Tax Benefits and Firms' Responses: Evidence for the Presumptive Tax Credits Policy

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Abstract

This paper leverages a large tax-benefit policy with administrative data from the state of Sao Paulo in Brazil to document the economic impact on firms' behavioral responses and correspondent tax collection. We compare firms mainly in the textile and clothing industries exposed to an increase in the presumptive tax credit with the footwear industry, a similar industrial sector not yet treated in our analysis period. We employ a dynamic difference-in-differences strategy to document a positive (close to 11%) effect on reported sales and purchases only in the year after its implementation without affecting tax collection and the number of firms in these sectors. Last, we explore a synthetic control strategy at the industry level to find no significant impact on formal jobs and wages for firms in the textile and clothing sectors. Our heterogeneity exercises suggest a (positive) negative effect on formal jobs in the (textile) clothing sector.

Keywords: Fiscal Benefit, tax collection, textile industries responses.

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1 Introduction

Taxation policies wield significant influence on economic activities and governmental strategies. In the Brazilian context, the Value-Added-Tax (VAT) - ICMS (Tax on Circulation of Goods and Services and on Interstate and Intermunicipal Transportation and Communication Services) holds immense sway, constituting a substantial portion of national tax revenue and GDP.[1] Under the responsibility of the Brazilian states, this VAT is frequently used as a mechanism of tax competition, producing tax expenditures that are less salient in developing economies and whose evaluations of such tax policies are scarcely documented.

Our study bridges this gap by rigorously evaluating the fiscal benefit conferred upon São Paulo's textile and clothing industry. In particular, this paper investigates the impact of imposing a presumptive tax credit for in-state transactions to benefit the textile and clothing sector, two low-concentrated and populous sectors in the state. The tax authority in São Paulo claimed this is a defensive policy (Sindivestuário (2015)), which practically exempted in-state transaction tax rates in 2017 for a large set of goods in these sectors.[2] Our analysis period starts in 2013 when the electronic invoice became universally consolidated in Sao Paulo - Brazil and ended in 2019, before the sanitary crisis of COVID-19. This period is convenient because 2019 is the last year before the footwear industry received a similar benefit, making this industry a natural, not-yet-treated comparison group. We combine the implementation of this fiscal policy with administrative data based on electronic invoices at the firm level and differences-in-differences econometric strategy to document the effects on five outcomes: (1) Tax liability reported on invoices, (2) Tax Collection, (3) Sales Revenues, (4) Purchases, and (5) Quantity of active companies. Finally, we also analyze the aggregated impact on (i) formal employment and (ii) average earnings.

Our findings reveal that an increase in the presumptive taxes that implied an exemption on in-state transactions did not impact tax collection or the number of firms in the benefited industry.[3]

[1]The ICMS is the largest tax in Brazil, comprising 28.2% of total tax collection (R$ 814.4 billion reais) and 8.2% of the GDP (IBGE (2022), EBC (2023), and CONFAZ (2022)).

[2]In May 2017, Decree No. 62,560/17 amended the Sao Paulo ICMS Regulation to allow companies in the textile and clothing sector to use presumptive credits on in-state transactions, which zeroed out the tax for those industries in these transactions. According to article 6 of Resolution SFP 51/22, such benefit is classified as "Defense of the competitiveness of the São Paulo industry."

[3]However, the impact of this policy on tax collection of the downstream sectors (retail, specifically) is expected

Our static diff-in-diff strategy also reports a null impact on all variables. However, our event study strategy reveals a positive increase in reported revenues and purchases one year after the reform, close to 10-12%. This reinforces the strategic co-movement between sales and purchases reporting on the part of the firms after a policy intervention (Pomeranz (2015); Carrillo et al. (2017)). The policy change caused an increase of 38% in reported tax liabilities, as expected. Using a synthetic control strategy, we find no impact on firms in the textile and clothing sectors. firms in the textile (Clothing) industry increase (decrease) formal jobs, which are barely significant for clothing. We find no impact on average earnings.

This paper contributes to three strands of the literature. First, we complement the literature on the impact of tax incentives on investment (House and Shapiro (2008)) that explores the heterogeneous size of the firms (Zwick and Mahon (2017)), uses cross-country analysis (Abadie et al. (2015); Cummins et al. (1996); Djankov et al. (2008)). We investigate the fiscal benefits' impact on a granular industry at the firm level in terms of reported sales and purchases, tax collection, the number of firms, and employment and wages in the benefited sectors. Second, we add to the large literature on profit/corporate tax incentives and investments (Suárez Serrato and Zidar (2016); Cullen and Gordon (2007); Devereux and Griffith (1998); Harju and Kosonen (2012)). Still, we focus on a VAT incentive impact on sales and cost reporting, addressing the policies' labor market impact rather than investment decisions.[4]. Third, we complement the literature on tax incentives in developing countries (Zhang et al. (2018); Maluf and Rocha (2017)). We look at the VAT incentives also on the firms' purchases, not only on sales, which connects with the literature on sales and purchases reporting decisions in a VAT system (Pomeranz (2015); Carrillo et al. (2017)). We also analyze the impact of this policy implementation on the labor market.

This paper is organized as follows. The next section presents the Institutional Background, explaining the mechanisms of the tax war and the instruments used by tax administrations. Section 3 is dedicated to data and methodology. Section 4 shows the main results by firm, and Section 5 shows the labor market outcomes by sector. The last section concludes.

to be negative as there would be a rise of tax credits to them.

[4]This paper also communicates with the policy literature on tax expenditures that either focus on measurement and transparency issues (Christian von Haldenwang (2023), Sebastian Beer and Loeprick (2022)) or calculation of their direct costs (Salto and Pellegrini (2018) and Linhares (2014))

2 Institutional Background

2.1 VAT in Sao Paulo - ICMS

The VAT on consumption (ICMS - Imposto sobre Circulação de Mercadorias e Serviços) is the main source of revenue for Brazilian states. In the State of São Paulo, for example, according to the Annual Budget Law 2023 - Law No. 17,614 / 2022, the tax represents about 69.6% of all budgetary revenue. In 2022, the Tax Revenue Report shows that the tax collection exceeded R$ 201 billion.[5]

Each state Unit has the prerogative to establish its tax rate away from the standard 18%. However, when goods circulate from one state to another, ICMS follows a mixed origin-destiny rule, establishing that the state of origin collects 12% of the value. The rest (6%) goes to destiny's state. The exception relies on when the goods are shipped from a state considered among the most developed states (in the South of Brazil) to less developed ones. In this case, the estate's origin tax rate is 7%. Therefore, states can decide upon tax benefits for in-state and intra-state - origin-related.

In Sao Paulo, the granted tax benefits are detailed in the first three annexes of the law of the VAT (RICMS). The Annex I publishes the list of products exempted from ICMS. The second annex lists items that may have their tax reduced due to a smaller tax base (RTB). In this modality, a product with a rate of 18% and a 50% base reduction has an effective rate of 9%. Annex III lists the tax benefits under the Presumptive Tax Credit modality. This modality is the main instrument used in the tax competition within the context of ICMS, as it directly offsets the benefited firm's tax liability without impacting their clients' tax credit. As with any VAT, the tax calculation entails applying the tax rate to the outputs and deducting the tax already embedded in their inputs, excluding materials designated for immediate use and consumption. Conventionally, the tax levied on outputs is denoted as 'debit,' while the tax incurred on inputs is termed 'credit.' This delineation arises from the presumption that the preceding entity within the supply chain

[5]It was established by Article 155 of the Federal Constitution and regulated by the Complementary Law -LC 87/96, Kandir Law. As a state tax, the Federative Units establish specific rules for ICMS in their legal systems through regulation via Executive Decree, an act of the governor. The specific rules cannot contradict those defined by the Complementary Laws.

has already remitted taxes on its value-added, leaving the taxpayer in the downstream chain circumscribed to the taxes on its own value-added.

The Presumptive Tax Credit. The Outgranted Credit - or Presumptive Credit - is one of the mechanisms that distinguishes ICMS from a standard VAT as the creation of the presumptive tax credit breaks the auditing component of the production chain but facilitates the computation of inputs and their associated tax credits to the benefited firms. Since many small firms lack computerized systems for tracking their transactions, that would imply less ability to prove their expenditures, which could lead them to impose larger prices for the consumer or even go out of the formal market. The state's tax authority implemented the presumptive tax credit to the sector to substitute firms' credit claims for the ICMS embedded in the input invoices. These credits are cheaper and easier to administer, so they prefer to claim a presumptive percentage of the outputs.[6] As firms do not need to prove their expenditures to obtain tax credits after this policy, we expect to observe the following responses: (i) a mechanical positive impact on sales tax liabilities, but (ii) an undetermined response on purchases as they are not clearly affected by the policy, and (iii) positive but small responses on sales as this tax benefit can impact firms' real and behavioral responses in the same direction. On the other hand, one of the downside effects of the presumptive tax credit is associated with interstate operations, where the destination state must honor the credit granted by the originating state, foregoing its net tax revenues. This provides artificial competitiveness to the firms' products in the conceding state, a typical tax competition framework, and forms the basis of what is popularly known as "the fiscal war," discussed below.

The Brazilian states started implementing this mechanism as a fiscal incentive by granting tax credits at percentages even above the tax liability in the correspondent input invoices. It is not unusual to find cases where the presumptive credit represents 100% of the value of the tax on the output, which essentially exempts the firm from remitting any ICMS to that state.[7] These interventions may cause an impact on the number of firms operating in these sectors, an extensive

[6] An example of this rule can be seen in Article 11 of Annex III of the RICMS, where the establishment providing transportation services, except for air transportation, may claim an amount equivalent to 20% (twenty percent) of the tax due on the service provided.

[7] This is different from tax exemption, where the output tax is zero because a client (retailer, for instance) would not be entitled to any tax credit. In this case, the downstream taxpayer would remit the tax on output in full without any deduction. This partly explains that Brazil's exemptions policy is usually granted towards the end of the supply chain or throughout it entirely.

margin effect.

The Fiscal War. Since 1975, the law LC 24/75 has established that granting tax benefits always depends on the unanimous decision of the represented states; their total or partial revocation will require the approval of at least four-fifths of the representatives present. In addition, any state that feels harmed by any tax benefit can veto it via the CONFAZ (National Council of Fiscal Policy) agreement. In practice, however, this law section has not been fully respected because states granted tax credits without CONFAZ approval on the notion that it would take years/decades to adjudicate.[8] The Supreme Federal Court recently 2017 validated all tax benefits granted without a CONFAZ agreement, allowing these previously irregular benefits to be enjoyed until 2032. Finally, it created a mechanism named "glue" (copy), allowing all states to replicate any validated benefits.[9]

With the power to export tax credits, states have advanced in granting presumptive tax credits to attract companies in less developed sectors within their territories. These policies can positively impact tax revenues for the originating states. For instance, consider a state without any textile industry. Suppose a state attracts a manufacturer of textile products by offering a presumptive tax credit of 11% on interstate operations. In that case, the company remits 1% to the tax authority that previously did not collect any taxes on the textile sector, leaving the state that formerly housed this industry obligated to net their tax debt by 11% of their sales, which explicitly shows the significant incentive to the incoming industry.

Sao Paulo state. The State of São Paulo, hosting the largest industrial activity in the country, was the most negatively affected by this fiscal war. Unlike the attacking state, responding to attacks may lead to a " race-to-the-bottom phenomenon," wherein a new Nash equilibrium decreases the overall ICMS revenue.

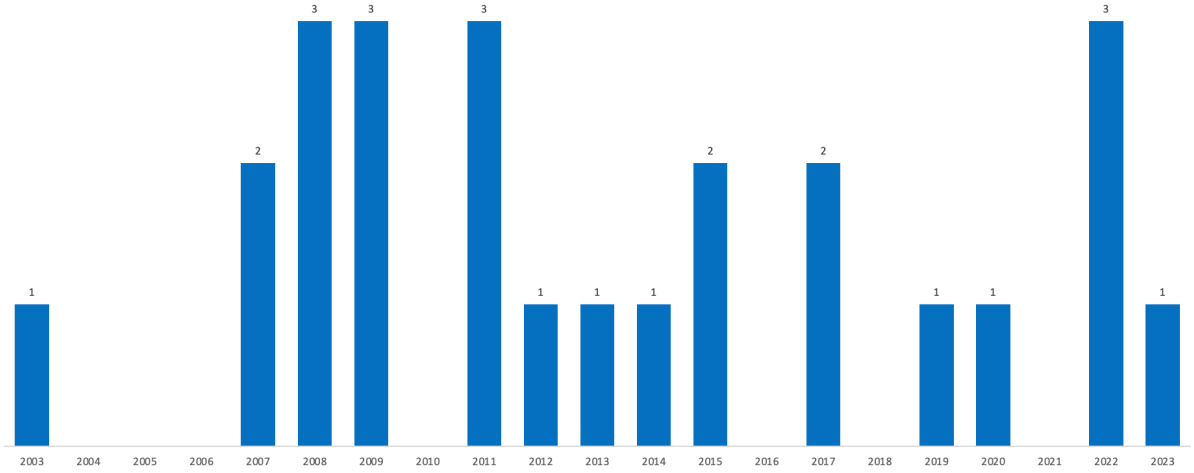
Figure 1 depicts all tax credit benefits the São Paulo state governments granted from 2003 to 2023. These benefits are classified internally as a defense mechanism for São Paulo's industry

[8]See https://exame.com/noticias-sobre/guerra-fiscal/ for some specific events on the Brazilian states' fiscal war.

[9]See https://redir.stf.jus.br/paginadorpub/paginador.jsp?docTP=TPdocID=753979034. The limitation to this mechanism relies on the fact that states adversely affected can only copy benefits from states within the same region, meaning inter-regional boundaries were disregarded. The CONFAZ is an entity that brings together the Secretaries of Finance, Treasury, or Taxation from all Brazilian states and the Federal District. Its objective is to promote the harmonization and coordination of fiscal policies among the states and the federal government, especially regarding taxes on sales and circulation of goods, such as the ICMS.

competitiveness. The graph shows twenty-four (24) such policies implemented, more than one per year, with a larger number in the ten years preceding the 2017 Federal Court validation of tax-benefits concession.

Figure 1: Number of Fiscal Benefits by Year



Notes: The figure shows the number of fiscal benefits by year granted by Sao Paulo state according to Annex III - RICMS. The figure shows a larger number of benefits before the 2017 convalidation.

Changes in the Tax Policy Table I summarizes the tax policy changes in the period. We start our analysis in 2013 with these sectors facing a low effective tax rate of 7% for internal sales and using input taxes as credits.[10]

On May 6, 2017, the state of São Paulo published that the textile and clothing sector (Article 41 of Annex III of the RICMS) could use presumptive tax credits of 12 out of their sales provided that four conditions are respected: (1) only a specific set of products are eligible, (2) the sales must be taxed at 12%, (3) the client must be within the state, and (4) all other input credits must be discarded.[11]

This reform aims to reduce the tax burden on in-state sales for firms in the textile and clothing sectors. While item (2) points to a rise in sales taxes, item (3) reinforces that the use of these tax credits is restricted to within-state transactions and does harm interstate transactions. In other words, the state exchanged the benefit of a moderate impact for a stronger one. This paper

[10]Compared to a standard 18%. As observed in Figure 2, the sector's revenue has always fallen during this period, even with this small tax rate.

[11]Eligible products have their NCMs (Mercosur Common Nomenclature) as in Article 52 of Annex II.

evaluates the impact of this change, noting that its impact is the difference between the effect of the new benefit and the reversal of the previous one.

Table I: Tax Policies over time: Textile and clothing industries

Year	**Sales tax rate**	**Presumptive taxes**
From Jan/13 to May/17	7% or 12%[1]	0%
From May/17 to Jan/21	12%	12%

Notes: In 2013, the government used an effective output tax rate of 7% for most products manufactured by the sector (12% for the others). The presumptive tax credit policies started in 2017. In Jan/2021, with the COVID-19 pandemic, part of the benefit was reduced, but we do not consider it in our analysis. The presumptive tax credit is valid only for internal outputs. In sales where the granted credit is 0%, taxpayers normally use their input tax credits.
[1] The list of products allowed to be sold at 7% is in Annex II of RICMS, in Article 52. Source: RICMS.

With this policy change, we must observe a mechanical increase in reported tax liabilities after May 2017, as some products' tax rates moved from 7 to 12%. Similarly, we must not observe an impact on tax collection, as the presumptive tax credits may neutralize taxes. The effect on tax collection revenue is really important because we have two new forces at play: (1) the presumed credit removes the tax obligation of companies in intrastate sales (from 7/12% to 0%), and (2) the new policy increases the taxes for interstate sales (from 7/12% to 12%). This net effect is investigated using the tax collection as a dependent variable.

3 Data and Empirical Strategy

3.1 Data

We use administrative microdata from the São Paulo State Tax Authority combined with employment and income derived from the public RAIS database.[12] We select the treatment group, CNAEs (National Activity Sector Code)), that show an equal or superior share of the production value of their products affected by the policy for their product sales conducted during the pre-

[12]The administrative database is safeguarded by fiscal confidentiality, and the execution of this investigation becomes feasible due to the author's functional access to such information and participation in the internal post-graduate support program. It is imperative to underscore that the data disclosed in this study are consistently summarized, adhering to extant legislation.

intervention period in 2012. Table II delineates the percentage index of product sales by CNAE. Thirty-one CNAEs are chosen, with prevalence observed in codes commencing with 13 (textile sector) and 14 (clothing sector), as anticipated. Notably, the most prominent CNAEs are 1412-6/02 (Tailoring of clothing, excluding underwear) with 26,792 establishments and 1412-6/01 (Manufacture of clothing, excluding underwear and tailored garments) with 5,342, both classified under CNAE 14 (Clothing). As a robustness check, we consider all firms in sectors (CNAEs) 13 and 14 as treated firms (treatment II) group.

