IDB WORKING PAPER SERIES Nº IDB-WP-644

Tax Incentives and Job Creation in the Tourism Industry of Brazil

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Inter-American Development Bank
Environment, Rural Development Disaster Risk Management Division

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Cataloging-in-Publication data provided by the
Inter-American Development Bank
Felipe Herrera Library
Garsous, Grégoire
Tax Incentives and Job Creation in the Tourism Industry of Brazil/ Grégoire Garsous, David Corderi, Mercedes Velasco.
.p. cm. — (IDB Working Paper Series ; 644)
Includes bibliographic references.
1. Tourism —Brazil. 2. Job Creation—Brazil. I. Corderi, David Novoa. II. Velasco, Mercedes. III. Inter-American Development Bank. Environment, Rural Development Disaster Risk Management Division. IV. Title. V. Series.
IDB-WP-644
JEL Codes: H25, H71, L83, R58, Z32
Keywords: local public economies; regional development; tax incentives; tourism; employment

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Abbreviations and Acronyms

ACT	Representative Activities of Tourism (Atividades Caraterísticas do Turismo)
ATT	Average Treatment Effect on the Treated
CNAE	National Classification of Economic Activities (Classificação Nacional de Atividades Economicas)
ECLAC	Economic Commission for Latin America and the Caribbean
FDI	Foreign Direct Investment
FINBRA	Database of the Brazilian Tax Department
FINOR	Northeast Investment Fund (Fundo de Investimento do Nordeste)
GDP	Gross Domestic Product
IBGE	Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatísticas)
IDB	Inter -American Development Bank
ILO	International Labour Office
IPEA	Institute of Applied Economic Research (Instituto de Pesquisa Econômica Aplicada)
OECD	Organization for Economic Co-operation and Development
PNAD	Pesquisa Nacional por Amostra de Domicílios
PROATUR	Regional Tourism Support Program (Programa de Apoio ao Turismo Regional)
RAIS	Relação Anual de Informações Sóciais
SUDENE	Superintendency of Development of the Northeast (Superintendência do Desenvolvimento do Nordeste)
UNTCAD	United Nations Conference on Trade and Development
UNWTO	United Nations World Tourism Organization
WTTC	World Travel & Tourism Council

Abstract[*]

In recent decades, a significant number of developing countries have implemented fiscal incentives programs for the tourism industry as part of their regional development policies. The main objective of these programs is to increase local investment and employment, as tourism activities are labor intensive. Little evidence is available, however, to assess the effect of these policies on job creation. This paper analyzes a fiscal incentives program that the Brazilian federal government introduced in 2002 to develop the tourism industry in the undeveloped region of Northeast Brazil. It provides evidence that income tax credits had a significant positive effect on job creation. We find that local employment in the tourism industry was on average 34 percent higher in those municipalities that benefited from the program.

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[*] Corresponding author: dcorderi@iadb.org. This paper is part of the IDB Economic Sector Work RG-K1413: Tax Incentives and Tourism Development in Latin America and the Caribbean. The authors are grateful to Mariano Bosch, Tomas Serebrisky, Rachel Boyce, Gines Suarez, and Gustavo García for helpful comments and suggestions, as well as Alexandre Reinehr for outstanding research assistance.

1. Introduction

Tourism is one of the largest and fastest growing industries in today's global economy, due partly to increasing globalization and disposable income (UNTCAD, 2013).[1] In 2013, the industry generated 9% of global gross domestic product (GDP) (UNWTO, 2014) and it accounts for 9% of the entire global workforce (UNWTO, 2014). In developing countries, the tourism industry significantly contributes to growth (Seetarah, 2011; Brida et al., 2010; Fayissa et al., 2009; Brida et al., 2008; Lee and Chang, 2008; Eugenio-Martin et al., 2004)[2], poverty alleviation (Klytchnikova and Dorosh, 2013; Mitchell and Ashley, 2010; Blake et al., 2008; Croes and Vanegas, 2008; ECLAC, 2007; Arbache et al., 2004), human development (Jiang et al., 2011) and job creation (Bolwell and Weinz, 2008). Benefits from tourism activities can spill over to related sectors (like transportation, construction and commerce) and ultimately to the rest of the economy through multiplier effects (ILO, 2013; Klytchnikova and Dorosh, 2013; WTTC, 2012).

