | (0.198) | (0.493) | (0.698) | (0.826) | (0.994) | (1.177) | (1.377) | (1.616) |
| Shock (t-2) | -0.316 | 0.027 | 0.804 | 1.387 | 1.840 | 1.529 | 1.316 | 0.816 |
| | (0.272) | (0.548) | (0.712) | (1.004) | (1.202) | (1.420) | (1.733) | (2.077) |
| Change in Gini (t) | 0.528*** | 0.965** | 1.228** | 1.321** | 1.605*** | 1.910*** | 2.051*** | 2.145** |
| | (0.139) | (0.264) | (0.334) | (0.401) | (0.322) | (0.306) | (0.425) | (0.567) |
| Change in Gini (t-1) | 0.0901 | 0.0906 | 0.0118 | -0.111 | -0.521 | -0.878* | -1.223*** | -1.681*** |
| | (0.095) | (0.214) | (0.306) | (0.413) | (0.397) | (0.314) | (0.302) | (0.351) |
| Observations | 225 | 216 | 207 | 198 | 189 | 180 | 171 | 162 |

Note:

*$*p<0.05$;** $p<0.01$; *** $p<0.001$*; *Standard errors in parentheses*

Table 3.21: Impact on inequality from tax-based consolidations – South American sample

| | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **Year 5** | **Year 6** | **Year 7** | **Year 8** |
|---|---|---|---|---|---|---|---|---|
| | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** | **(6)** | **(7)** | **(8)** |
| Shock (t) | -0.020 | -0.192 | -0.314 | -0.323 | -0.366 | -0.152 | 0.182 | 0.027 |
| | (0.0847) | (0.226) | (0.332) | (0.480) | (0.576) | (0.689) | (0.723) | (0.667) |
| Shock (t-1) | -0.134 | -0.131 | -0.161 | -0.218 | -0.025 | 0.154 | -0.117 | -0.242 |
| | (0.099) | (0.170) | (0.311) | (0.375) | (0.430) | (0.403) | (0.359) | (0.281) |
| Shock (t-2) | -0.006 | -0.071 | -0.149 | 0.012 | 0.136 | -0.010 | -0.006 | -0.010 |
| | (0.068) | (0.153) | (0.229) | (0.312) | (0.433) | (0.528) | (0.622) | (0.686) |
| Change in Gini (t) | 0.528*** | 0.957** | 1.236** | 1.359** | 1.725*** | 2.017*** | 2.119*** | 2.153** |
| | (0.138) | (0.262) | (0.336) | (0.421) | (0.304) | (0.313) | (0.454) | (0.616) |
| Change in Gini (t-1) | 0.086 | 0.105 | 0.025 | -0.094 | -0.568 | -0.941* | -1.279*** | -1.692*** |
| | (0.097) | (0.220) | (0.324) | (0.459) | (0.415) | (0.331) | (0.323) | (0.412) |
| Observations | 225 | 216 | 207 | 198 | 189 | 180 | 171 | 162 |

Note:

*$*p<0.05$;** $p<0.01$; *** $p<0.001$*; *Standard errors in parentheses*

Table 3.22: Impact on inequality – direct- vs. indirect tax-based episodes - South American sample