Table II: Number of Firms (N) with the index of sales of tax-benefited products by CNAES
CNAEs - Treatment Groups I and II

CNAE	**Index**	**N**	**CNAE**	**Index**	**N**
1220403	99.4	2	1411801	97.5	1245
1311100	96.79	70	1411802	99.7	62
1312000	96.15	48	1412601	90.56	17987
1313800	93.86	70	1412602	92.32	2768
1314600	74.56	43	1412603	81.39	970
1321900	98.39	133	1413401	81.87	1034
1322700	96.69	52	1414200	45.56	399
1323500	83.42	298	1421500	99.34	108
1330800	96.55	230	1422300	94.83	190
1340501	97.54	451	3292201	98.7	11
1340502	94.34	58	1359600	75.55	966
1340599	93.32	345	1354500	60.19	355
1351100	76.46	1820	1353700	83.63	101
1352900	57.84	340			

Notes: This table shows all CNAES included as treatment groups from the administrative data of the SEFAZ-SP. CNAEs 13 (textile industry) and 14 (clothing manufacturing) are predominant. The latter stands out, bringing the highest number of benefiting contributors. Our treatment group II only considered firms in the textile and clothing industry

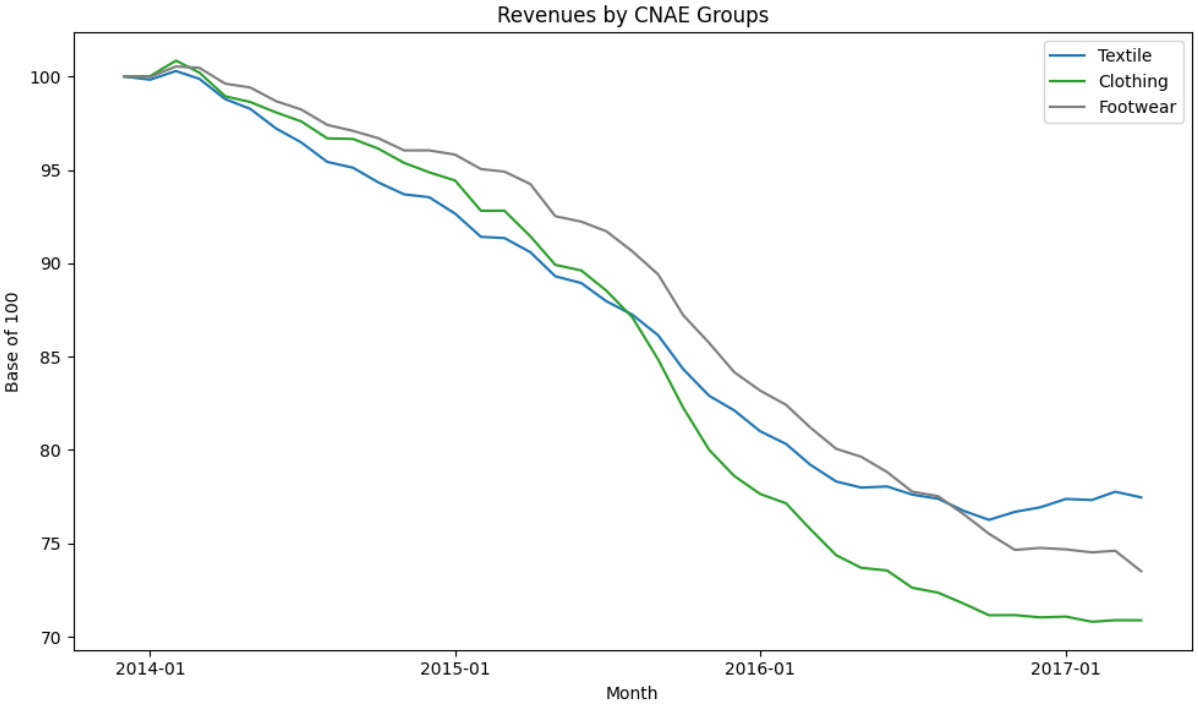
Textile and Clothing industries. The textile and clothing industries comprise companies engaged in complementary activities within the production chain. While firms in the textile industry manufacture yarns and fabrics, those in the clothing/apparel sector use these inputs

to produce clothing. We observe that some companies operate in both stages of the chain, aiming to optimize costs and seek greater added value for their products. Brazil is the 5th largest textile industry and the 4th largest apparel segment globally, representing the largest textile chain in the Western Hemisphere (Cavalcanti and Santos (2022)). These sectors are the second-largest employers in the country, justified by the high demand for labor that the nature of the activity entails. The industry also holds over 30% of the Brazilian sector's revenue in the State of São Paulo (Sinditêxtil-SP (2023)). According to the Brazilian Institute of Geography and Statistics (IBGE) the textile (clothing) sector used to have 100 (175) thousand formally employed workers. Still, this figure decreased during our period of analysis. Figure 2 shows, using data from electronic invoices, a steep fall in the 12-month moving average of sales revenue adjusted for inflation (IPCA), from December 2012 to April 2017 for textile and clothing industries. We also report the correspondent figure for the footwear industry, who was unaffected by this policy during the period. Textile firms are considered those with CNAE 13 (National Activity Sector Code), and clothing firms with CNAE 14 will be used as a treatment group in this study. We also show a similar pattern in sales for the footwear sector (CNAE 15-3), which was chosen as the main counterfactual in the analysis. The Brazilian economy has been under a crisis during this period. In 2015, the cumulative growth rate turned negative, reaching nearly a 5% drop by the second quarter of 2016. There is a resemblance in the performance between the Brazilian GDP and the textile and apparel sectors, which suggests that the poor performance of these sectors cannot be solely attributed to tax wars.[13]

We combine two strategies to select counterfactual industries for the treatment group. First, we build a correlation matrix among all industrial CNAEs with 2 digits, based on the sum of taxed outputs recorded in the grouped invoices per month. Figure 3 highlights the point indicating that the sector that leather industry (CNAE 15) exhibits the highest correlation with the clothing manufacturing sector (CNAE 14), at 0.74, and the fourth highest with the textile sector (CNAE 13), with an index of 0.54. Next, we consider a correlation between sectors 13 and 14 and three-digit sectors to obtain a more precise set of sectors to be our counterfactual groups. Interestingly, the footwear industry (CNAE 153) shows a correlation of 0.92. This result is intuitive as consumer

[13]See Figure B1 in the Appendix.

Figure 2: Sales Revenues: Textile, clothing and footwear industries



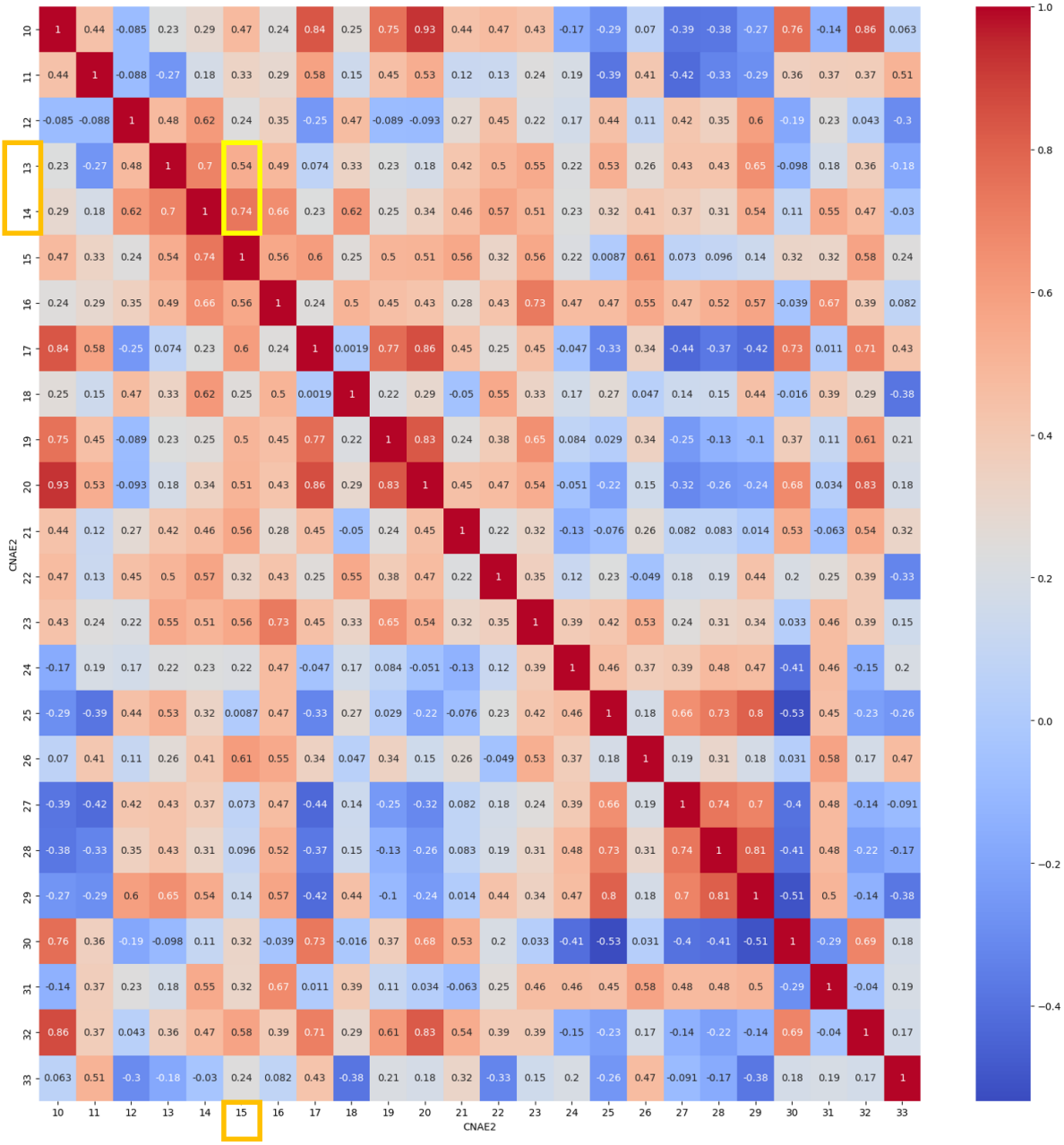
Notes: The graph shows 12-month moving average of the aggregated sales revenue data from firms adjusted for inflation and standardized on a base of 100 anchored in December 2012. The three sectors exhibit very similar pattern in the years prior to the intervention policy in 2016, with declines from the beginning of the series, with greater emphasis in the years 2014 and 2015.

behavior may not be that different between clothing and footwear products.[14] Moreover, the same tax policy change (presumptive tax policy) will be applied to the footwear industry in 2020. This makes these industries a natural, not-yet-treated group and our preferred set of firms in the control group (control group I). We also consider a larger set of sectors to participate in our second control group, those with larger correlation with the treated sectors. As a robustness check, all firms in the top three correlated (with textile and clothing industries) three-digit sectors (153, 152, and 254). Firms in the leather and cutlery/metalwork/ tools industries have been added to control group II.

Therefore, our first control group firms is the footwear sector. Typical CNAEs of the footwear industry, those within the 15.3 family, are selected, resulting in 5 seven-digit CNAEs. Table III displays the number of companies per CNAE constituting the counterfactual grouping. Highlights

[14]Top ten three-digit sectors correlated with textile and clothing industries: 153 (0.92), 152 (0.82), 254 (0.81), 309 (0.78), 222 (0.76), 259 (0.75), 162 (0.75), 321 (0.74), 239 (0.72), 323 0.7).

Figure 3: Correlation matrix among the sum of outputs from firms by 2-digit CNAEs.)



Notes: The matrix shows that the footwear sector exhibits the highest correlation with the clothing manufacturing sector and the fourth highest correlation with the textile sector.

include CNAE 1531-9/01 (Manufacture of leather footwear) with 2,395 firms and 1531-9/02 with 1,610 (Finishing of leather footwear under contract).[15]

This sector exhibits similar movements to the treatment group during the pre-intervention

[15] As a robustness check we build a second control group - Control group II - which incorporates to the control group I all CNAES with large correlation to the treated group (coefficients larger than 80%), which includes Manufacture of travel various leather articles (152) and Manufacture of cutlery, metalwork and tools (254).

period in four variables of interest, namely, associated taxes, revenues, tax collection, and the number of companies, which reinforces our diff-in-diff strategy (parallel trends assumption before the benefit).[16]

Table III: Number of firms (N) by CNAE: Footwear sector

CNAE	**N**
1521-1/00	795
1529-7/00	503
1531-9/01	2044
1531-9/02	349
1532-7/00	24
1533-5/00	405
1539-4/00	668
2541-1/00	68
2542-0/00	277
2543-8/00	1451

This table shows all CNAES included as a control groups from the administrative data of the SEFAZ-SP. Control group only includes the footwear industry.

The database represents invoices issued between January 2013 and December 2019. The cutoff from 2013 is justified as it is the year when the issuance of electronic invoices became mandatory for all sectors. The temporal cutoff in 2019 was decided for two reasons. Firstly, the footwear sector was granted a similar benefit in early 2020 (RICMS, Annex III, art. 43). Secondly, 2020 was marked by the onset of the COVID-19 pandemic. This period was characterized by disruptions in global production chains, which undoubtedly affected the variables of interest in this study. It is understood that the period between May 2017 and December 2019 is more than sufficient to understand the effects of the applied policy.

The dataset constructed for analysis comprises 1.76 million rows and 47 columns. Each row represents a grouping by State Registration and reference month, where the former identifies the

[16] As for employment and income variables using another dataset, the counterfactual is constructed through synthetic control.

individual and the latter represents the time frame. The choice of State Registration as the firm identifier is due to it being the primary key field in most internal systems of the Department of Finance and Planning. Additionally, the CNAE is linked to the establishment and not to the corporate group, represented by the base CNPJ. The choice of monthly periodicity is primarily because the benefit was implemented in May 2017. The monthly breakdown allows us to assess the impact shortly after the policy came into effect. In the remaining 45 columns, there are data of interest for understanding the effects, such as invoice data, declarations, and revenue. Furthermore, the RAIS (Annual Report of Social Information) data addresses employment and income outcomes. The limitations of this public database are that the keys are less granular, as they are divided by 5-digit CNAEs and annual periodicity.[17]

Table IV presents a summary of our data. The treatment group has approximately eight times more companies than the control group, and both groups demonstrate a low concentration level in their sector. For instance, the leader of the treatment group holds less than 2% of the market, and the leading footwear company commands a 5.29% market share. The top five players in the control group exhibit the highest rate, with a share of 15.42%. The annual revenue of the treatment group is also higher: R$ 61.2 billion versus R$ 6.6 billion reais. Last, the companies' average annual revenue for the treatment group is slightly higher. The treatment group is larger and less concentrated, but the sizes of the companies are Similar.

Although all companies in the Treatment I group benefit from the tax incentive, this population exhibits some heterogeneity. The last two columns present the same descriptive statistics for the textile sector, i.e., establishments with CNAEs starting with 13, and for the clothing sector, starting with CNAE 14.

This table reveals that the clothing sector is more numerous within the Treatment group and has a significantly lower average revenue than the others. It also shows that the clothing and textile sectors are dispersed and have similar overall revenue sizes. The subgroup labeled as Others is significantly more concentrated and smaller in size.

Table V aims to illustrate the behavior of certain variables in the pre and post-treatment periods

[17] All values are monthly adjusted by the IPCA (Consumer Price Index for All Urban Consumers). The correction base was the month of March 2023, the month of the last update before the completion of this work.

Table IV: Descriptive Statistics: Treatment vs Control

	Treatment I	**Control I**	**Control II**	**Textile**	**Clothing**
N plants (IE)	30,728	3,514	9,278	5,497	25,662
N Industries (tax-code base)	29,991	3,467	9,046	5,324	25,089
Revenues (Annual in R$ bi)	40.5	4.96	10.33	22.20	18.68
Revenues/industry (Annual in R$ mil)	1351.83	1431.34	1142.26	4171.6	744.82
Tax liabilities (Annual in R$ bi)	3.81	3.83	0.83	2.28	1.55
Tax Collection (Annual in R$ bi)	1.73	0.16	0.6	0.777	0.97
Formal Jobs (Annual)		39,298		261,608	
Average wages (Annual in R$)		1,460.76		1,838.21	
Market share leader	1.95%	5.29%			
Market share top 5	7.80%	15.42%			

Notes: The table displays comparative data between the Treatment and Control groups. The variables number of companies, revenue, associated ICMS, tax revenue, number of formal jobs, and average salary are the focus of this study. The data reveal that the treatment group is much larger than the control group, although the latter is significant. The data cover the period between 2012 and 2019.

for each group. The Treatment group shows a certain stability in sales distribution by destination. Most outputs are destined for the domestic market, both before and after the intervention. The percentage of exports is low, ranging from 2% to 2.4%. Meanwhile, the observed average tax rate experienced an expected variation, increasing from 7.8% to 9.0%. This change reflects the adjustment in the calculation base from 7% to 12%. It is important to note that the percentages do not reach 12% because taxpayers opting for Simples Nacional, who do not highlight ICMS on their invoices, are included in the population. The table shows that, although 86.5% of companies in the Treatment group are under Simples Nacional, they account for only 13.4% of the outputs. In contrast, in the control group, a negative variation in the effective tax rate is observed, decreasing from 7.1% to 6.6%. This difference is consistent with another observed variation, the increase in the participation of taxpayers opting for Simples Nacional.