As a result, governments in developing countries have been paying increasing attention to the development of the sector and implementing support policies with the expectation that they will help generate economic growth, employment, and higher income, thereby contributing to poverty reduction (UNTCAD, 2013). Specifically, in many developing countries, these policies include fiscal incentive regimes aimed at stimulating private investment in the tourism sector. For several decades, tax exemptions of various kinds have been granted in low- and medium-income countries to support the construction or remodeling of hotels, restaurants, and services catering to visitors (IDB, 2014).

Previous empirical evidence on the effectiveness of tax incentives to attract investment in developing countries is inconclusive (James, 2009; OECD, 2013; Zee, Stotsky and Ley, 2002). Several studies have been conducted on developed countries.[3] Feld and Heckmeyer (2009) conducted a meta-analysis of 46 studies on the elasticity of foreign direct investment to tax incentives in developed countries and concluded that it is substantially high. Bondonio and Greenbaum (2007), Chirinko and Wilson (2008; 2010), and Neumark and Kolko (2010) find modest positive effects of tax incentives on investment in the United States but almost no long-term effects on employment. Billings (2009), Bondonio and Greenbaum (2014), Bronzini and De Blasio (2006), and Givord (2011) report findings for Europe that are similar to those found for

[1] International tourist arrivals increased from 25 million in 1950 to 278 million in 1980, and to almost 1.1 billion in 2013 (UNWTO, 2014).

[2] Del P. Pablo-Romero and Molina (2013) recently reviewed the relationship between tourism and economic growth in both developing and developed countries.

[3] See Artana and Templado (2012), Caiumi (2011), Chirinko (1993), and Hassett and Hubbard (2002) for a detailed review of main methodological aspects to be considered when evaluating such schemes.

the United States. Few studies have focused on the tourism sector alone. The most relevant study in the tourism sector, by Van Parys and James (2010), identifies the effects of changes in taxation on tourism-related foreign direct investment (FDI) at the country level in the Caribbean region using a difference-in-differences methodology.

This paper analyzes the impact of a tax incentives program introduced by the Brazilian federal government in 2002 to increase investment and employment in the underdeveloped region of Northeast Brazil. The key measures of the Brazilian fiscal package allowed tourism firms to benefit from a substantial break in income taxes as they made new investments or engaged in expansion, modernization, or diversification projects. Additionally, existing businesses in the tourism industry received other types of income tax exemptions. These fiscal benefits could imply an increase of up to 25 percent in firm profits, a significant difference from the situation with no fiscal incentives. Consequently, we believe that these new rules have played an important role in investment decisions and job creation.

Using a difference-in-differences empirical strategy, we assess the effect of this program on job creation at the municipal level over the period 1998–2002. We provide robust evidence that tax credits to tourism firms have increased municipal employment in the tourism sector by about 34 percent. Therefore, we find that in 2009, approximately one job out of four in the tourism industry was the result of this particular fiscal policy. For the sector, the total number of jobs created is 45,905.

The paper is organized as follows. Section 2 describes the tax incentives program that was introduced by the Brazilian federal government in 2002. Section 3 presents the data and the empirical strategy upon which the analysis and the results are developed in Section 4. Section 5 concludes.

2. Institutional Context

The Northeast region of Brazil (Nordeste) has historically lagged behind other more industrialized parts of the country, such as the Southeast region, which encompasses the states of Rio de Janeiro and São Paulo. Regional development policies date back to the mandate of President Juscelino Kubitschek, who created the Superintendency of Development of the Northeast (Superintendência do Desenvolvimento do Nordeste, or SUDENE), as an institution established to coordinate development policies in the region. The SUDENE area covers all of the states in Northeast Brazil and some of the states of Espirito Santo and Minas Gerais. As of 2011, the area had a population of approximately 54.2 million inhabitants and generated approximately 14.3 percent of national GDP (IBGE, 2011; PNAD, 2011). Over the period 1995–

2011, the growth rate of the area was on average 4 times larger than the national growth rate (IBGE, 2011). This indicates that the region has scope for economic development. In 2011, however, per capita GDP was still less than half the national average (IBGE, 2011).