| | **Year 1** | **Year 2** | **Year 3** | **Year 4** | **Year 5** | **Year 6** | **Year 7** | **Year 8** |
|---|---|---|---|---|---|---|---|---|
| | **(1)** | **(2)** | **(3)** | **(4)** | **(5)** | **(6)** | **(7)** | **(8)** |
| Direct tax-based shock (t) | -0.291* | -0.789*** | -1.276*** | -1.826*** | -2.285*** | -2.447*** | -1.936** | -1.681* |
| | (0.107) | (0.195) | (0.268) | (0.375) | (0.428) | (0.394) | (0.507) | (0.644) |
| Direct tax-based shock (t-1) | -0.310** | -0.606** | -1.146** | -1.614*** | -1.652** | -1.310* | -1.213 | -1.147 |
| | (0.0891) | (0.181) | (0.319) | (0.417) | (0.504) | (0.598) | (0.691) | (0.677) |
| Direct tax-based shock (t-2) | -0.088 | -0.390* | -0.659* | -0.730*** | -0.622* | -0.668* | -0.637 | -0.697 |
| | (0.058) | (0.177) | (0.237) | (0.184) | (0.230) | (0.297) | (0.363) | (0.449) |
| Indirect tax-based shock (t) | 0.199 | 0.327 | 0.460 | 0.873 | 1.130 | 1.489* | 1.781* | 1.393 |
| | (0.132) | (0.292) | (0.438) | (0.586) | (0.705) | (0.699) | (0.812) | (0.885) |
| Indirect tax-based shock (t-1) | 0.107 | 0.420 | 0.925* | 1.376** | 1.882** | 2.129* | 1.460 | 0.961 |
| | (0.131) | (0.216) | (0.330) | (0.377) | (0.519) | (0.835) | (0.959) | (1.035) |
| Indirect tax-based shock (t-2) | 0.108 | 0.337 | 0.567 | 1.012 | 1.169 | 0.802 | 0.695 | 0.723 |
| | (0.171) | (0.365) | (0.635) | (0.952) | (1.239) | (1.305) | (1.470) | (1.583) |
| Change in Gini (t) | 0.510*** | 0.906** | 1.138** | 1.221** | 1.511*** | 1.769*** | 1.922** | 1.967** |
| | (0.136) | (0.258) | (0.321) | (0.395) | (0.312) | (0.420) | (0.508) | (0.590) |
| Change in Gini (t-1) | 0.101 | 0.145 | 0.106 | 0.020 | -0.369 | -0.700** | -1.081*** | -1.522*** |
| | (0.093) | (0.208) | (0.291) | (0.393) | (0.296) | (0.243) | (0.242) | (0.310) |
| Observations | 225 | 216 | 207 | 198 | 189 | 180 | 171 | 162 |

Note:

*$*p<0.05$;** $p<0.01$; *** $p<0.001$; Standard errors in parentheses*

Table 3.23: Effects on GDP – OECD sample – spending- vs. tax-based fiscal shocks

| | **Year 0 (h=0)** | **Year 1 (h=1)** | **Year 2 (h=2)** | **Year 3 (h=3)** | **Year 4 (h=4)** | **Year 5 (h=5)** | **Year 6 (h=6)** | **Year 7 (h=7)** |
|---|---|---|---|---|---|---|---|---|
| GDP growth (t-1) | 0.413*** | 0.662*** | 0.568** | 0.552** | 0.607** | 0.545* | 0.377 | 0.278 |
| | (0.105) | (0.167) | (0.183) | (0.184) | (0.213) | (0.258) | (0.316) | (0.329) |
| GDP growth (t-2) | -0.115 | -0.175 | -0.129 | -0.119 | -0.254 | -0.389 | -0.442 | -0.308 |
| | (0.064) | (0.150) | (0.183) | (0.226) | (0.268) | (0.300) | (0.369) | (0.428) |
| Commodities (t) | 0.134 | 0.330 | 0.232 | 0.188 | 0.429 | 0.569 | 0.968 | 1.263** |
| | (0.197) | (0.215) | (0.412) | (0.404) | (0.362) | (0.442) | (0.549) | (0.427) |
| Commodities (t - 1) | 0.129 | 0.403 | 0.383 | 0.544 | 0.743 | 1.516* | 1.641* | 1.344* |
| | (0.219) | (0.365) | (0.362) | (0.333) | (0.553) | (0.659) | (0.688) | (0.621) |
| Commodities (t - 2) | -0.004 | 0.141 | 0.362 | 0.650 | 1.229 | 2.013** | 2.051** | 2.162** |
| | (0.125) | (0.242) | (0.371) | (0.741) | (0.692) | (0.633) | (0.593) | (0.666) |
| Tax-based fiscal shock (h) | -0.466** | -0.829*** | -1.152*** | -1.449*** | -1.597*** | -1.695*** | -1.637*** | -1.573*** |
| | (0.155) | (0.211) | (0.234) | (0.225) | (0.298) | (0.348) | (0.344) | (0.326) |
| Spending-based fiscal shock (h) | -0.405* | -0.476* | -0.529** | -0.555** | -0.610*** | -0.655*** | -0.716*** | -0.735** |
| | (0.169) | (0.204) | (0.192) | (0.152) | (0.117) | (0.142) | (0.172) | (0.201) |
| Fiscal shock (t - 1) | -0.091 | -0.012 | -0.036 | 0.025 | 0.032 | 0.166 | 0.085 | -0.216 |
| | (0.136) | (0.199) | (0.245) | (0.332) | (0.460) | (0.631) | (0.512) | (0.507) |
| Fiscal shock (t - 2) | 0.100 | 0.173 | 0.249 | 0.297 | 0.264 | -0.040 | -0.391 | -0.199 |
| | (0.101) | (0.221) | (0.481) | (0.715) | (0.799) | (0.535) | (0.602) | (0.573) |
| Observations | 544 | 528 | 512 | 496 | 480 | 464 | 448 | 432 |