We focus the analysis on (1) Tax liability associated with the Invoice, (2) Revenues, (3) Tax Collection, (4) Purchases and (5) Number of active companies. We also analyze the labor market effect of that policy by investigating (5) the number of formal jobs and (6) the Average salary

Table V: Descriptive Statistics

	Full Sample 01/2013 to 12/2019		**Pre-Treatment period** 01/2013 to 04/2017		**Post-Treatment Period** 05/2017 to 12/2019	
	Treatment	Control	Treatment	Control	Treatment	Control
All Sales						
Intra-state sales	0,495	0,445	0,495	0,4373	0,494	0,459
inter-state sales	0,479	0,474	0,480	0,485	0,476	0,475
Exports	0,025	0,079	0,023	0,077	0,0294	0,082
Tax rates						
Nominal tax rate (standard - RPA)	-	-	0,07/0,12	0,07/0,12	0,12	0,07/0,12
Effective tax rate	0,086	0,074	0,080	0,074	0,094	0,073
Sales (Simples Tax Regime)						
Number of firms (Tax-Code Basis)	0,70	0,77	0,69	0,76	0,72	0,78
Share	0,123	0,211	0,121	0,208	0,125	0,216

Notes: The table displays data on the destination of outputs, tax rates, and the relevance of taxpayers opting for the Simples (Nacional) Tax Regime for two periods: pre-intervention, between January 2013 and April 2017, and post-intervention, between May 2017 and December 2019. In the Outputs section, there is no relative increase in domestic sales in the Treatment group. Additionally, neither sector stands out for exports, although the footwear sector is slightly larger than that of the Treatment group - 7% compared to 2.2%. Regarding tax rates, the Treatment group deals with 2 output rates in the pre-treatment period. Most products are taxed at 7%, with the remainder at 12%. After the intervention, products are aligned at 12%. Meanwhile, the footwear sector faces both rates throughout the period. The observed effective tax rate is considerably below the nominal rate due to companies opting for the Simples Tax Regime highlighting 0% on their output invoices. Finally, the Simples Tax Regime taxpayers are more numerous but with much lower revenue than other companies with a lower percentage of the Simples options in the pre-and post-treatment periods than the complete sample.

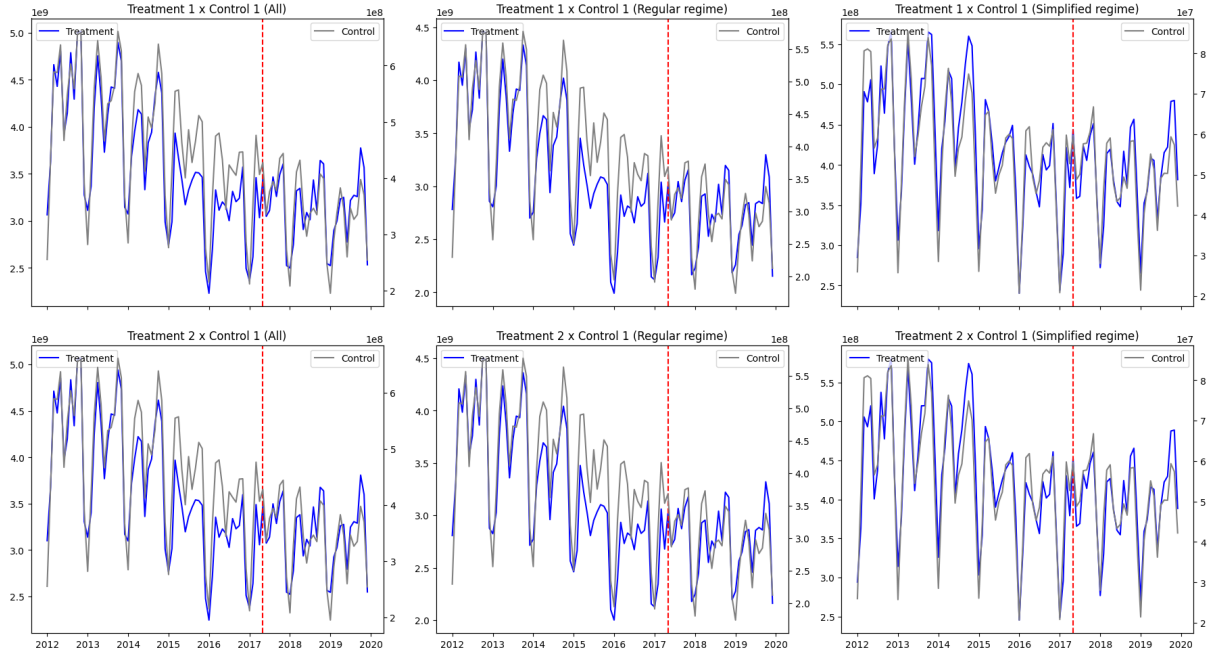
on treated firms.[18] Our Figure 4 shows how these variables are related in both treatment control groups.

The new tax policy replaced the previous reduction in the tax rate, 7% for most eligible products to the return of the 12%. We expect that the mechanical consequence of this policy is an increase in the observed associated taxes, our first outcome. This is the case because these associated taxes are calculated at the invoice level based on the sales times the tax rate. Without any change in the tax base, an increase in the sales tax rate would lead to an increase of 5 percentage points in the associated taxes. The presumptive credit benefit is only applied through issuing credits in the monthly report and not in issuing invoices. Therefore, the associated taxes on the invoice variable should reflect a significant increase after the interventions.

We look at their reported revenues to identify if the intervention directly impacted the industries. Company revenue is estimated by summing all sales and transferring invoices to other states.

[18]Since these last two exercises are investigated using data external to the SEFAZ-SP, the results are shown in a separate section.

Figure 4: Sales Revenues: Treatment (textile, clothing) and control (footwear) industries



Notes: The graph shows 12-month moving average of the aggregated sales revenue data from firms adjusted for inflation and standardized on a base of 100 anchored in December 2012. The three sectors exhibit very similar pattern in the years prior to the intervention policy in 2016, with declines from the beginning of the series, with greater emphasis in the years 2014 and 2015.

Considering these transfers is essential in our analysis because the state of São Paulo cannot access invoices where neither the issuer nor the recipient is within the state. Therefore, it is presumed to be a sale when a transfer is made to another state, as it would not be logical for the product to return for internal consumption. Since there was a change in the base calculation rule at the time of the intervention, it was decided to deduct the ICMS declared on the Invoice. Although the dependent variable is not exactly the companies' revenue, it is understood that this is the best approximation with the existing data, and any small discrepancies are likely to cancel out in the difference-in-differences model. The policy formulator's expectation at the time of granting the benefit is that this variable will show a significant increase greater than the cost of the policy, aiming to promote an increase in industrial production in São Paulo.

The third variable is the revenue collection from ICMS. Although it is intuitive to expect a decrease in revenue due to the granted tax benefit, the expectation is that it will remain close to stability. This is because the interventions have positive and negative effects on this variable. The first point is that the benefit was granted only for domestic sales. Although the granted credit

harms manufacturers' revenue, the rate's return to 12% will cause an increase in revenue from interstate sales. Additionally, companies under Simples Nacional are unaffected by the changes, maintaining revenue proportional to their revenues. Finally, it is worth noting that the state's revenue loss occurs in the later stage of the chain, namely wholesalers and retailers. This happens because buyers start to credit themselves with 12% instead of the previously predicted 7% in the previous rule.

The number of active companies will also be evaluated. This evaluation aims to determine if the policy prevented companies from leaving the state due to tax competition. On the other hand, from the moment São Paulo adopts the same tax condition as a neighboring state, it is expected that companies that left the state in search of tax advantages will return to São Paulo. To construct this variable, we use a complete CNAE group, to compute the number of taxpayers. Active companies were considered those that issued at least one invoice within the month. This option was chosen because many companies that cease their activities do not report this fact to the tax authorities, distorting the taxpayer register. Therefore, it is understood that issuing invoices is a more faithful proxy for representing active companies. When granting the benefit, the expectation is that it will positively affect its counterfactual because the sector's flight of companies is one of the most highlighted arguments.

The Implications for Aggregated Sectors section will analyze data from RAIS on employment and income. Regarding the number of formalized employees, a positive effect is expected. This is one of the main objectives of tax policy. The constant demand from society for the generation and maintenance of jobs by the state theoretically justifies the application of this type of public policy. This study will investigate whether there is a positive effect on formal jobs and, if so, whether the cost of the policy is adequate to the observed result. It is worth noting that RAIS data naturally only present formalized jobs. Since the synthetic control technique will be used to construct a temporal counterfactual, it is understood that the absence of data on informal jobs will not hinder the analysis.

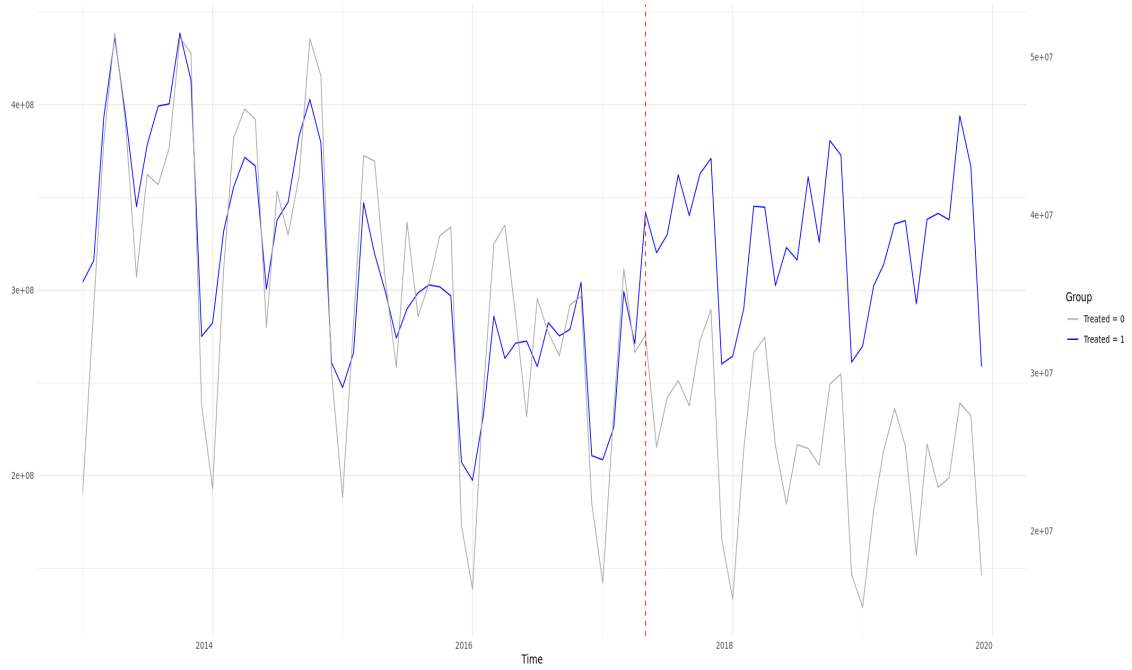
In addition to desiring a positive effect on company revenue and job creation, the state is interested in observing whether the policy also increased the average income of formalized workers

compared to the counterfactual. If no effect is found on jobs, verifying whether the labor gain occurred through the employees' income is important for the analysis to be complete. Similar to the jobs analysis, the same data source and econometric method will be used.

3.2 Empirical Strategy

Identifying the real effects of applied tax policy is not a trivial task. The graphs displayed in Figures 5, 6, 7, 8, 9, 10, and 11 show, respectively, the historical series of the variables highlighted ICMS, revenue without ICMS, collection, number of companies, formal employment, and average salary. Causality cannot be inferred solely by observing the graphs because within them, various effects prevent the exact identification of the effect of interest.

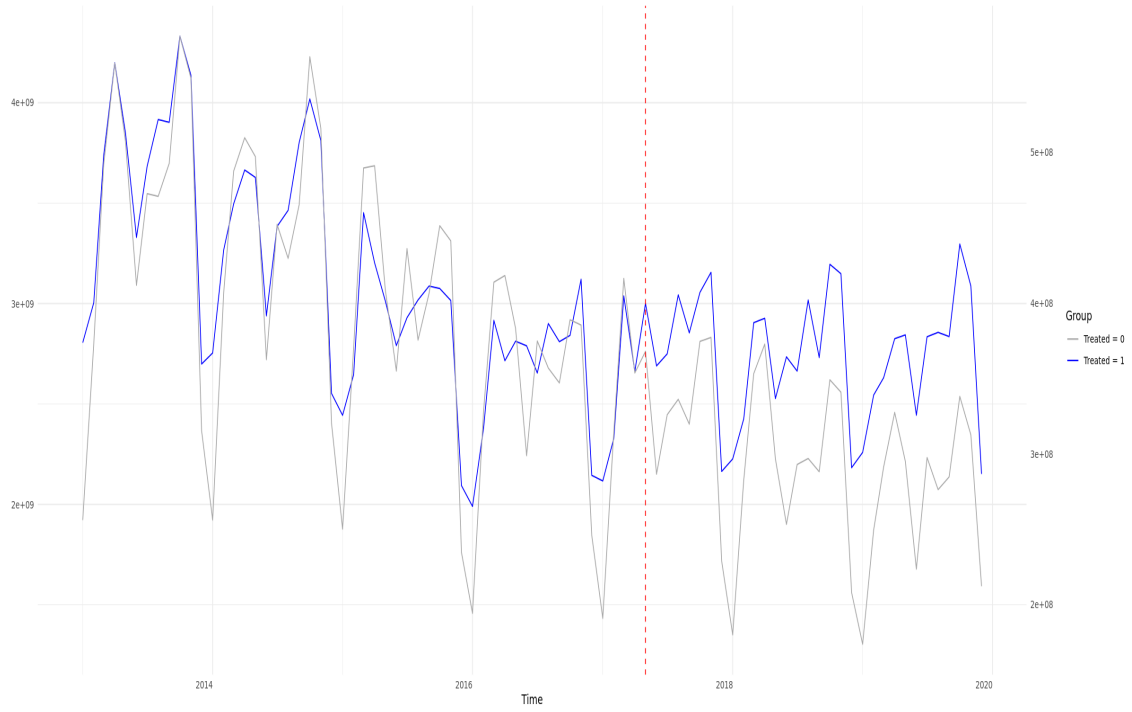
Figure 5: Tax Liabilities



The red line indicates the intervention date. The treatment group experienced an upward trend break after the policy application. This is due to the increase in the rate from 7% to 12% for most of the benefited products. Data from SEFAZ-SP.

We are interested in the dynamic effects across years after the adoption of the tax benefits

Figure 6: Sales Revenues



Notes: The red line indicates the intervention date. The Treatment series appears to slightly deviate from the control group after the intervention. Data from SEFAZ-SP.

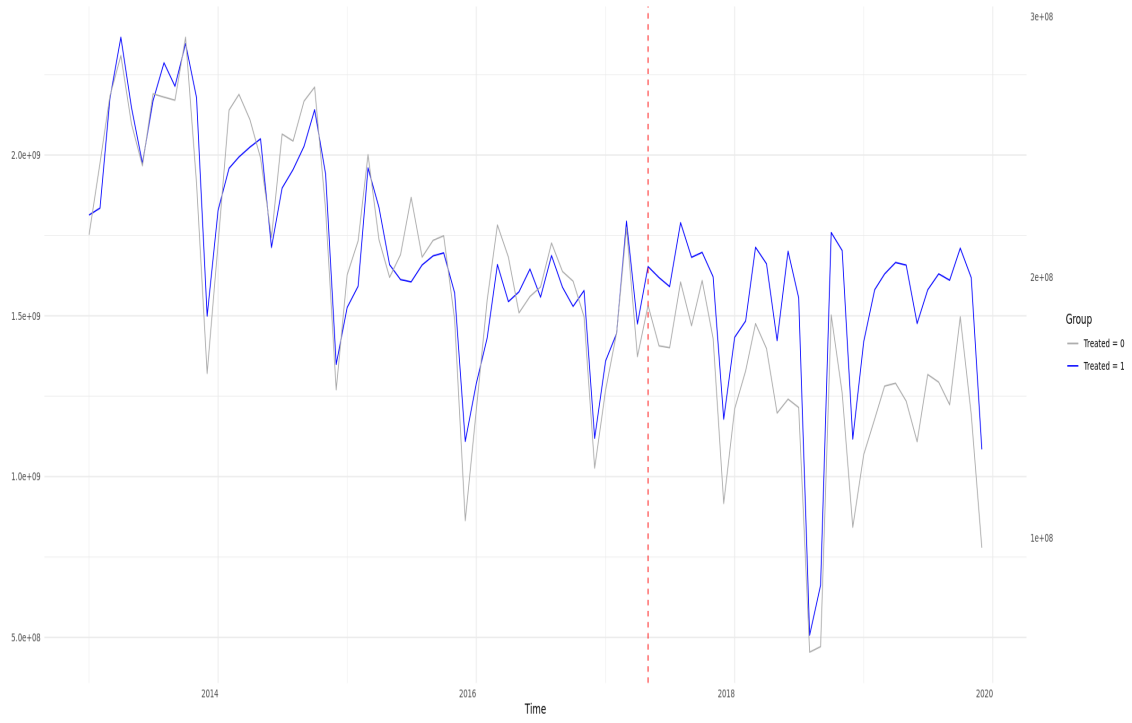
policy. To do so, we implement a dynamic difference in differences that shows a series of annual dummies to interact with our treatment variable (*dummy* $D^k_{t_{i0}}$.). This model allows us to track the trend year by year to confirm the hypothesis of the parallel trend of the two groups using the empirical strategy of Event Studies. i.e., we can test whether there are significant effects in the pre-treatment period, indicating that the parallel trend hypothesis is reasonable, as follows.

$$Y_{ict} = \alpha_i + \beta_k \sum_{k=2012}^{2019} D^k_{t_{i0}} + w_c + v_t + \varepsilon_{ict} \quad (2)$$

where Y_{ict} is the outcome of our interest for the firm i, in the CNAE c, in month t, $D^k_{t_{i0}}$ corresponds to the *dummy* that identifies the intervention when active to the treated group (firms that produce the goods benefited by the tax reform, after May 2017), α_i and w_c are, respectively, firm fixed effects at the CNAE (c), v_t represents time fixed effect and ε_{ict} captures the error term.