In 1966, the federal government allowed tax credits for hotel construction, renovation, and expansion projects at the national level.[4] These tax incentives were set to expire in 1985.[5] In 1974, the federal government also created the Northeast Investment Fund (Fundo de Investimento do Nordeste, or FINOR), a federal fund to finance investment projects in SUDENE.[6] According to a complicated fiscal rule, firms throughout Brazil could opt to transfer part of their income tax to the fund. Through the latter, donor firms could then become shareholders of recipient firms in SUDENE. Tourism projects could qualify to receive financial support from FINOR. However, by the early 1990s, significant irregularities related to corruption were observed in the management of the fund. Large amount of resources were diverted from their initial objectives and, as a result, by the end of the 1990s, FINOR had played a very limited role in the development of SUDENE (Campos, 2008; Moreira, 2003).[7]

It was only in 2002 that tax breaks for tourism firms in SUDENE reappeared on the development agenda of the federal government. Between 2001 and 2002, the administration of President Henrique Cardoso overhauled SUDENE and redefined the priority sectors that should benefit from fiscal support as part of a new development policy for the region.[8] The main objectives of this reform were to attract new investment and create jobs in the area. The tourism industry was explicitly included in these priority sectors, with a more comprehensive definition of tourism activities than in the past. The definition of investment in the tourism industry was extended to encompass convention centers and other projects, such as tourist resorts, while previous incentives were only offered to hotels.

The key measures of this fiscal package focused on the income tax. First, the new law allowed a 10-year, 75 percent income tax credit for new investments in priority industries in municipalities located in the SUDENE area.[9] In addition to new investments, expansion,

[4] Decreto Lei n° 55, December 18, 1966.
[5] Originally, tax credits including on income tax were defined in Decreto-Lei n° 55 of December 18, 1966. They were renewed (and modified) in 1971 (Decreto-Lei n° 1.191 of October 27, 1971) and in 1975 (Decreto-Lei n° 1.439 of December 30, 1975).
[6] In addition to FINOR, the government created another fund (Fundo de Investimentos Setoriais, or FISET) with resources exclusively targeted at tourism with Decreto-Lei n° 1.376 of December 12, 1974. However, these incentives were canceled with Decreto-Lei n° 2.397 of December 21, 1987.
[7] Corruption cases were subsequently investigated by National Commission (Comissão Parlamentar de Inquérito, or CPI), and FINOR was terminated in 2001 via Medida provisória n° 2.199-14. See Campos (2008) and Moreira (2003) for further discussion.
[8] These reforms took place through Medida provisória n° 2.199-14 of August 24, 2001 and Decreto n° 4.213 of April 26, 2002. Priority sectors are listed in the latter. In addition to tourism, they include industries such as pharmaceuticals, mining, textiles, and electronics. The Cardoso administration also changed the name of SUDENE to ADENE. In 2007, the Lula administration renamed the area as SUDENE. For the sake of consistency, in this paper, SUDENE refers to the area subsequently renamed ADENE.
[9] Medida provisória n° 2.199-14 of August 24, 2001.

modernization, and diversification projects were also subject to the measure.[10] Second, existing business in priority industries and in municipalities located in SUDENE could benefit from a 10-year, 25 percent income tax credit.[11] Finally, firms could benefit from a 30 percent rebate on taxable income if at least 45 percent of the (original) amount of the latter was reinvested in facilities improvement projects.

Consequently, this set of new rules was likely to play an important role in investment decisions and job creation. In Brazil, income tax credits account for up to 25 percent of firms' profits. Thus, the magnitude of the incentive is considerable. A 75 percent subtraction from income tax could imply an increase of 25 percent in profits, a large difference from the situation with no fiscal incentives. Note also that tax credits can be granted for new projects as well as for the expansion or modernization of existing businesses. Therefore, the effect on employment is likely to take place through both new investments (extensive margin) and expansion of existing activities (intensive margin).