Note:

*$p<0.05$;** $p<0.01$; ***$p<0.001$; *Standard errors in parentheses*

Table 3.24: Effects on GDP – OECD sample – direct- vs. indirect tax-based episodes

| | **Year 0 (h=0)** | **Year 1 (h=1)** | **Year 2 (h=2)** | **Year 3 (h=3)** | **Year 4 (h=4)** | **Year 5 (h=5)** | **Year 6 (h=6)** | **Year 7 (h=7)** |
|---|---|---|---|---|---|---|---|---|
| GDP growth (t-1) | 0.403*** | 0.637*** | 0.489* | 0.426* | 0.500* | 0.456 | 0.295 | 0.240 |
| | (0.103) | (0.169) | (0.181) | (0.173) | (0.182) | (0.224) | (0.285) | (0.279) |
| GDP growth (t-2) | -0.133* | -0.233 | -0.212 | -0.211 | -0.330 | -0.426 | -0.418 | -0.317 |
| | (0.061) | (0.149) | (0.162) | (0.182) | (0.206) | (0.243) | (0.306) | (0.340) |
| Commodities (t) | 0.153 | 0.380 | 0.286 | 0.181 | 0.438 | 0.569 | 1.031 | 1.242* |
| | (0.202) | (0.214) | (0.428) | (0.407) | (0.369) | (0.472) | (0.649) | (0.566) |
| Commodities (t - 1) | 0.147 | 0.410 | 0.345 | 0.524 | 0.708 | 1.434 | 1.581 | 1.116 |
| | (0.217) | (0.369) | (0.375) | (0.323) | (0.536) | (0.712) | (0.779) | (0.723) |
| Commodities (t - 2) | -0.059 | 0.028 | 0.250 | 0.467 | 0.984 | 1.698* | 1.361** | 1.396** |
| | (0.133) | (0.255) | (0.314) | (0.646) | (0.620) | (0.626) | (0.452) | (0.491) |
| Direct tax-based fiscal shock (h) | -0.382 | -0.769 | -1.029 | -1.219* | -1.378* | -1.507** | -1.568** | -1.621** |
| | (0.206) | (0.410) | (0.532) | (0.569) | (0.566) | (0.511) | (0.494) | (0.464) |
| Indirect tax-based fiscal shock (h) | -1.470*** | -2.217*** | -3.162*** | -3.850*** | -4.464*** | -5.055*** | -5.194*** | -5.085*** |
| | (0.310) | (0.409) | (0.454) | (0.443) | (0.463) | (0.569) | (0.670) | (0.664) |
| Tax-based fiscal shock (t - 1) | -0.355* | -0.673** | -0.912** | -1.145** | -1.597*** | -1.080 | -1.302 | -2.144*** |
| | (0.170) | (0.222) | (0.277) | (0.411) | (0.417) | (0.893) | (0.754) | (0.528) |
| Tax-based fiscal shock (t - 2) | -0.257 | -0.312 | -0.671 | -1.117 | -0.654 | -0.984 | -2.091** | -2.227** |
| | (0.154) | (0.277) | (0.465) | (0.706) | (1.250) | (0.973) | (0.750) | (0.746) |
| Observations | 544 | 528 | 512 | 496 | 480 | 464 | 448 | 432 |