The time-fixed effect captures shocks common to all companies within a time frame. The firm

Figure 7: Purchases



Notes: The red line indicates the intervention date. The Treatment series appears to slightly deviate from the control group after the intervention. Data from SEFAZ-SP.

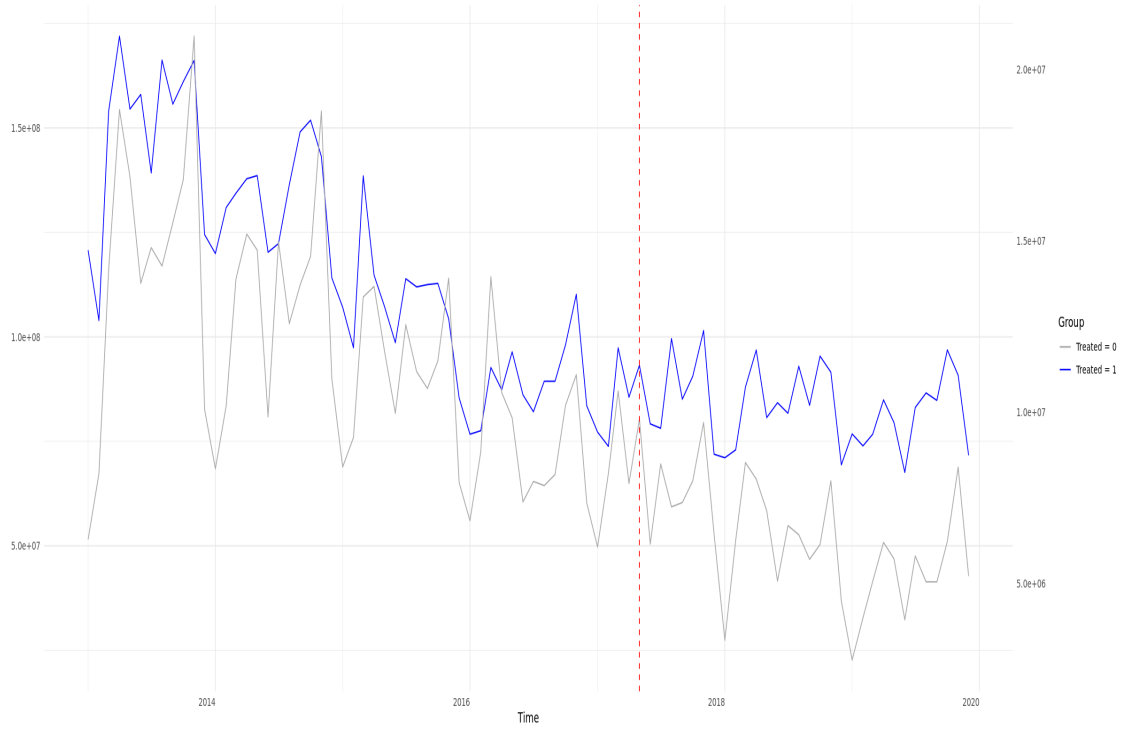
fixed effect consists of (i) State Registration of the firm and (ii) CNAE (National Classification of Economic Activities) fixed effects. Including CNAE captures firms that change their CNAE within our period of analysis. As our focus is on the short-term impact of the policy, we do not include control variables, as our model is sufficiently identified.

To estimate the average treatment effect on the treated, we also implement a differences in differences strategy controlling for the group and time-fixed effects, as below:

$$Y_{ict} = \alpha_i + \beta D_{ict} + w_c + v_t + \varepsilon_{ict} \quad (1)$$

where Y_{ict} is the outcome of our interest for the firm i, in the CNAE c, in month t as before, but D_{ict} corresponds to the *dummy* that identifies the intervention when active to the treated group (firms that produce the goods benefited by the tax reform), the other terms have similar interpretation as our event studies strategy.

Figure 8: Tax Collection



Notes: The red line indicates the intervention date. Only in 2019 did the Treatment group diverge from the control group. Although it is intuitive to think that revenue should decrease after granting the benefit, the design of this tax policy predicts a decrease only in the commercial links of the chain. The slight increase may be due to the increase in the rate from 7% to 12%.

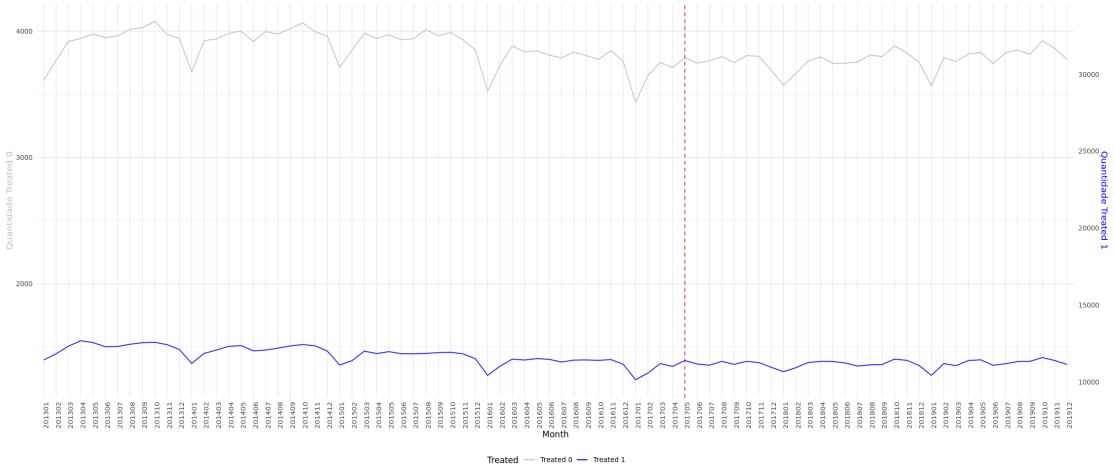
We must check the main identification hypothesis, i.e., whether the Treatment and control groups show parallel trends before the policy intervention. Otherwise, other potential unobservable effects are necessarily contaminating the analysis.[19] We present below our empirical estimations

[19]The formula below shows an ATT in the difference of the first two terms if the result of the differences of the last four terms, which represents the parallel trend hypothesis, is not statistically significant.

$$\hat{\delta}_{kU}^{2\times2} = E[Y_k^1|Post] - E[Y_k^0|Post] + [E[Y_k^0|Post] - E[Y_k^0|Pre]] - [E[Y_U^0|Post] - E[Y_U^0|Pre]]$$

Additionally, we also check our second identification hypothesis, namely, the absence of anticipation, that is, the taxpayer, already knowing about the intervention in advance, could change their behavior before the policy is implemented.

Figure 9: Number of Active firms



Notes: The red line indicates the intervention date. The series show the number of companies that issued at least one invoice within a month, as this measure is considered more accurate than observing the registration status of the firm, as such information may be outdated.

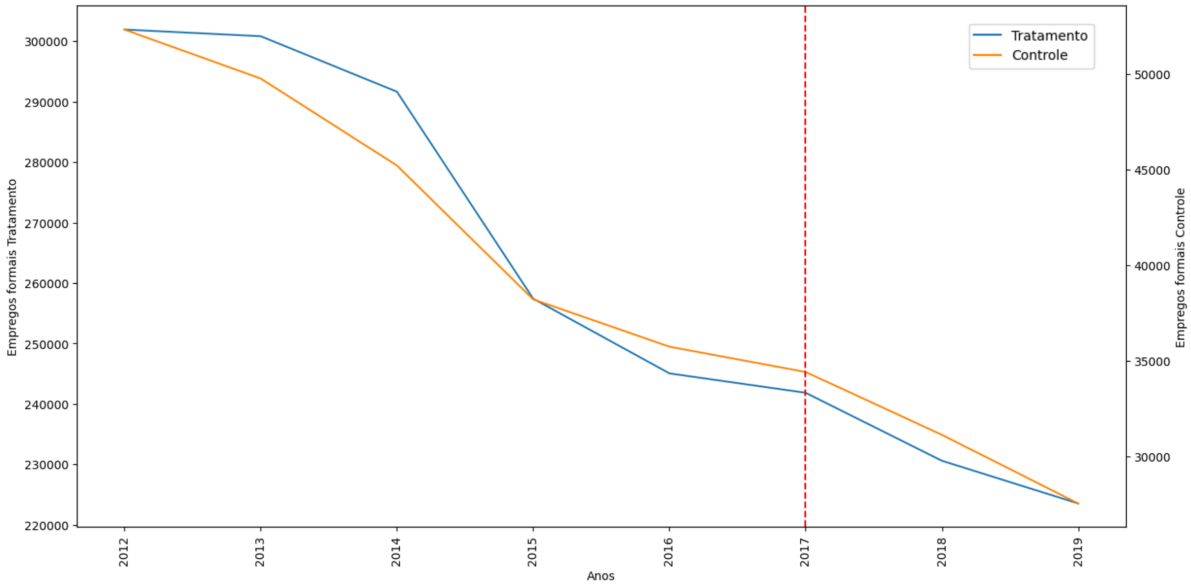
4 Empirical Results

4.1 Event-Study Estimates

We start addressing the parallel trend assumption as we construct a set of figures showing the leads and lags of the variables within the event study methodology. The Figures 12, 13, 15, and **??** show the event studies for the main five outcomes, respectively, in panels A, B, C, D and E of Table VI, with annual data (Figures A) and monthly data (Figures B). In all analyses, the evaluated period ranges from 2013 to 2019. Notably, no significant variations are expected in 2017, as the policy was only implemented in May.

The Table VI summarizes our main findings. Tax liabilities increase after the implementation of the policy, which was already observed in the first year of the policy. This corresponds to an

Figure 10: Number of formal jobs per year

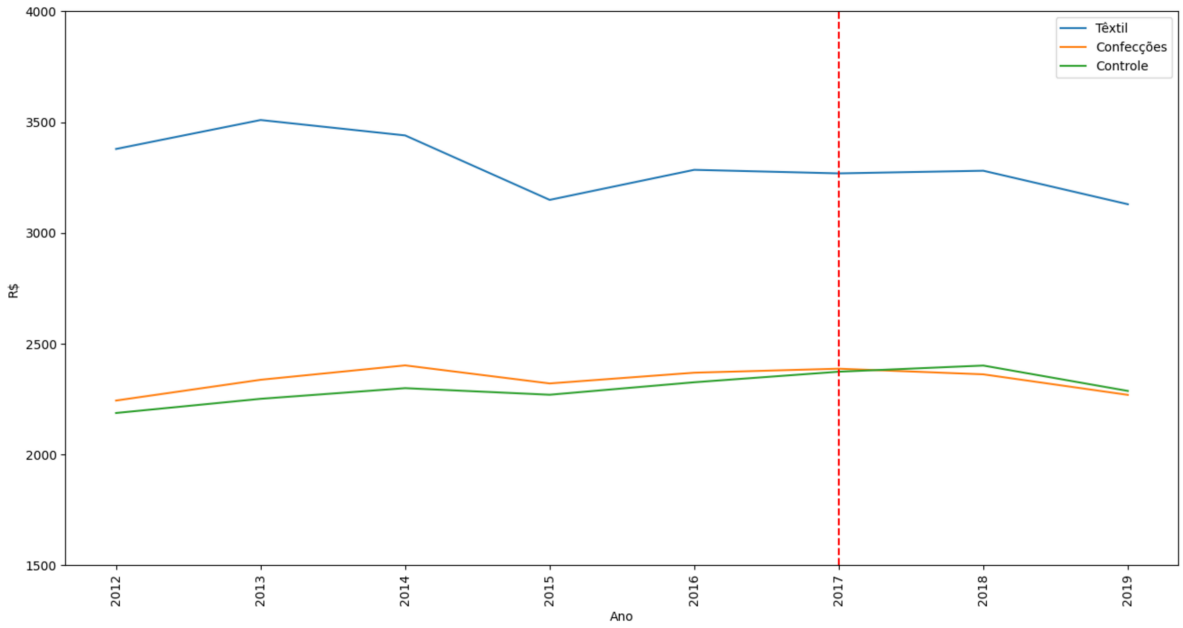


Noes: The red line indicates the intervention date. Both sectors present a downward trend in the formal jobs series, even after the benefit is granted.

increase of 20% (18/86) of tax liabilities for the treated versus non-treated firms one year after versus one year before the reform. As it is a mechanical effect, we point out that in the second and third years after the reform, it reaches 30%. Interestingly, reported sales and purchases behave identically. They increased close to 11% (107/860 and 45/440 resp.) in 2018, leaving the average reported value-added unaffected. In 2019, we also observed a similar phenomenon for these two variables 2019, although a bit more pronounced in statistical terms for the reported purchases (57/440) versus sales (118/860). This tax benefit policy seems effective in maintaining the number of active firms, and we find no effect on the number of firms in the treated sector versus non-treated compared to before versus after.

The benefit seems to have affected the companies' reported revenue and purchases but not the extensive margin, i.e., the number of firms within the São Paulo territory. In other words, the policy benefited the already established companies but could not retain or attract new companies to the state. Stability in revenue collection is expected because the waiver occurs in the credits taken by the wholesale and retail chains. On the other hand, the considerable increase in tax

Figure 11: Average wage



Notes: The red line indicates the intervention date. In this variable, the Treatment group is separated into the textile and clothing sectors. The highest average salary is in the textile sector and clothing and footwear wages show nearly identical series.

collection (ICMS) indicated on the invoices ensures the robustness of the model as it reflects the expected outcome of the rule change. OUr figures summarizes our findings. Graph A of Figure 12 suggests that the variable changed its behavior after the intervention. Graph B confirms that behavior and reinforcers that the parallel trend assumption is validated. After implementing the new policy, the effect is clear and works as a test for the policy salience. For the sales revenue, focusing on the annual data (Graph A), we observe a positive and significant impact on 2018 and barely significant at 9% in 2019.

Graph A of Figure 15 reinforces this finding but also indicates a difficulty in demonstrating parallel trends before 2016. The revenue collection of the textile sector shows a slowdown compared to the footwear sector, which is altered to similar movements after the intervention. Graph B of Figure 15 suggests a small increase in the revenue collection of the impacted sector, but it is also not significant. It is understood that the difficulty in precisely estimating an effect in this variable is expected because it concerns a fiscal benefit of granted credit that was granted concurrently with the revocation of the 7% base reduction.

Table VI: Event Studies Estimates

	(A)	(B)	(C)	(D)	(E)
	Tax Liabilities	Sales Revenues	Tax Collection	Purchases	Number of Firms
treated x year = 2013	12,652.50	58,530.00	9,183.60	29,635.00	242.3
	(11671.7)	(95,593.2)	(7,037.4)	(51,711.3)	(343.2)
treated x year = 2014	6,810.40	30,975.00	6,952.40	5,252.20	133.7
	(8,678.4)	(72,805.4)	(4,553.9)	(37,850.7)	(252.1)
treated x year = 2015	2,310.00	-10,212.40	2,958.00	18,400.30	25.42
	(3,363.4)	(32,647.0)	(2,078.5)	(15,564.9)	(151.0)
treated x year = 2017	18,855.8***	34773.8.	89.85	17,862.50	-25.86
	(5,025.5)	(19,924.4)	(1,051.0)	(14,286.0)	(83.43)
treated x year = 2018	33,752.7***	107,427.7**	3,205.5.	45,004.0**	-19.36
	(7,368.8)	(32,295.4)	(1,874.7)	(13,068.7)	(88.39)
treated x year = 2019	37,096.2***	118,859.2.	2,103.10	57,316.7*	-44.93
	(10,003.5)	(62,889.3)	(2,399.4)	(27,231.9)	(154.4)
Fixed Effects	yes	yes	yes	yes	yes
Firm Year	yes	yes	yes	yes	yes
S.E. Clustered -7 digit sector	yes	yes	yes	yes	yes
N	326764	326765	326765	326766	326767

Notes: ***, **,**,. Significant at 1%, 5%, 10%, and 15%. Treated firms are in sectors that benefited at least 50% from the tax benefit policy. The control group are firms in the footwear industry. The dependent variable in panel E is built grouping 5-digit CNAE. The regressions were modeled considering time and firm fixed effects. Standard errors are clustered at the CNAE 7 level and displayed in parentheses. Data from SEFAZ-SP.