While they affected several important sectors of the economy, the rules introduced in 2002 are likely to have large effects in the tourism industry. Indeed, by the end of the 1990s, investments in agricultural and industrial activities had already received considerable federal support through fiscal incentives. Investments in these industries benefited from a 75 percent income tax credit since 1998.[12] Some evidence also suggests that tourism is one of the industries that has benefited the most from fiscal incentives in SUDENE. On average, over the period 2013–14, among more than 19 industries that had access to tax incentives, tourism ranked in the top five in terms of projects approved for tax credits by SUDENE authorities (SUDENE, 2013; 2014).[13]

Finally, an argument can be made that firms could have anticipated changes in the tax regime and strategically postponed their investment decisions in the region until such a program was put into place. We believe that the decision of the federal government to provide these tax incentives could not have been anticipated by firms, since the program was enacted via an executive order (Decreto n° 4.213). Unlike legislative orders, executive orders do not need the approval of Congress or parliamentary commissions that verify the validity and relevance of the law. In fact, while a legislative order can take months to become law, the enactment of an executive order is immediate. Therefore, no lengthy discussions in Congress before 2002 could

[10] Projects of expansion, modernization, and diversification aim at improving the current facilities of a business. To be granted the tax rebate, these projects had to account for at least 50 percent of the value of the firm's tangible assets (Medida provisória n° 2.199-14 of August 24, 2001).
[11] Decreto n° 4.213 of April 26, 2002. However, this measure was later reduced to a 12.5 percent deduction from taxable income in 2009 with Decreto n° 6.539 of August 18, 2008.
[12] Lei n° 9.532 of December 10, 1997.
[13] Data for our period of analysis are not available.

have influenced businessmen's expectations about future tax credits in SUDENE. In addition to that, we were able to verify that neither national nor local newspapers provided information on this topic before April 2002.[14]

In summary, in April 2002, tourism investments in the SUDENE area could benefit from significant fiscal advantages, while no similar support was provided in other regions of Brazil. This provides an ideal quasi-experiment to study the effect of this fiscal shock on job creation, as other states can be used as a control group to mimic the counterfactual of SUDENE. As we have data on tourism employment from 1998, the difference-in-differences identification strategy is an appropriate approach to study this question.

3. Empirical Strategy

3.1. Estimation Methodology

In our analysis, the estimand of interest is the average treatment effect on the treated (ATT) of fiscal incentives on municipal employment in the tourism industry. As we observe municipalities before and after the introduction of tax credit, we use a difference-in-differences strategy.

We define two groups of municipalities: one that benefits from the tax incentives program described in the previous section from 2002 onward and the other that has never had access to such fiscal advantages. Hereafter, we refer to these two groups as the treatment and the control group, respectively. The essence of our difference-in-differences approach is to compare the change in local tourism employment in the treatment group before and after 2002 to the change in the same outcome in the control group. That is, we assume that the control group mimics the counterfactual of the treatment group, or how the latter would have behaved in the absence of a tax incentives program. Formally, we estimate the following equation:

$$y_{it} = \alpha + \delta T_{it} + \beta X_{it} + \theta_i + \lambda_t + \varepsilon_{it} \qquad (1)$$

where y_{it} is the tourism employment in municipality i in year t; T_{it} is the treatment variable that takes value 1 if municipality i is treated in year t, that is, if municipality i belongs to the SUDENE area and $t \geq 2002$; X_{it} is a set of time-varying (observable) control variables; θ_i is a fixed effect of municipality i; λ_t is a year dummy variable that captures the trend common to all municipalities; and ε_{it} is the idiosyncratic error. In this model, the parameter of interest is δ as it

[14] We searched for articles related to Decreto n° 4.213 between April 1 and April 25 in the following newspapers: *A Tarde* (Bahia), *Diario de Pernambuco* (Pernambuco), *Folha de São Paulo, Valor Economico,* and *Veja.*

captures the extent of the difference in the trend of the treatment group from the trend of the control group after the introduction of the program.

Difference-in-differences strategies have been widely used for impact evaluation of public policies (see, for example, Galiani, Gertler, and Schargrodsky, 2005). The central assumption of this type of identification is that unobservable characteristics that may bias the estimates are time invariant. That is, we assume that no time-varying unobservable characteristic is correlated with both the treatment variable T_{it} and the outcome variable y_{it}.

In our setting, municipalities that receive the treatment are likely to be different from the control group. As illustrated in the previous section, the government decided to allow a tax credit on investments in SUDENE specifically because this area suffers from a lack of economic dynamism. However, the problem is not new, as the Northeast region of Brazil has historically lagged behind. Therefore, we think that the underlying reasons that explain the underdevelopment of the region can be considered as fixed from an econometric point of view, which makes our difference-in-differences identification strategy a valid approach to address the effect of tax incentives on local employment.