Note:

*$*p<0.05$;** $p<0.01$; *** $p<0.001$; Standard errors in parentheses*

Table 3.25: Impact on inequality from spending-based consolidations – OECD sample

| | **Year 1** **(1)** | **Year 2** **(2)** | **Year 3** **(3)** | **Year 4** **(4)** | **Year 5** **(5)** | **Year 6** **(6)** | **Year 7** **(7)** | **Year 8** **(8)** |
|---|---|---|---|---|---|---|---|---|
| Shock (t) | 0.244 | 0.370 | 0.460 | 0.520 | 0.229 | 0.178 | 0.255 | 0.453 |
| | (0.153) | (0.204) | (0.274) | (0.317) | (0.463) | (0.523) | (0.526) | (0.537) |
| Shock (t-1) | -0.089 | -0.105 | -0.101 | -0.365 | -0.280 | -0.163 | -0.003 | 0.039 |
| | (0.177) | (0.152) | (0.218) | (0.268) | (0.276) | (0.314) | (0.362) | (0.400) |
| Shock (t-2) | -0.030 | -0.119 | -0.329 | -0.186 | 0.003 | 0.167 | 0.178 | 0.091 |
| | (0.173) | (0.269) | (0.399) | (0.400) | (0.425) | (0.476) | (0.565) | (0.600) |
| Change in Gini (t) | 0.359*** | 0.460*** | 0.487*** | 0.451*** | 0.418*** | 0.457** | 0.439* | 0.453* |
| | (0.060) | (0.087) | (0.114) | (0.124) | (0.111) | (0.143) | (0.180) | (0.202) |
| Change in Gini (t-1) | -0.014 | -0.015 | -0.069 | -0.074 | -0.016 | -0.028 | -0.013 | -0.047 |
| | (0.070) | (0.110) | (0.111) | (0.138) | (0.196) | (0.222) | (0.233) | (0.264) |
| Observations | 608 | 592 | 576 | 560 | 544 | 528 | 512 | 496 |

Note:

*$*p<0.05$;** $p<0.01$; *** $p<0.001$*; *Standard errors in parentheses*

Table 3.26: Impact on inequality from tax-based consolidations – OECD sample

| | **Year 1** **(1)** | **Year 2** **(2)** | **Year 3** **(3)** | **Year 4** **(4)** | **Year 5** **(5)** | **Year 6** **(6)** | **Year 7** **(7)** | **Year 8** **(8)** |
|---|---|---|---|---|---|---|---|---|
| Shock (t) | 0.0522 | 0.149 | 0.101 | 0.230 | 0.327 | 0.383 | 0.373 | 0.289 |
| | (0.0833) | (0.161) | (0.218) | (0.272) | (0.333) | (0.395) | (0.448) | (0.518) |
| Shock (t-1) | 0.0818 | 0.00921 | 0.154 | 0.179 | 0.212 | 0.179 | 0.124 | 0.300 |
| | (0.0900) | (0.182) | (0.208) | (0.284) | (0.342) | (0.385) | (0.414) | (0.519) |
| Shock (t-2) | -0.0721 | 0.0399 | 0.0166 | 0.0104 | -0.0612 | -0.0960 | 0.135 | 0.521 |
| | (0.126) | (0.157) | (0.212) | (0.295) | (0.409) | (0.494) | (0.617) | (0.580) |
| Change in Gini (t) | 0.357*** | 0.457*** | 0.481*** | 0.439** | 0.410*** | 0.454** | 0.437* | 0.446* |
| | (0.0571) | (0.0859) | (0.112) | (0.122) | (0.113) | (0.148) | (0.185) | (0.206) |
| Change in Gini (t-1) | -0.0101 | -0.0120 | -0.0684 | -0.0677 | -0.0101 | -0.0186 | -0.00235 | -0.0369 |
| | (0.0680) | (0.109) | (0.110) | (0.135) | (0.191) | (0.216) | (0.228) | (0.262) |
| Observations | 608 | 592 | 576 | 560 | 544 | 528 | 512 | 496 |