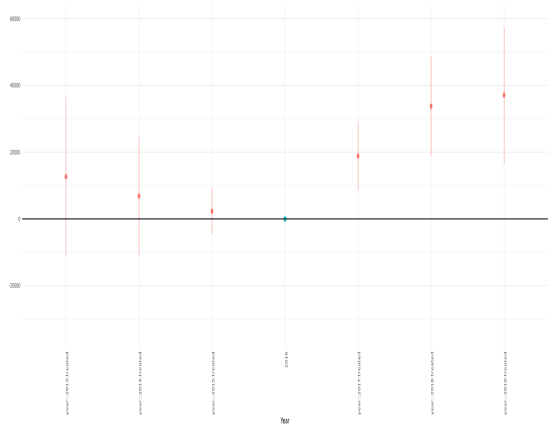
4.2 Average Treatment on the Treated Effects

Table VII summarizes the results obtained under three samples. Column 1 represents all taxpayers who fit into the Treatment group described in the Data section and our preferred control group, only the footwear industry. This criterion selects only taxpayers who directly benefited from the policy, as only those classified under the normal regime can use granted credits. Column 2 includes all sectors in the control group with a high correlation with our treated control group II. Finally, in column 3, we consider only companies belonging to CNAEs 13 (textile) and 14 (clothing) as the Treatment group and use the footwear industry companies in the control group. The errors are clustered in the 7-digit sector. First, note that the results seem consistent across samples.

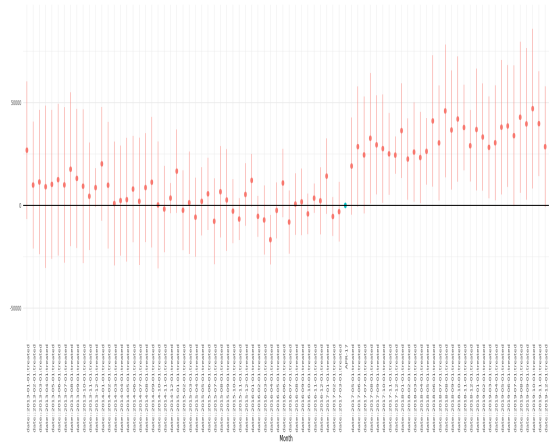
Panel A presents the coefficients of the effect on the Tax Libilities in the invoices. As expected, there was a considerable increase in highlighted ICMS on the invoices because the reduction of the

Figure 12: Tax liabilities

(a) Annual Data



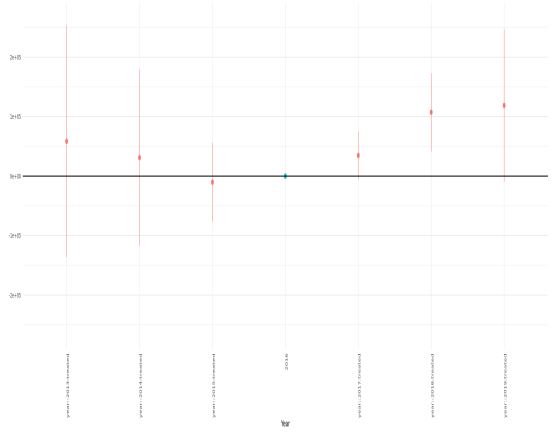
(b) Monthly Data



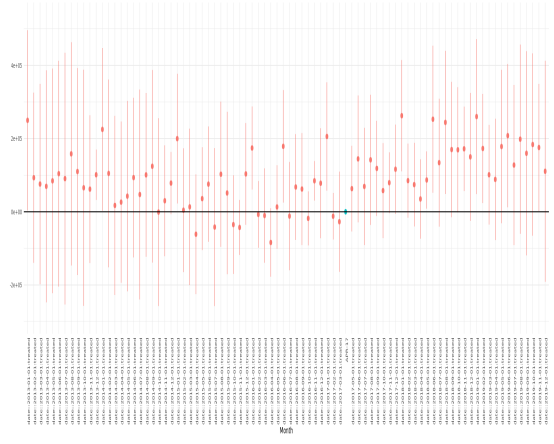
Notes: Panel (a) shows annual estimation and Panel (b) shows monthly estimation model. The dynamic diff-in-diff results present a clear parallel pre-trend estimation, with an increase after the policy change in 2017, significant in both years after the intervention. Our estimations using monthly data are noisier but also show a similar path. Data from SEFAZ-SP.

Figure 13: Sales Revenues

(a) Annual Data



(b) Monthly Data

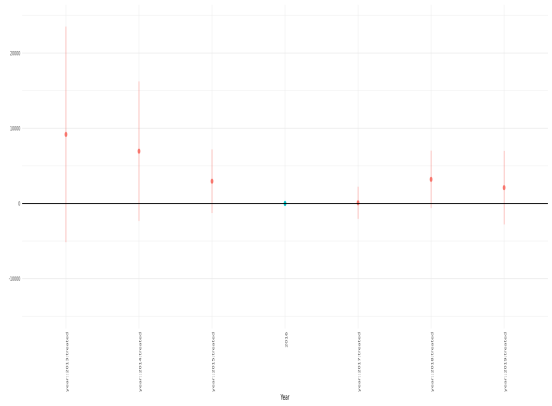


Notes: Panel (a) shows annual estimation and Panel (b) shows monthly estimation model. The dynamic diff-in-diff results present a clear parallel pre-trend estimation, with an increase after the policy change in 2017, significant in only in 2018. Our estimations using monthly data are noisier but also show a similar path. Data from SEFAZ-SP.

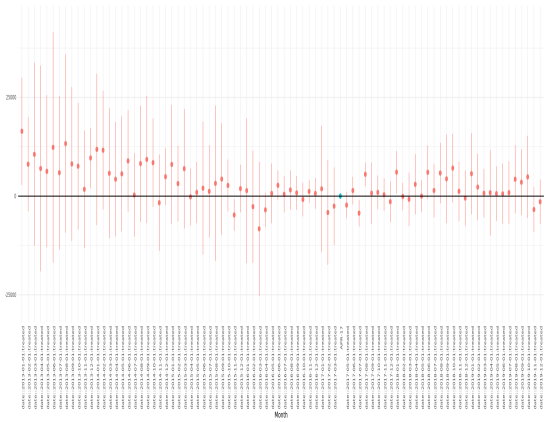
calculation base changed from an equivalent rate of 7% to 12% at the time of the intervention. The result in level represents an increase of R$ 28396.1 for each individual per month. In percentage terms, the increase represents 38%. Panel B of Table VII shows the impact on the sales revenue

Figure 14: Tax Collection

(a) Annual Data



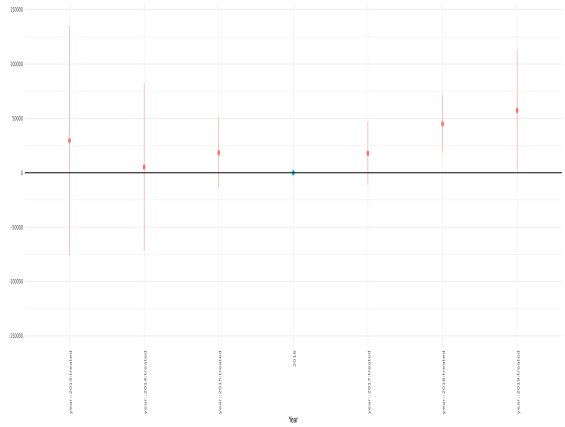
(b) Monthly Data



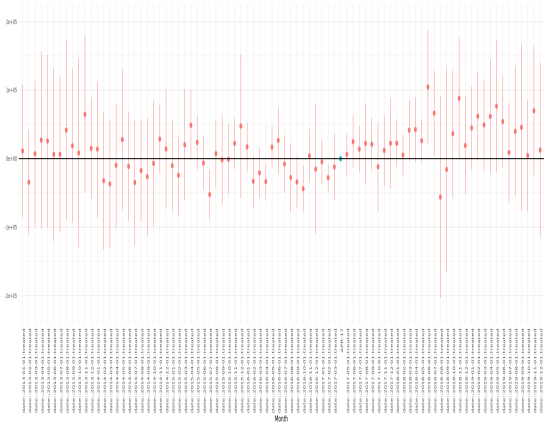
Notes: Notes: Panel (a) shows annual estimation and Panel (b) shows monthly estimation model. The dynamic diff-in-diff results present a clear parallel pre-trend estimation, without any effect after the policy change in 2017. Our estimations using monthly data are noisier but also show a similar path. Data from SEFAZ-SP.

Figure 15: Purchases

(a) Annual Data



(b) Montlhly Data

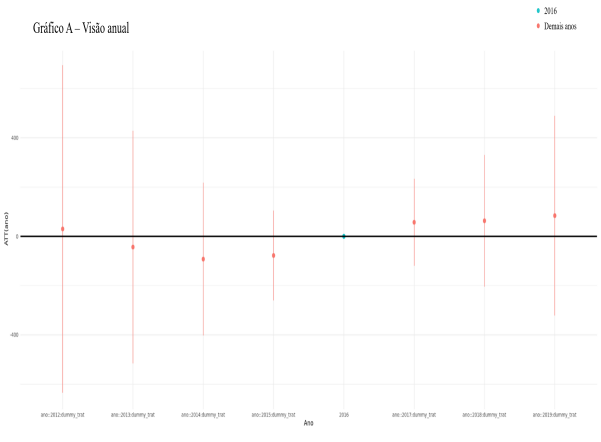


Notes: Panel (a) shows annual estimation and Panel (b) shows monthly estimation model. The dynamic diff-in-diff results present a clear parallel pre-trend estimation, with an increase after the policy change in 2017, significant in 2018 and 2019. Our estimations using monthly data are noisier but also show a similar path. Data from SEFAZ-SP.

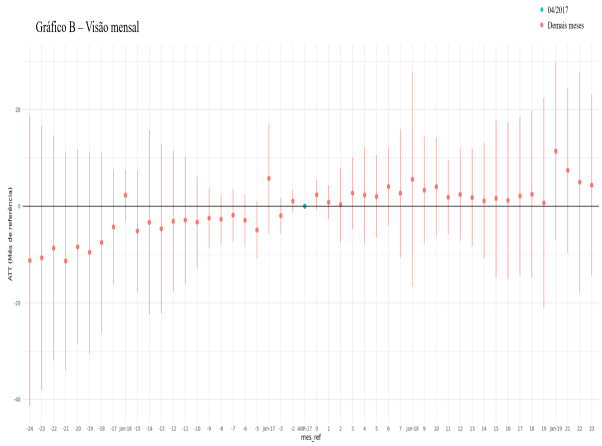
of taxpayers. Although the level shows a positive coefficient (R$ 80949.1) it is not statistically significant. On the other hand, the two graphs in Figure 13 suggest a change in the movement of these variables after policy intervention, especially in 2018 and 2019. The reported values represent

Figure 16: Number of Active Firms

(a) Annual Data



(b) Monthly Data



Notes: We use information aggregated at CNAE5 digits in this regression. Panel (a) shows annual estimation and Panel (b) shows monthly estimation model. The dynamic diff-in-diff results present a clear parallel pre-trend estimation without any effect after the policy change in 2017, Our estimations using monthly data are noisier but also show a similar path. Data from SEFAZ-SP.

an average increase of 12% in the revenue of companies in the Treatment group. The third panel of Table VII shows the impact on the revenue collection of the benefited manufacturers. The ATT from the regression shows a decrease of R$ 1779, or 9%. However, statistically, we cannot reject the null hypothesis that the intervention did not impact revenue collection.

Finally, the number of active taxpayers in São Paulo is evaluated to assess the migration of companies to aggressive states. Although the result was positive with an average of 8.4 more companies per CNAE - or 7.35% - in none of the three scenarios, these coefficients were statistically significant. The first graph in Figure 16 suggests no apparent effect on this variable. The graph in Figure 16 reinforces this interpretation.

5 Labor Market Analysis

One of the largest concerns associated with the tax benefit is the potential impact on the labor market and/or formal income in the benefited sectors. Tax benefits are public expenditures and must also be evaluated.

Some additional difficulties were encountered in assessing the impact on employment and in-

Table VII: Behavioral responses using Average Treatment on the Treated (ATT)

	(1)	(2)	(3)
Panel A. Tax Liabilities (ICMS)	28,396.1***	29.895.80	30.177,80
	(5,392.1)	(7.040,5)	(6.985,8)
Average of the pre-treatment period	86590.04	102.307,13	98.466,69
N	326,764	432.480	420.328
within R^2	0.00107	0,86694	0,85821
Clustered at 7 digit CNAE	Yes	Yes	Yes
Panel B. Sales Revenues	80,949.1	86.449,30	83.139,80
	(50,805.1)	(70.297,30)	(70.301,1)
Average of the pre-treatment period	862080.6	1.047.778,10	980.695,02
N	1.757.649	432.480	420.328
Within R^2	0,88693	0,88421	0,87860
Clustered at 7 digit CNAE	Yes	Yes	Yes
Panel C. Tax Collection	-1,779.3	-3.772,80	-3.275,60
	(3,240.1)	(4.162,6)	(4.157,5)
Average of the pre-treatment period	32497.19	40.051,94	37.387,83
N	1.757.649	432.480	420.328
Within R^2	0,59769	0,59108	0,60886
Clustered at 7 digit CNAE	Yes	Yes	Yes
Panel D. Purchases	31,873.7	-3.772,80	-3.275,60
	(21,799.6)	(4.162,6)	(4.157,5)
Average of the pre-treatment period	439759	40.051,94	37.387,83
N	1.757.649	432.480	420.328
Within R^2	0,59769	0,59108	0,60886
Clustered at 7 digit CNAE	Yes	Yes	Yes
Panel E. Number of active firms	-9.647	8,40	5,86
	(20.63)	(23,6)	(24,96)
Average of the pre-treatment period	16.678	4.169	4.040
N	3.456	3.331	2.947
Within R^2	0,99533	0,98402	0,98399
Clustered at 7 digit CNAE	Yes	Yes	Yes
Only footwear control	Yes	No	Yes
Only CNAES 13 and 14 treated	No	No	Yes

Note:s The dependent variable in panel D was grouped by 5-digit CNAE. Column 1 considers all firms classified in CNAEs benefiting more than 50% from the new policy, including those under the Simples Nacional regime. Column 2 considers the same CNAEs but excludes firms within the Simples Nacional regime as they did not directly benefit. Column 3 starts from the scenario in column 2 but excludes benefited CNAEs other than 13 and 14. The regressions were modeled considering time, firm, and CNAE fixed effects. Standard errors are clustered at the firm level and displayed in parentheses. Data from SEFAZ-SP.

come outcomes. First, we could not merge our tax-administrative with labor market data at the same granularity i.e., by the firm and month.[20] Therefore, we moved to the publicly available data using the de-identified RAIS-IBGE, which provides relevant information grouped by CNAE with 5 digits and by year. The second difficulty is our identification assumption (parallel trends) for treatment and control groups. The latter group (footwear labor outcomes) was experiencing

[20]Actually, data from SEFAZ-SP cannot be merged to any data because they are in a highly protected server that does not receive nor withdraw any information.

a more intense aggregated employment decline than the Treatment group (textile and clothing industries).

We employed a synthetic control strategy to circumvent the absence of a parallel trend in the pre-treatment period. We build a counterfactual for the textile and clothing sectors from an optimized combination of various manufacturing industry sectors. providing weights for each sector and covariate. We start with public RAIS data grouping sectors into 2-digit CNAE. We conduct a joint analysis of the textile and clothing sectors to capture the potential heterogeneous responses in each sector. Next. we allow all industrial CNAEs to belong to the control group, i.e., those CNAES starting from 10 to 33, except for treated groups: 13 (textile) and 14 (clothing). Three covariates were added to improve the optimization of the model: average company size (number of workers), the combination of average education level (years of education), and average degree of education (from incomplete elementary school to undergraduate degree)).[21] In the third step, an optimization algorithm was applied to identify the weights of each 2-digit CNAE and covariates for forming the synthetic control. Finally, placebo tests are executed to observe the statistical relevance of the results. The identification of the effect follows:

$$Y_{1t} - \sum_{j=2}^{J+1} w_j^* Y_{jt} \quad (3)$$

onde Y_{1t} represents the *output* from the Treatment group ($j = 1$) in each year t, where J is the number of 2-digit CNAEs candidates to form the control group, w_j denotes the weight of each sector j in the synthetic control. Finally, Y_{jt} represents the projected output for each sector.[22]

Although the synthetic control addresses the issue of parallel trends, it is important to highlight that some limitations should be considered in this experiment. The first one is the small temporal sample of the pre-intervention period. Since RAIS data is annual and starts from 2012, there are only 5 periods before the intervention. With this in mind, it is understood that this limitation increases the margin of error but does not invalidate the results. The second limitation is the

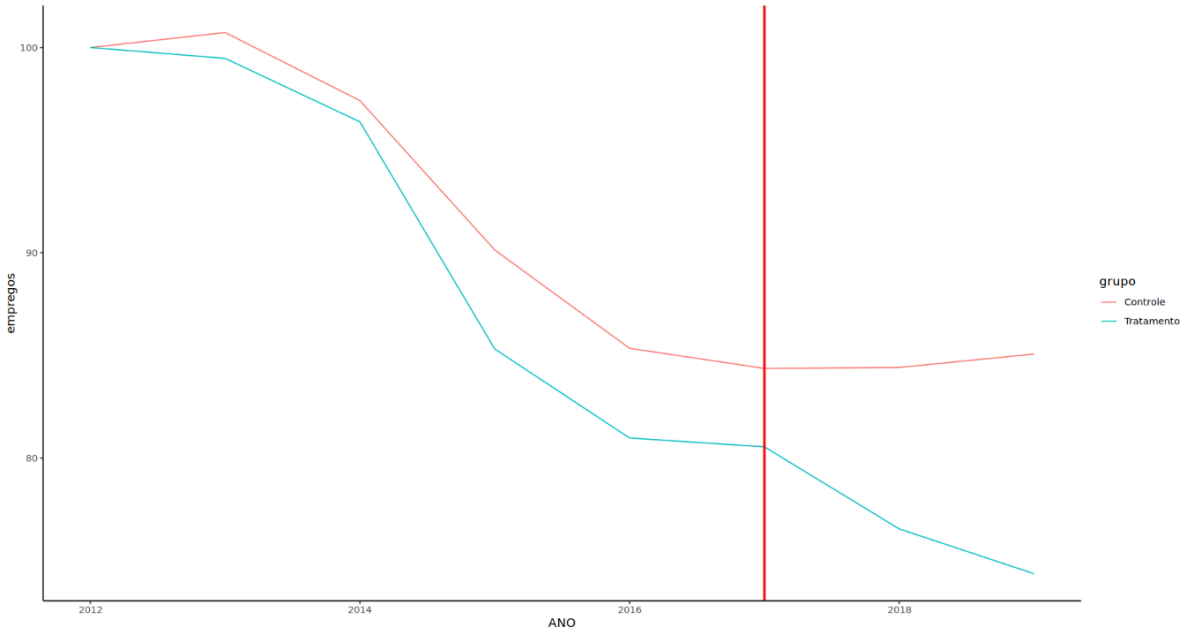
[21] Although these last two covariates are on different scales from employee education, using both variables reduces the model's loss in the pre-treatment period. The output was also added, which improved the adherence of the control group to the Treatment in the pre-treatment period.