Nonetheless, as in Galiani, Gertler, and Schargrodsky (2005), we also provide additional estimation results that use a strategy combining difference-in-differences and matching methods in order to address potential omitted-variable bias issues. We estimate equation (1) with a restricted sample of observations that belong to a common support in the distribution of observable characteristics in the treatment group and the control group. In our setting, where the treatment is assigned by the Brazilian federal authorities rather than self-selected, this process ensures that any combination of characteristics observed in the treatment group can also be found in the control group (Bryson, Dorsett, and Purdon, 2002; Caliendo and Kopeinig, 2008). This process makes the treatment group and the control group more homogeneous, as we discard observations that would be too different to be compared across both groups. Finally, we also provide estimates of the treatment effect by using the generalized difference-in-differences matching estimator of Heckman, Ichimura, and Todd (1998) for robustness checks.

3.2. Data

In our empirical analysis, the treatment and the control groups are those municipalities that do and do not belong to the SUDENE area, respectively. As the latter is a vast and heterogeneous region in terms of economic activity, we construct our sample of observations as follows. We consider the states of Espirito Santo and Minas Gerais as the northern parts of these two states

belong to the SUDENE area, while the southern parts do not. The municipalities of these two states are particularly important, as they allow us to observe a within-state variation of the treatment variable therefore reducing potential omitted-variable bias from between-state variations. Additionally, as we focus our analysis on the tourism industry, we decide to also include municipalities from the states of Bahia and Rio de Janeiro. These two states are contiguous to Espirito Santo and Minas Gerais and are important tourist destinations.[15] Moreover, it is likely that the type of tourism is the same, as both states are located on the Atlantic coast of Brazil, offering beaches and tourism amenities. Bahia is part of SUDENE, while Rio de Janeiro is not. Therefore, the latter can be considered as a good counterfactual of the former. Figure 1.A in appendix A shows the region of analysis on a map of Brazil.

In addition, we restrict our analysis to municipalities that present potential business for the tourism industry. The Brazilian Department of Tourism provides a list of municipalities that have a tourist attraction. Specifically, for a municipality to be considered an area of tourist interest, it must have a historical, cultural, economic, and/or geographic attraction. Furthermore, it must offer services and facilities for tourists.[16] In this paper, we use the most updated list of 2013.

Our estimates use municipality-level data that come from various sources. Our dependent variable, measured as the log number of jobs in tourism industry, is calculated from the Relação Anual de Informações Sóciais (RAIS) database. These data are collected annually by the Brazilian Department of Labor. This database provides the details of all formal sector workers, including the (type of) industry, wages, and gender.

We use the definition of Representative Activities of Tourism (Atividades Caraterísticas do Turismo, or ACT) to identify employees working in tourism industry. The Brazilian Tourism Department and the Brazilian Institute of Geography and Statistics (Instituto Brasileiro de Geografia e Estatísticas, or IBGE) use this group of activities to carry out research on tourism in Brazil. Representative Activities of Tourism are a specific subset of categories in the National Classification of Economic Activities (Classificação Nacional de Atividades Economicas, or CNAE) which is the official classification provided by the Brazilian Department of Labor. Categories in the tourism industry include lodging, catering, transportation, culture, and leisure. They are identified with a code provided for each worker in the RAIS database. This allows us to

[15] In 2005, Bahia and Rio de Janeiro accounted for 7.4 percent and 8.4 percent of total tourist destinations in Brazil, respectively. Only São Paulo and Minas Gerais ranked higher. It is also important to note that, for the SUDENE area only, the state of Bahia accounted for 38 percent of tourist destinations, ranking first by far among the states of Northeast Brazil (Ministério do Turismo, 2007).

[16] Portaria n° 313 of December 3, 2013 (Ministério do Turismo).

calculate the number of employees in the tourism industry for each municipality. A full list of ACTs with CNAE codes that were used is provided in Appendix B of this paper.

We control for a set of labor-market characteristics that might explain investment in the industry and, therefore, job creation in the sector. These variables include the average municipal salary in terms of inflation-adjusted minimum wage and the proportion of women in the municipal labor force. They are calculated annually from the RAIS database. In addition, we use population estimates at the municipal level provided by the IBGE.