Note:

*$*p<0.05$;** $p<0.01$; *** $p<0.001$*; *Standard errors in parentheses*

Table 3.27: Impact on inequality – direct- vs. indirect tax-based episodes - OECD sample

| | **Year 1** **(1)** | **Year 2** **(2)** | **Year 3** **(3)** | **Year 4** **(4)** | **Year 5** **(5)** | **Year 6** **(6)** | **Year 7** **(7)** | **Year 8** **(8)** |
|---|---|---|---|---|---|---|---|---|
| Direct tax-based shock (t) | 0.177 | 0.317 | 0.278 | 0.461 | 0.400 | 0.436 | 0.331 | 0.045 |
| | (0.130) | (0.243) | (0.281) | (0.338) | (0.416) | (0.487) | (0.510) | (0.532) |
| Direct tax-based shock (t-1) | 0.118 | 0.028 | 0.182 | 0.067 | 0.017 | -0.103 | -0.306 | -0.207 |
| | (0.121) | (0.210) | (0.261) | (0.370) | (0.457) | (0.471) | (0.454) | (0.571) |
| Direct tax-based shock (t-2) | -0.161 | -0.065 | -0.253 | -0.420 | -0.510 | -0.701 | -0.590 | -0.218 |
| | (0.128) | (0.167) | (0.257) | (0.360) | (0.367) | (0.367) | (0.467) | (0.469) |
| Indirect tax-based shock (t) | -0.143 | -0.210 | -0.089 | -0.067 | 0.313 | 0.569 | 0.670 | 1.044 |
| | (0.104) | (0.175) | (0.251) | (0.373) | (0.415) | (0.502) | (0.665) | (0.693) |
| Indirect tax-based shock (t-1) | -0.020 | 0.053 | 0.046 | 0.390 | 0.478 | 0.420 | 0.606 | 0.408 |
| | (0.094) | (0.192) | (0.255) | (0.376) | (0.506) | (0.628) | (0.639) | (0.764) |
| Indirect tax-based shock (t-2) | 0.090 | 0.158 | 0.581 | 0.720 | 0.838 | 1.106 | 1.154 | 1.755∗ |
| | (0.210) | (0.312) | (0.379) | (0.463) | (0.595) | (0.590) | (0.676) | (0.680) |
| Change in Gini (t) | 0.357∗∗∗ | 0.459∗∗∗ | 0.485∗∗∗ | 0.450∗∗∗ | 0.424∗∗∗ | 0.473∗∗ | 0.461∗ | 0.472∗ |
| | (0.060) | (0.090) | (0.115) | (0.125) | (0.114) | (0.147) | (0.185) | (0.205) |
| Change in Gini (t-1) | -0.004 | -0.005 | -0.058 | -0.056 | -0.005 | -0.016 | -0.003 | -0.045 |
| | (0.068) | (0.109) | (0.110) | (0.135) | (0.189) | (0.212) | (0.222) | (0.255) |
| Observations | 608 | 592 | 576 | 560 | 544 | 528 | 512 | 496 |

Note:

*$*p<0.05$;** $p<0.01$; *** $p<0.001$; Standard errors in parentheses*

# CONCLUSION

Based on David and Leigh's (2018) narrative dataset, Chapter 1 estimated the dynamic effects of fiscal consolidations on income inequality employing Jordá's (2005) Local Projections method for nine South American economies in the 1991-2017 period. Our baseline results showed that while spending-based fiscal consolidations significantly increased the Gini index for disposable income, tax-based fiscal policy shocks did not show statistically significant effects on income inequality. The Gini index for disposable income rose 2.48% in eight years after a spending-based fiscal adjustment of 1% of GDP. The magnitude of this effect was higher than in most of the previous studies carried out for OECD countries. Our main finding for the impact of spending-based fiscal consolidations on inequality in the medium run was robust when using alternative control variables, lag structures, country samples, and the Cyclically Adjusted Primary Balance (CAPB) strategy for identifying fiscal shocks.