[22] The weights are obtained through an optimization function that seeks to minimize the sum of the differences of outputs in the pre-treatment period, where constraints are applied such that no weight is less than 0 and their sum is exactly 1.

issue of support for the Treatment groups. It was observed that the clothing sector is the one that employs the most but has a lower average salary. Therefore, it is impossible to find a weight matrix that can achieve, at the upper limit, the quantity of employees and, at the lower limit, the average salary. To address this, data for all sectors were normalized to a base of 100, anchored in 2012.

Formal Jobs. Figure 17 It shows the trajectory of employment in the evaluated sectors, adjusted to a base of 100, in comparison to other sectors of the manufacturing industry. Two points are highlighted in the graph: the absence of parallel trend and the strong declining trend in employment in the São Paulo industry, particularly noticeable in the textile and clothing sectors.

Figure 17: Number of formal jobs CNAES 13 - 14 x Other CNAEs (Base 100)



Notes: Based on 2012, the graph shows that the Treatment group experienced a greater decline in employment in 2014 and 2015 compared to other industries.
Source: RAIS.

Table VIII shows the optimal weight matrix used to select the CNAEs closely aligned with the Treatment. The algorithm gives the highest weight to the non-metallic minerals sector (45.2%).

As previously mentioned, in order to better adjust the model in the pre-Treatment period, in addition to the normalized number of jobs, three more covariates were used: average index of company size, average educational index, and average level of education. Table IX shows the

Table VIII: Wegiths CNAE - Formal Jobs

CNAE	Description	Weights	CNAE	Description	Weights
10	Food products	0.012	23	Non-metallic minerals	0.452
11	Beverages	0.006	24	Metallurgy	0.006
12	Tobacco	0.004	25	Metal, except machinery and equipment	0.013
15	Footwear	0.255	26	Information technology and electronics	0.004
16	Wood products	0.063	27	Machinery and electrical materials	0.006
17	Cellulose and paper	0.008	28	Machinery and equipment	0.008
18	Printing	0.011	29	Motor vehicles	0.005
19	Fuels	0.000	30	Transportation	0.003
20	Chemical products	0.006	31	Furniture	0.056
21	Pharmaceuticals	0.000	32	Miscellaneous products	0.026
22	Rubber and plastic	0.012	33	Machinery and equipment maintenance	0,043

Note: The table shows the weights of each sector in the formation of the synthetic control. The non-metallic minerals and footwear sectors are highlighted with weights of 45.2% and 25.5%, respectively. Data from RAIS-IBGE.

comparison of averages between the Treatment group, synthetic Treatment, and other sectors.

Table IX: Average of the covariates by group - Formal Jobs

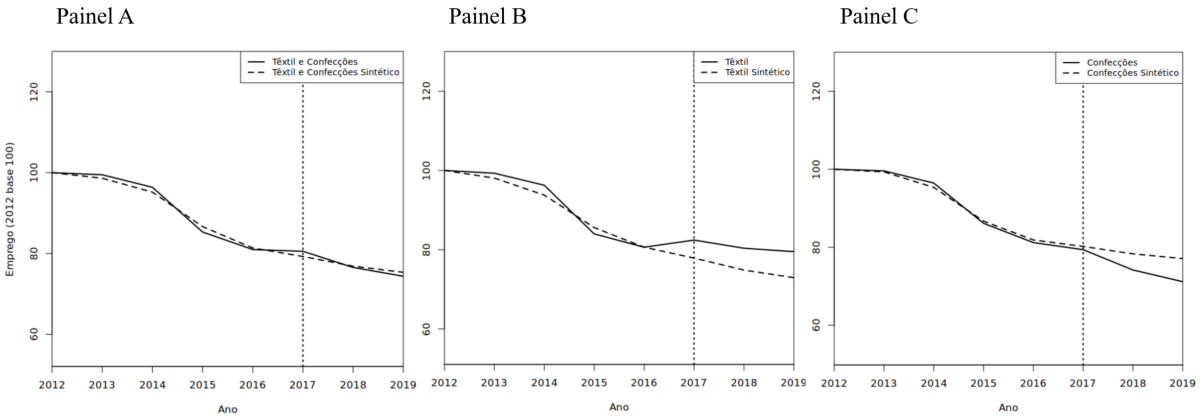
Covariates	Treatment	synthetic	Sample average
Size of the firm[1]	5,833	6,167	7,043
Schooling[2]	2,515	2,517	2,789
Instruction level[3]	6,223	6,220	6,728
Number of formal jobs[4]	92,428	92,366	94,162

[1] Company size is an ordinal variable ranging from 2 to 10, where 2 represents a company with between 1 and 4 formalized employees and 10 for companies with over 1,000 employees.
[2] Educational level is an ordinal variable ranging from 1 to 4, where 1 represents incomplete primary education and 4 indicates completed higher education.
[3] Level of education is also an ordinal variable indicating employees' educational attainment. Slightly more detailed, it ranges from 1 (illiterate) to 11 (PhD). The model minimizes more efficiently when using both educational covariates.
[4] The quantity of formal jobs is normalized to a base of 100 in 2012.

Figure 18 depicts the results of 3 Yesulations: one for the textile industry (CNAE 13), another for the clothing industry (CNAE 14), and a third one creating a combination of both industries as Treatment. Although the main interest of this research is to assess the impact on the benefiting companies, it was deemed important to separately evaluate CNAEs 13 and 14 to verify if there are heterogeneous effects stemming from the tax policy. Panel A's graph shows that it was impossible

to observe the policy's effects on employment. However, the graphs in panels B and C indicate a positive effect on the textile sector and a negative effect on the clothing sector.

Figure 18: Formal Jobs - Treatment x synthetic Control - Basis 100



Note: The panels display employment series normalized to a base of 100 in 2012, comparing the Treatment groups with their respective synthetic control series. Panel A considers CNAEs 13 and 14 as the Treatment group. Visually, it seems that the policy did not affect the employment level. Panel B deals solely with the textile sector in the Treatment group. Similar to the revenue without ICMS variable, the graph suggests that the textile sector benefited in this aspect. Finally, panel C shows the opposite effect for the clothing sector starting from 2018. Table X quantifies the results indicated by the graphs. Data from RAIS-INGE.

Table X displays the results for 2017 to 2019, quantified in absolute and relative terms. Further detailing what was seen in the previous figure, no perception of impact on employment in the textile and clothing sectors exists. Interestingly, a positive effect was observed in the textile sector while a negative effect was observed in the clothing sector. The former shows an estimated creation of 6,713 (6.14%) jobs in 2019, whereas the clothing sector shows an estimated decrease of 10,489 (-5.96%) formal job positions.

To check the results' robustness, we follow Abadie et al. (2015) and conduct placebos tests. The main idea is to apply the same synthetic control technique to each sector in the database. For the model's effect to be credible, it is expected that the simulation of the output of the other sectors shows a more stable result in the post-treatment period. This analysis was done in two ways: first, the ratio between the variation - through the MSPE (mean squared prediction error) - of the post-treatment period and the pre-treatment period for each sector was established. Afterward, sectors were ranked from the highest variation to the lowest. A p-value was assigned to each sector, where the top-ranked sector received a value of 1/23, the second 2/23, and so forth. Since there are only 23 sectors, we propose considering effects with a statistical significance level of 10%, or

Table X: Formal Jobs Responses

	Panel A - All		Panel B - Textile		Panel C- Clothing	
Annual Result	Number	Number(%)	Number	Number(%)	Number	Number(%)
2017	3.514	1,23	4.509	4,12	-1.519	-0,86
2018	-1.104	-0,39	5.563	5,09	-7.338	-4,17
2019	-2.951	-1,03	6.713	6,14	-10.489	-5,96
Std Dev (2012-2016)	*(2.886)*	*(1,01)*	*(1.663)*	*(1,52)*	*(1.268)*	*(0,72)*

Note: The table shows estimates of the variation effects on formal employment in the analyzed sectors. Panel A, which combines the textile and clothing sectors, shows an estimate ranging from a gain of 3,514 jobs in 2017 to a loss of 2,951 in 2019. Considering a standard deviation of 2,886 in the pre-treatment period, the observed effects do not suggest statistical relevance. Panel B, which isolates the textile sector, shows a more relevant effect on employment, ranging from 4.12% to 6.14%. Finally, Panel C shows a significant negative variation for the clothing sector. This result may be surprising as it goes against the intended purpose of the benefit. Data from RAIS-IBGE.

in other words, if the Treatment is among the top 2-3 ranked sectors. Table XI shows the value of the MSPE ratio, the ranking position, and the p-value. The second way to validate the effects is through visual inspection, where it is expected that the effect of the treated sector stands out compared to the others. Figure 19 shows the graphs for each panel.

Table XI: Placebo Tests: Treatment x other sectors

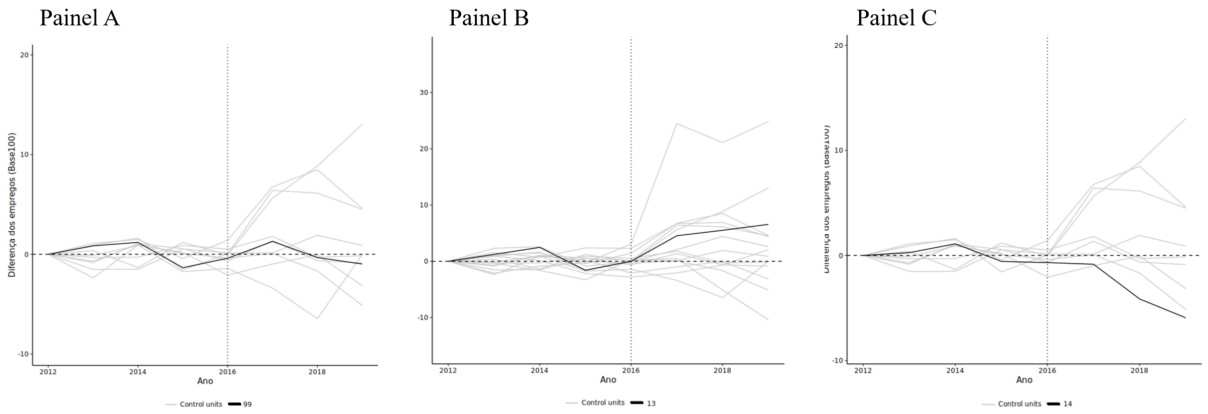
Covariate	**MSPE**	**Ranking**	**p-value**
Panel A: Textile and Clothing	1,1	20/23	0,87
Panel B: Textile (CNAE 13)	15,5	10/23	0,43
Panel C: Clothing (CNAE 14)	42,5	3/23	0,13

Note: This table indicates that the decline in employment in the clothing sector is the most significant, and it falls close to the defined interval of 10% statistical significance. Data from RAIS-IBGE.

There is no significant aggregate effect on the Treatment group due to heterogeneity of the formal job outcomes. While in the textile sector we observe a positive response, it is also statistically non-significant. On the other hand, the negative impact on formal Jobs on firms in the clothing sector is very close to be significant.

Average Wages. Similar to the formal employment outcome analysis, we select the control group from the industrial CNAEs between 10 and 33 (except 13 and 14) and the comparison

Figure 19: Placebo Tests: Treatment x other sectors



Notes: These graphs explicit the fall in the formal jobs for the clothing sector. Data from RAIS-IBGE.

between the Treatment group (CNAEs 13 and 14). Figure 20 displays the average wages of the groups (inflation-adjusted). The graph reveals an apparent change in trend after the policy implementation, which we further evaluate below using the synthetic control technique. Next, Table XII shows the weight matrix from the optimized selection process of our synthetic control method. We consider the same covariates from the previous exercise, as shown in Table XIII with the corresponding means.

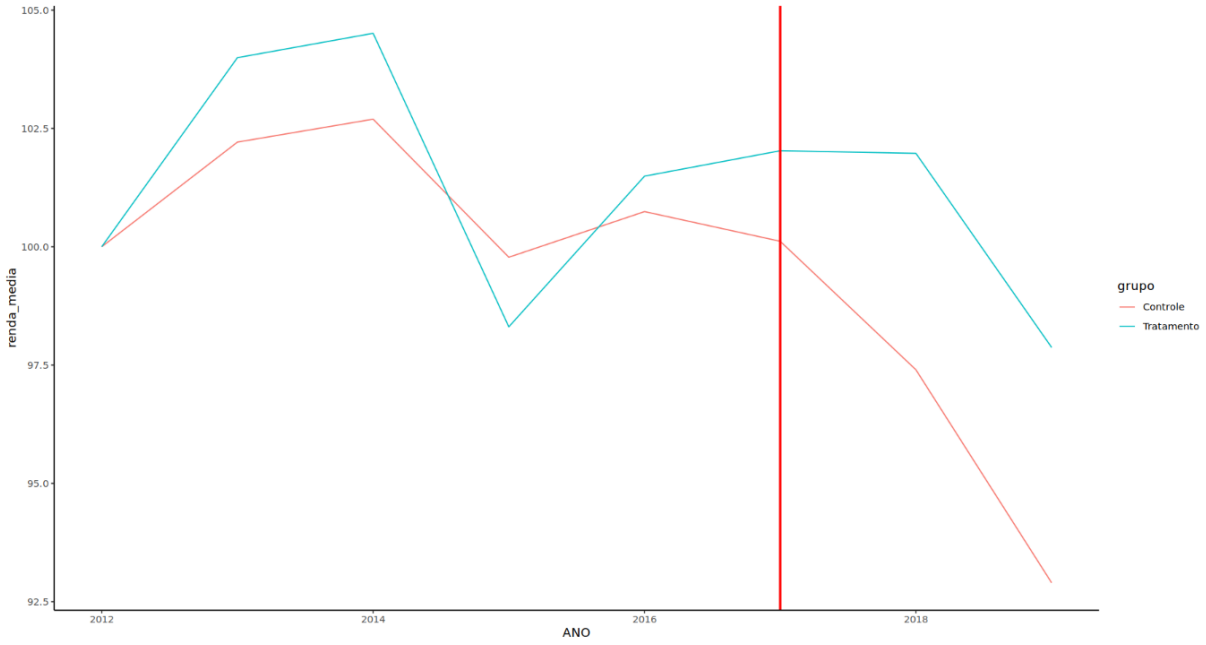
Table XII: Pesos por CNAE 2 dígitos - Renda Média

CNAE	**Description**	**Weight**	**CNAE**	**Description**	**Weight**
10	Food Products	0.002	23	Non-metallic Minerals	0.000
11	Beverages	0.002	24	Metallurgy	0.004
12	Tobacco	0.002	25	Metals, except machinery and equipment	0.011
15	Footwear	0.190	26	Information Technology and Electronics	0.002
16	Wood Products	0.652	27	Machinery and Electrical Materials	0.003
17	Pulp and Paper	0.003	28	Machinery and Equipment	0.004
18	Printing	0.006	29	Motor Vehicles	0.002
19	Fuels	0.002	30	Transportation	0.001
20	Chemical Products	0.003	31	Furniture	0.090
21	Pharmaceuticals	0.000	32	Miscellaneous Products	0.007
22	Rubber and Plastics	0.005	33	Machinery and Equipment Maintenance	0.009

Note: The table displays the weights of each sector in the formation of the synthetic control. The wood products and footwear sectors stand out with weights of 65.2% and 19.0%, respectively. Data from RAIS-IBGE.

Our table 21 shows the textile and clothing sectors in Panel A, only the textile sector for

Figure 20: Average Wage CNAES 13 e 14 x Other CNAES (Base 100)



Notes: The Figure shows the greater variation in the Treatment series compared to the others. From 2017 onward, after the policy implmenttion, there is an apparent positive deviation in favor of the Treatment group. Data from RAIS-IBGE.