We also include fiscal policy characteristics in our regressions that account for the quality of public goods at the municipal level. From the FINBRA database of the Brazilian Tax Department, we are able to observe annual fiscal revenues (in Brazilian reais), which could provide important information about wealth creation and, therefore, the quality of the business environment. We also consider federal and state transfers to municipalities. Federal transfers are the most important source of municipal revenues (see Brollo and Nannicini, 2012, for a discussion). There are two types of transfers: (i) constitutional automatic transfers and (ii) discretionary transfers (*convênios*). The main objective of these transfers is to improve public goods. Automatic transfers are generally associated with health or education programs, while discretionary transfers relate to specific infrastructure projects. As such, both types of transfers may actually attract investments in the tourism industry.[17] Therefore, we control for the total amount of the transfers that a municipality is able to obtain from both federal and state authorities (*transferências correntes*). Finally, we also control for a set of variables that account for economic activity. These include GDP per capita at the municipal level and the percentage of industrial GDP and service industry GDP. All these data are available from the IBGE.

From the IBGE 2000 population census, we are able to observe a set of socioeconomic characteristics. As the latter are not observable annually, we cannot include them in difference-in-differences regressions. However, we can use them as pretreatment variables for matching. These include the municipal poverty level, measured as the percentage of households with a monthly revenue per capita lower than half the minimum wage, which is the official definition used by IBGE to measure poverty; a measure of education proxied by the percentage of people with at least a high school diploma above the age of 25; a measure of employment activity as the percentage of the economically active population (above the age of 10); a measure of wealth inequality provided by a municipal Gini index; and the percentage of the urban population. All these variables are from IBGE databases except data on Gini index, which are

[17] Some infrastructure projects might even directly target tourism activities. For instance, PRODETUR is a federal initiative that aims to improve airport access and the convenience of tourist attractions.

from the Institute of Applied Economic Research (Instituto de Pesquisa Econômica Aplicada, or IPEA).

Our period of analysis spans from 1998 to 2009 for the following reasons: we have access to the RAIS database only from 1998 onward. Then, we excluded the post-2010 period as the Brazilian authorities decided to allow more incentives to investment in the tourism industry as a result of the winning bid for the FIFA World Cup 2014 and the 2016 Olympic Games to be held throughout the country and in the city of Rio de Janeiro, respectively.[18] The main goal of these measures was to improve tourism infrastructure, anticipating a larger flow of visitors due to these events. In order to clear the analysis from the effect of these new incentives, we do not cover the period after their introduction. Finally, population data are available only starting in 2000. Therefore, all regressions that control for population estimate coefficients over the period 2000–09.

We end up with a sample of 617 municipalities, distributed as 29 percent and 71 percent in the treatment group and the control group, respectively. Table 1 provides the pretreatment mean—as of 2000—of each variable used in the empirical analysis for the treatment and control groups. In addition, we also report the mean differences between the two groups. We find that the treatment group, that is, municipalities belonging to the SUDENE area, is somewhat less developed. These municipalities are significantly poorer and less educated and have higher inequalities and a lower per capita GDP. This should not be surprising in view of what we mentioned previously: SUDENE has historically been a less-advanced area in Brazil that public policies have targeted to attract investments.

[18] Federal incentives for the FIFA World Cup were defined in Lei n° 12.350 of December 20, 2010. Municipal incentives for the city of Rio de Janeiro were defined in Lei n° 5.230 of October 10, 2010.

Table 1: Treatment and Control Group Variables and Mean Differences

	Pretreatment variable as of 2000	Treatment group (1)	Control group (2)	Mean difference (3)
Municipalities	Number	180	437	
Dependent variable	Log tourism employment	3.549	4.242	-0.693***
				(0.234)
Labor market characteristics	Average wage	2.252	2.615	-0.363***
				(0.077)
	Average percent women	0.294	0.340	0.046***
				(0.011)
	Population	46.39	56.11	-9.717
				(19.57)
Fiscal characteristics	Fiscal revenues	164.3	322.3	-158.0
				(121.7)
	Transfers	125.3	200.1	-74.87
				(59.15)
GDP characteristics	GDP per capita	2,775	5,513	-2738***
				(349.1)
	Percent of industrial GDP	0.131	0.183	-0.052***
				(0.010)
	Percent of service GDP	0.570	0.526	0.044***
				(0.012)
Socioeconomic characteristics	Percent of high-school graduated	0.104	0.147	-0.043***
				(0.006)
	Percent employment	0.530	0.558	-0.028***
				(0.005)
	Gini index	0.567	0.516	0.051***
				(0.009)
	Percent poor people	0.420	0.241	0.179***
				(0.008)
	Percent urban population	0.556	0.685	-0.129***
				(0.019)