In Chapter 2, we constructed a narrative dataset that decomposed tax-based austerity packages for 14 Latin American and Caribbean economies from 1989 to 2016 into direct- and indirect tax-based fiscal policy shocks. In Chapter 3, based on this decomposition and Alesina et al.'s (2017) dataset for OECD countries, we estimated the direct- and indirect-tax-based austerity impacts on income distribution and economic activity for LAC and OCDE economies using the Local Projections method (Jordà 2005). We compared these results with those of spending-based and tax-based fiscal policy shocks.

For the LAC sample, fiscal adjustments based on expenditure cuts were more adverse to GDP than the effects of tax-based policy shocks, with bands statistically distinguishable, reducing GDP by 1.15% in the short run and 2.81% in the medium run. Direct tax-based episodes did not generate statistically significant impacts on economic activity. Regarding indirect tax-based effects, the results were similar for both regions.[82] On the impacts on income distribution, direct tax-based (spending-based) fiscal consolidations decreased (increased) inequality for the LAC sample by 1.66% (1.11%) in the medium run, and did not generate impacts on the Gini index for disposable income for OECD economies. Differently, indirect tax-based fiscal consolidations deteriorated income distribution only for the OECD sample, increasing inequality by 1.04% in year 8.

Therefore, this doctoral dissertation has significantly contributed to the literature on austerity by presenting novel evidence and delving deeper into existing data pertinent

[82]For LAC, fiscal adjustments of 1% of GDP based on indirect taxes generated a 1.80% drop in economic activity in year 0 and a 4.69% cumulative drop in year 7. For the OECD sample, indirect tax-based consolidations decreased the GDP by 1.47% in the short run and 5.08% in the medium run. These findings presented statistical significance.

to this subject. Given the practical implications of research in this field for shaping the fiscal policies of various countries, it becomes imperative for the literature to elucidate potential outcomes stemming from different compositions of tax policies. To enable future investigations on the consequences of tax-oriented fiscal consolidations in greater detail, we have elaborated the narrative dataset of Chapter 2. Based on David and Leigh (2018), this dataset decomposed such episodes into tax categories - direct and indirect — for Latin American and Caribbean economies, akin to the approach taken by Alesina et al. (2017) for OECD countries.

Furthermore, Chapter 1 has expanded the scope of studies on the effects of fiscal adjustments on income inequality. While prior research had primarily focused on developed countries, our contribution redirected this discussion to the Global South. We presented evidence for economies in South America and estimate that, during austerity episodes, the distributive impacts of spending cuts are more detrimental than those of tax increases.

Additionally, this work seeks to address unanswered questions in existing literature. Recent research has established that austerity is contractionary, but it has emphasized that tax-based adjustments yield more adverse effects than spending-based adjustments on economic activity (Guajardo, Leigh, and Pescatori 2014; Alesina, Favero, and Giavassi 2019). In an effort to refine this understanding, we delved into whether the composition of the tax package holds significance and scrutinized the persistence of these results in our estimates. Across both the Latin American and Caribbean (LAC) and OECD samples, our findings indicated that indirect taxes have a more detrimental impact on the economy. Contrary to evidence from developed countries, expenditure cuts proved more detrimental to economic activity than tax increases in the LAC sample. On the flip side, fiscal adjustments based on direct taxes did not adversely affect GDP and contributed to reducing income inequality.

These findings bear practical implications for shaping economic policies in these regions, particularly for Latin America and the Caribbean. They hold relevance in the context of ongoing discussions about tax reforms, adherence to fiscal rules, and the broader discourse on the size of the State. Finally, this evidence challenges ideological assumptions that posit that reducing budgetary capacity through spending cuts would yield positive medium-term effects on economic activity.

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