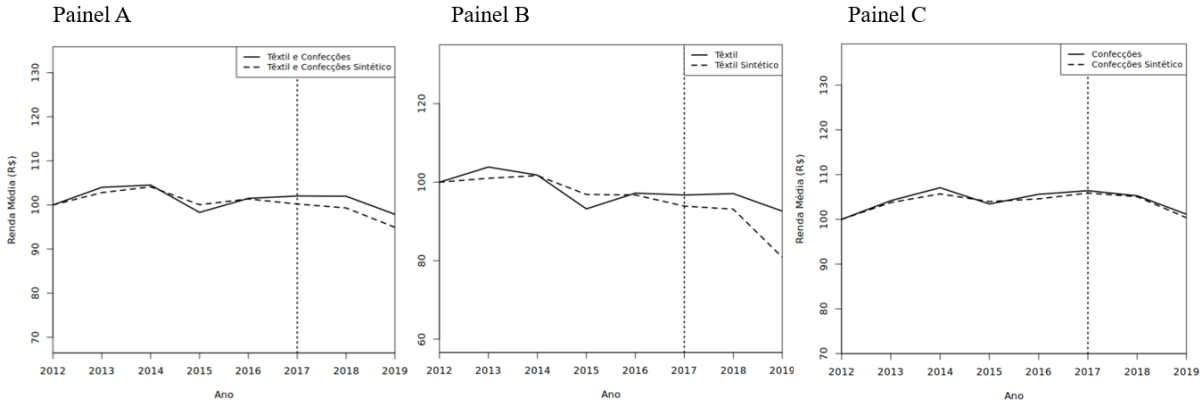
Table XIII: Average of the Covariates by group - Average Wage

Covariates	**Treatment**	**synthetic Control**	**Sample Mean**
Size of the firm	5,83	5,84	7,04
Schooling	2,51	2,51	2,79
Instruction Level	6,22	6,22	6,73
Average Wage	101,66	101,66	100,87

Notes: The average values of the covariates of the synthetic control are nearly identical to those of the Treatment column. Data from RAIS-IBGE.

Panel B, and the clothing sector in Panel C. Figure 21, Panel A, suggests a positive effect on the average income of workers in the two sectors combined. Although Panels B and C show slightly more divergent control series from Treatment, the images suggest that, similar to revenue without ICMS, the effect came exclusively from the textile sector. We show the effect estimates for average income between 2017 and 2019. Considering the standard deviation from the period between 2012 and 2016, positive effects are observed in the combined two sectors, amounting to 2.95%. When the branches of activity are isolated, an effect is evidenced only in the textile sector, reaching

Figure 21: Average Wage - Treatment x Synthetic Control Group - Base 100



Notes: The panels display wage series normalized to a base of 100 in 2012, comparing the Treatment groups with their respective synthetic control series. Panel A considers CNAEs 13 and 14 to be the treatment group. Visually, it is noticeable that the policy affected workers' average income. Panel B focuses solely on the textile sector in the Treatment group. Similar to the formal employment variable, the graph suggests that the textile sector benefited in this aspect. Finally, Panel C suggests no significant effect on workers' income in the clothing sector. Table XIV quantifies the results indicated by the graph. Data from RAIS-IBGE.

11.79% in 2019. This result aligns with what was observed in the variables of ICMS without revenue and formal employment, where the policy effect appeared only in the textile sector, i.e., at the beginning of the apparel product chain.

Table XIV: The effect on average wages

	Panel A		**Panel B**		**Panel C**	
Result by year	R$	var(%)	R$	var(%)	R$	var(%)
2017	48,72	1,82	97,14	2,59	1,43	0,06
2018	71,01	2,65	135,65	4,01	-5,81	-0,26
2019	79,04	2,95	398,28	11,79	7,01	0,31
Standard Deviation (2012-2016)	*(29,01)*	*(1,08)*	*(79,07)*	*(2,34)*	*(17,37)*	*(0,77)*

Note: The table displays the estimated variation in workers' salaries, in Brazilian reais and in percentage variation. The results indicate a positive variation in the policy's impact on salaries, although all the effect went to textile sector workers. Data from RAIS-IBGE.

As in the previous section, a placebo test was conducted to check if the positive effects on earnings were statistically significant. Table XV shows that the increase in the effect on average income, even with the highlight of the textile sector, does not present statistical significance. Finally, Figure 22 shows that other sectors exhibited more significant variations.

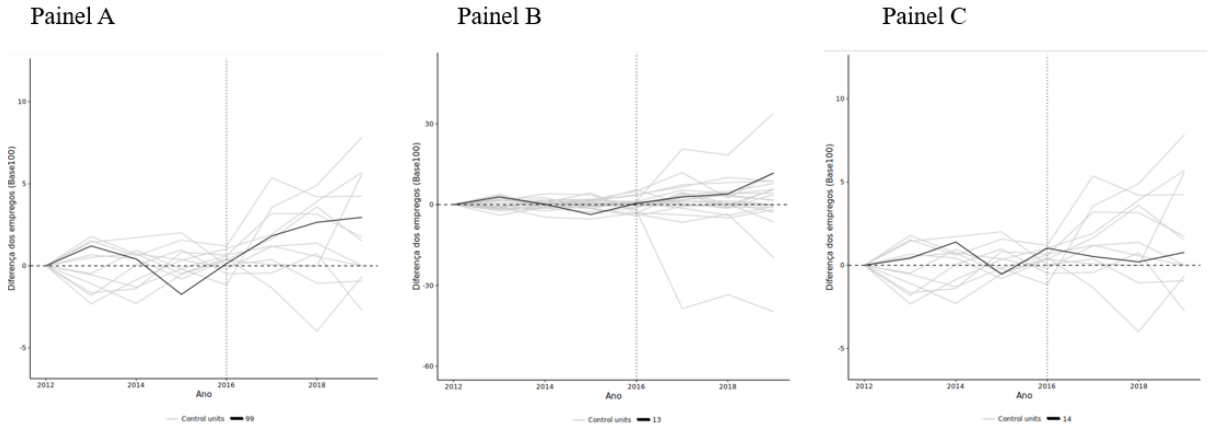
Finally, although the placebo tests do not allow us to reject the null hypothesis that the policy

Table XV: Placebo Test for the Average Wage Outcome: Treatment x other sectors

Treatment	**MSPE**	**Ranking**	**p-value**
Panel A: Textile e Clothing	6,7	13/23	0,57
Panel B: Textile (CNAE 13)	12,3	11/23	0,48
Panel C: Clothing (CNAE 14)	0,44	21/23	0,91

Note: None of the three panels showed significant p-values. Data from RAIS-IBGE.

Figure 22: Placebo Test for the Average Wage Outcome: Treatment x other sectors



Notes: This Figure shows the placebo testes for three samples. Panel A shows the results for firms that are either in the textile or clothing industries. Panel B (C) shows the counter part for the textile (clothing). Only the Panel B presents an increase in the average wage post-reform.

had no effect, it cannot be ignored that the 2.95% income variation was nearly 3 times larger than the standard deviation of the differences in the 5 pre-treatment points (1.08%). It is worth Simulating, solely to understand the impact of the policy, how much of the wage bill would have been increased if the effect had been exactly 2.95%, or, in monetary terms, R$ 79.04 per month for each worker. Considering that 2019 ended with 212,182 formalized workers, the wage bill would have increased by R$ 223.6 million.

6 Conclusion

The tax benefit granted to the textile sector is a large intervention that the São Paulo tax authority adopted as a development policy. The main motivation of the policy was to defend the textile industry of São Paulo from the fiscal policies executed by neighboring states that aimed to

attract firms to their states. At the time, the sector was experiencing a sharp decline in revenues, which increased pressure from local employers' unions for the government to intervene. The decline in revenue - and employment - could be explained (in part) by the lack of competitiveness of São Paulo taxpayers compared to their neighbors. In May 2017, the government granted the presumptive tax credit benefit equivalent to total in-state sales. Using the firm's behavioral responses, this study investigates whether the policy positively affected these sectors in São Paulo. We implement an event-study strategy with a differences-in-differences method and tax administrative data to document the effects on companies' sales and purchases (10-12%) one to two years after the policy change. We do not find any average treatment effect on the treated in the period or tax collection. Using synthetic control method and RAIS-IBGE we do not find a robust impact on average earnings or in the number of formal jobs.[23]

For every real expenditure on this policy (assuming a positive impact on sales revenues), we estimate a total revenue increase between R\$2.67 and R\$5.04. This policy works as a state's fiscal waiver that would reflect in the tax collection of wholesale and retail firms, where the tax credit may be utilized. Similarly, no impact is found on the number of firms nor on the number of formal jobs. However, the textile sector performed slightly better in the labor market analysis than the clothing sector.

[23]Only for the clothing sector, our results suggest a close to significant 5%.

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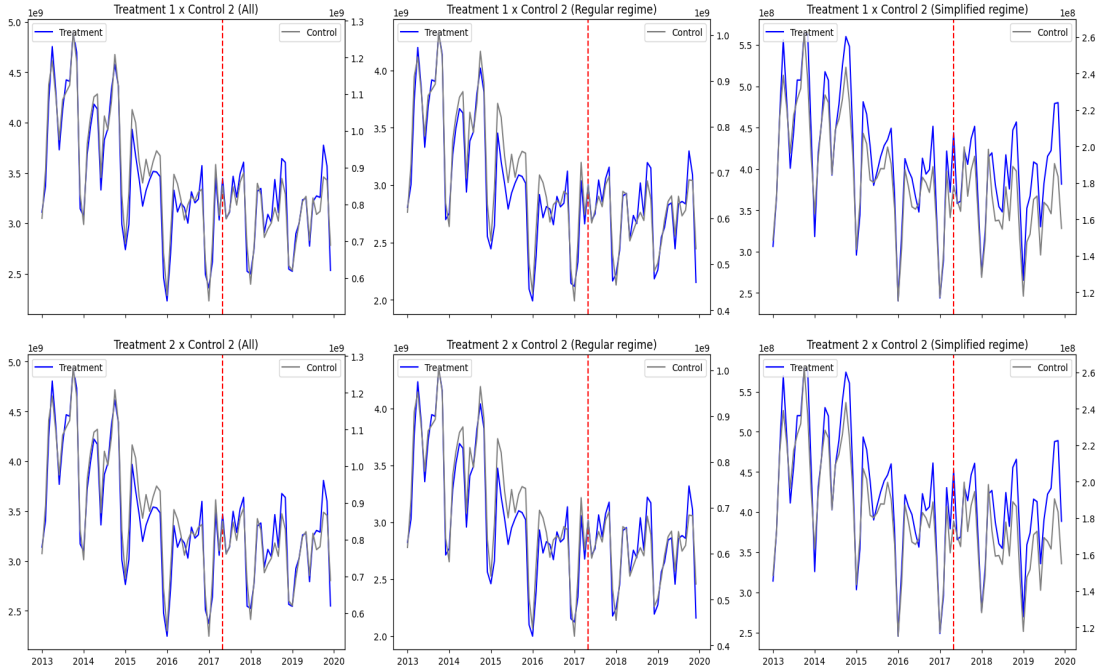
Appendix A - Auxiliary Table

Figure 23: A1: Sales Revenues: Treatment (textile, clothing) and all control industries



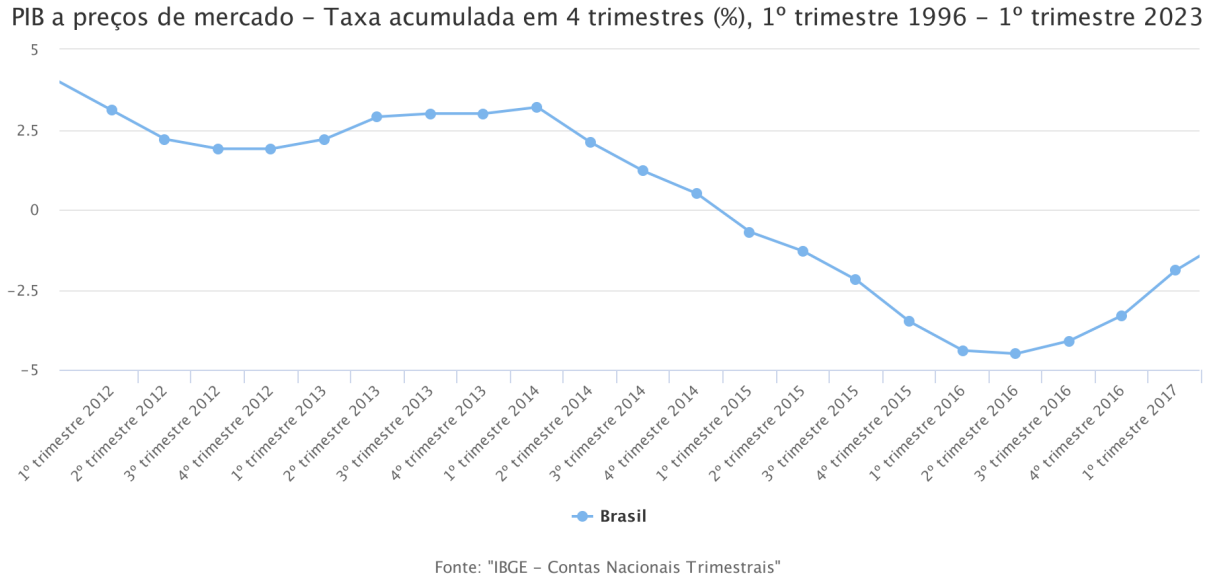
Notes: The graph shows 12-month moving average of the aggregated sales revenue data from firms adjusted for inflation and standardized on a base of 100 anchored in December 2012. The three sectors exhibit very similar pattern in the years prior to the intervention policy in 2016, with declines from the beginning of the series, with greater emphasis in the years 2014 and 2015.

Table A1: Responses to the fiscal benefit - Errors are clustered in the CNAE-2 dígits

	(1)	(2)	(3)
Panel A. Associated ICMS	7.016,60	29.895.80	30.177,80
	(1.377,20)	(4.393,20)	(4.496,20)
Average pre-Treatment period	25.586,68	102.307,13	98.466,69
N	1.757.649	432.480	420.328
R^2	0,87104	0,86694	0,85821
Panel B. Sales REvenues	21.843,50	86.449,30	83.139,80
	(11.869,60)	(27.607,30)	(31.948,80)
Average pre-Treatment period	293.925,11	1.047.778,10	980.695,02
N	1.757.649	432.480	420.328
R^2	0,88693	0,88421	0,87860
Panel C. Tx Collections	-713,40	-3.772,80	-3.275,60
	(1.381,10)	(2.415,00)	(2.599,40)
Average pre-Treatment period	10.346,43	40.051,94	37.387,83
N	1.757.649	432.480	420.328
R^2	0,59769	0,59108	0,60886
Panel D. Number of Active Firms	1,05	8,40	5,86
	(30,73)	(12,15)	(15,83)
Average pre-Treatment period	16.678	4.169	4.040
N	3.456	3.331	2.947
R^2	0,99533	0,98402	0,98399
Simples Nacional	Yes	No	No
CNAES 13 and 14	Yes	Yes	Yes
Other CNAES	Yes	Yes	No

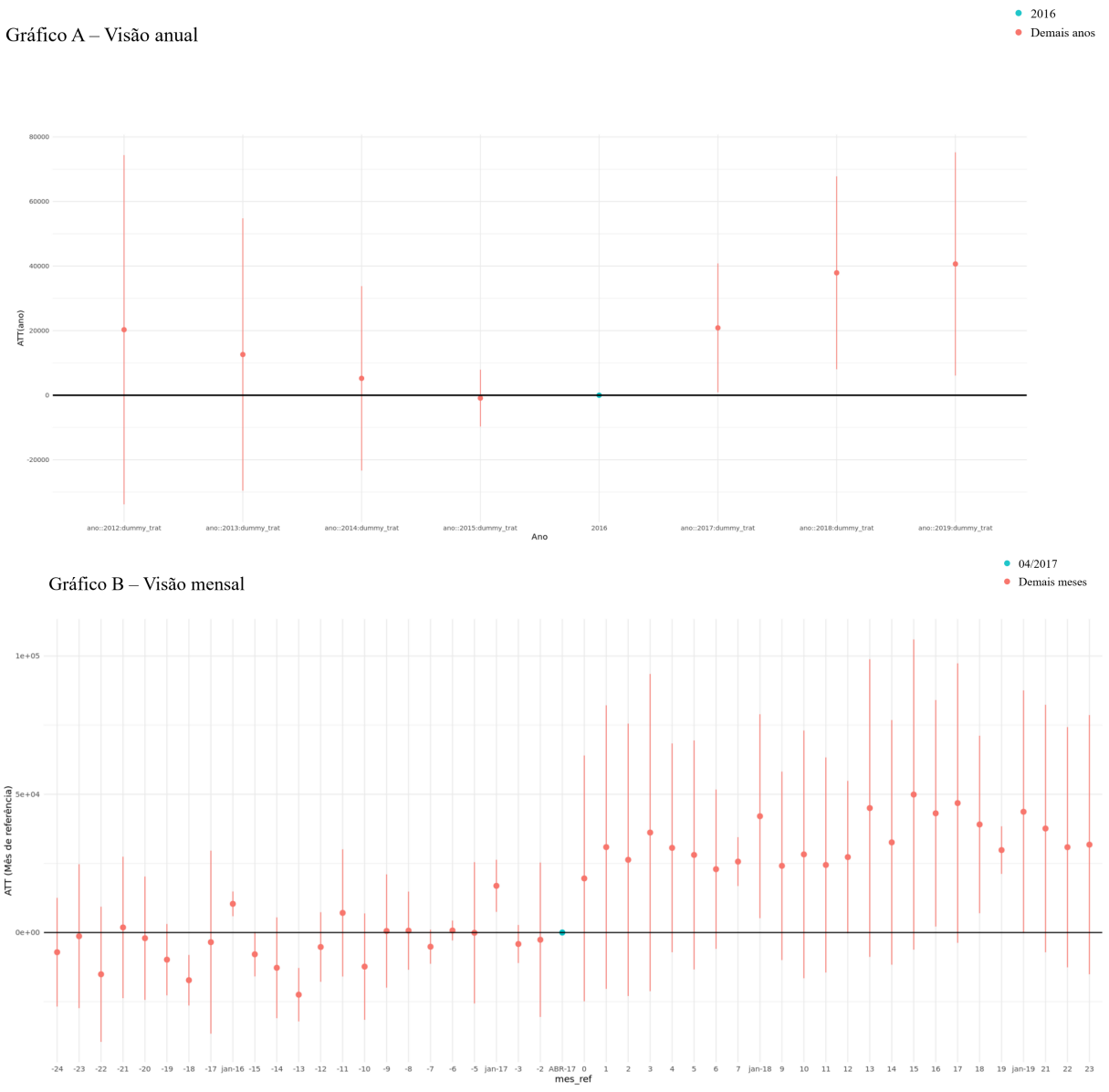
Appendix B - Other Figures

Figure B1: Growth GDP (1st quarter/2012 to 1st quarter/2017)



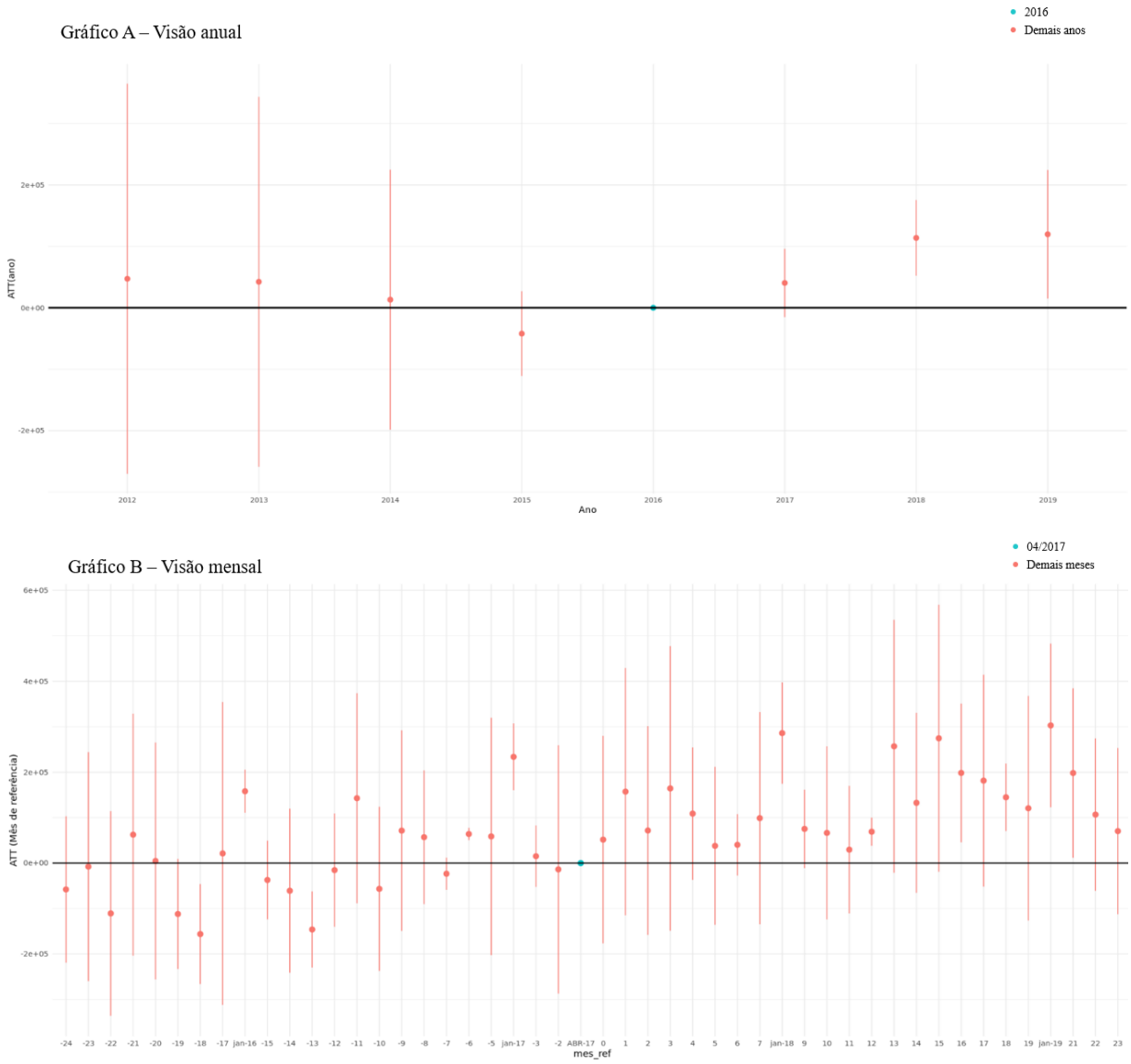
Notes: The graph shows a decline in the GDP growth rate starting from the second quarter of 2014. In 2015, the cumulative rate turned negative, reaching nearly a 5% drop by the second quarter of 2016. There is a resemblance in the performance between the Brazilian GDP and the textile and apparel sectors. The graphs suggest that the poor performance of these sectors cannot be solely attributed to tax wars. Source IBGE.

Figure B2: Event Study - Associated ICMS - Errors clustered at CNAE - 2 dígits



Appendix C - Cost - Benefit Analysis

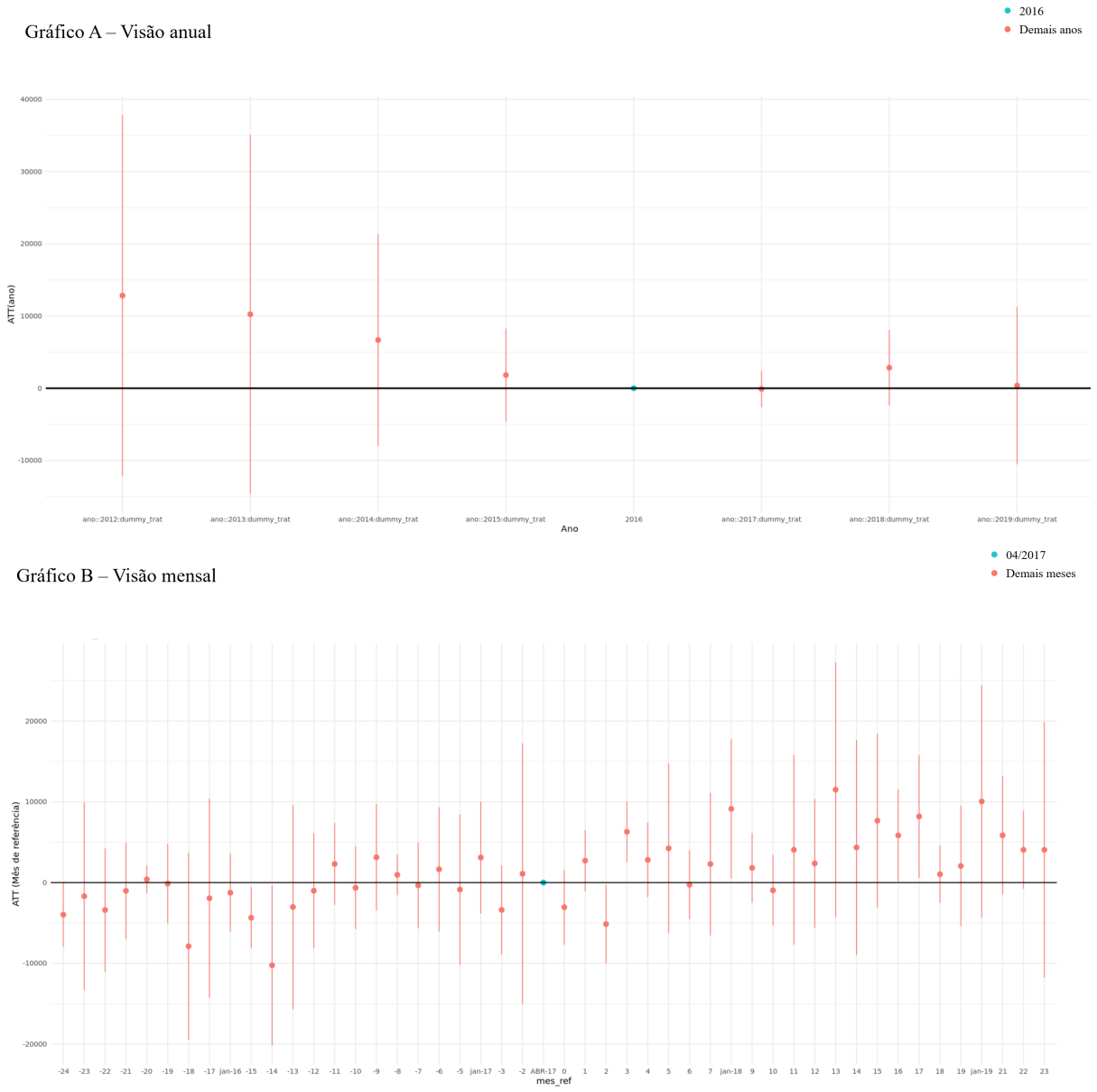
Figure B3: Event Study - Sales Revenues - Errors clustered at CNAE - 2 dígits



Considering that there are good indications that the policy applied has brought relevant effects to the companies' revenue, the question to be answered is how much the state spent to achieve these results. Or, what was the cost-effectiveness of the intervention? To do this, it is necessary to gather the tax expenditures for this measure.

The records entered as granted credit were collected from the monthly declarations (GIA) of all taxpayers allocated in the Treatment group to calculate the policy's cost. The tax expenditure for 2017 was R$ 503.6 million, rising to R$ 819.1 million in 2018 and R$ 965.7 million in 2019. A significantly lower value in 2017 is expected since the policy was only implemented in May.

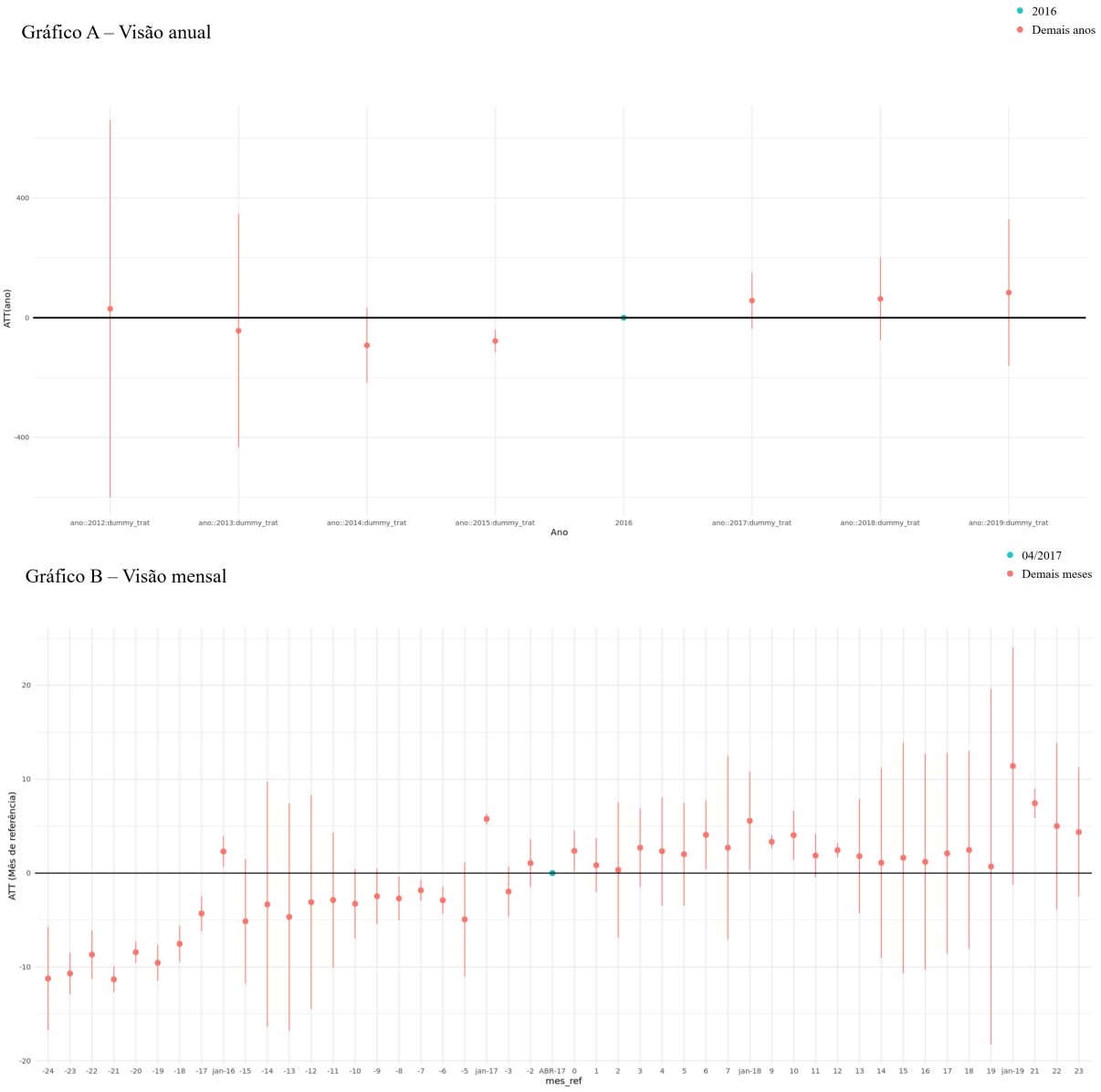
Figure B3: Event Study - Tax Collection - Errors clustered at CNAE - 2 dígits



With the tax expenditure calculated, we can assess the cost-effectiveness of the applied policy, that is, quantify the effect for each real spent by the state. Table **??** compares the revenue variable without ICMS. Only this variable was verified because it is the only one.[24] That suggests some effect resulting from the intervention. In panel A, the ATT, at the level estimated by the difference-in-differences regression, was distributed proportionally to the revenue of the treated

[24]This analysis was not conducted with the declared ICMS, as the effect stems from the revocation of the reduction of the calculation basis. The application of this variable in the diff-in-diff was made only for data and model robustness testing.

Figure B4: Event Study - Number of active firms - Errors clustered at CNAE - 2 dígits



taxpayers each year. An effect of R$ 2.54 billion is observed for 2017, R$ 3.64 billion in 2018, and R$ 3.61 billion in 2019. For every real spent on the intervention, there is R$ 5.04, R$ 4.44, and R$ 3.74 for 2017, 2018, and 2019, respectively. The ATT of each year generated by the event study was used in panel B. The panels show a positive return for every real spent by the state, in values ranging from R$ 2.67 to R$ 4.99. This view shows that the policy did not have an immediate complete effect because the cost-effectiveness in 2017 was slightly more than half of what was observed in the following years.

Table C1: Policy Cost Analysis

	2017	**2018**	**2019**
Intervention Cost (R$ mi)	503,6	819,1	965,7
Panel A			
ATT. Sales Revenues (R$ mi)	2.540,5	3.637,0	3.612,1
Effect by money unit (R$)	5,04	4,44	3,74
Painel B			
ATT. Sales Revenues (R$ mi)	1.345,5	4.090,6	4.353,5
Effect by money unit (R$)	2,67	4,99	4,51

Notes: This table compares the effect found on the increase in the revenue of the benefiting companies with the cost of the policy. The granted credit releases in the taxpayers' declarations were observed to estimate the cost. To estimate the extra revenue, the equivalent of 9.4% of the firms' annual revenue in the post-intervention period was identified. For panel A, this surplus was identified as ATT. The ATT identified each year in the event study was used for panel B. Finally, the result-to-cost ratio was applied to determine the effect generated for every real spent. Data from SEFAZ-SP.

Finally, we check for heterogeneous effects on the benefiting sectors without the 9.4% effect in the post-Treatment period and compared with the actual observed revenue in the same period. The result is shown in the table C2 shows that the textile sector and sectors other than the CNAEs 13 and 14 were the benefited sectors. The fiscal benefit did not promote significant effects on the clothing sector.

Table C2: Heterogeneous Effects - Sales Revenues

	Treatment	**Têxtil**	**Confecções**	**Demais**
Sales Revenues pr-Treatment (R$ bi)	268,11	147,77	105,78	14,55
Share of the pre-Treatment (%)	100,00%	55,11%	39,46%	5,43%
Sales Revenues pos-Treatment (R$ bi)	114,86	66,31	41,65	6,9
Projected Sales Revenues pos-trat. without ATT (R$ bi)	104,99	57,87	41,43	5,70
Observed differences (R$ bi)	9,87	8,44	0,22	1,21
Observed differences	9,40%	14,59%	0,54%	21,17%

Notes: The first row shows the sum of the companies' revenues between January 2012 and April 2017. The second row relates to each sector's share of the revenue from the first row. The next row shows the sum of revenue in the post-treatment period, i.e., between May 2017 and December 2019. In the fourth row, revenue in the post-period was projected assuming no intervention, respecting the proportion from the second row of this table. The fifth row is calculated from the difference between the two previous rows. Finally, the last row shows that the effect on the textile sector was estimated at 14.59%, 0.54% for the clothing industry, and 21.17% for other sectors. Data from SEFAZ-SP.