Notes: Means calculated for the year 2000 with 617 municipalities used in regressions of Section 4. Treatment and control groups include 180 and 437 municipalities respectively. Robust standard errors clustered at the municipal level in parentheses: *** p<0.01, ** p<0.05, * p<0.1

4. Empirical Analysis

4.1. Stylized Facts on Tourism Investment in the Treatment Group

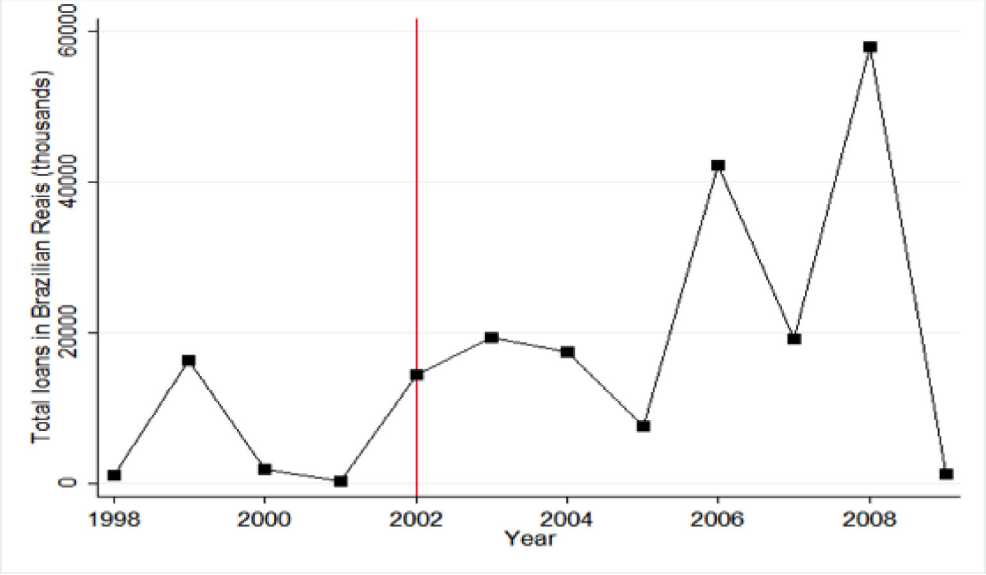
We start our empirical analysis with some stylized facts on the tourism investments made in the SUDENE area over the period of analysis. We do not observe total investment in tourism

industry, but we have access to disaggregated data from the Regional Tourism Support Program (Programa de Apoio ao Turismo Regional, or PROATUR), a loan program from Banco do Nordeste for firms in the tourism industry located in the SUDENE area. These data can be considered a good proxy for the trend of total tourism investment in Northeast Brazil.[19]

We calculate the total amount of PROATUR loans in 2010 prices received by treatment group municipalities. Results for each year in our period of analysis are reported in Figure 1. From a first visual inspection, these results suggest that trends in the pre- and post-treatment period are different. Total loans in the treatment group seem to be stagnant before 2002, while they show an increasing pattern after 2002. While it is difficult to infer robust conclusions on trends, we simply note at this stage that the yearly average of total loans is 4,938k reais and 22,498k reais in pretreatment and post-treatment periods, respectively. In particular, with the exception of 1999, loans in the pretreatment period are always lower by 2,000k reais.

Given the reasons explained above, a potential cause of this pattern is the introduction of tax incentives in 2002 because, by reducing the income tax, they would increase the net profit of firms. The next subsections provide evidence that these tax incentives had a causal effect on employment in the tourism industry.

Figure 1: Total Loans Received by Treatment Group Tourism Firms (PROATUR) (in constant prices)

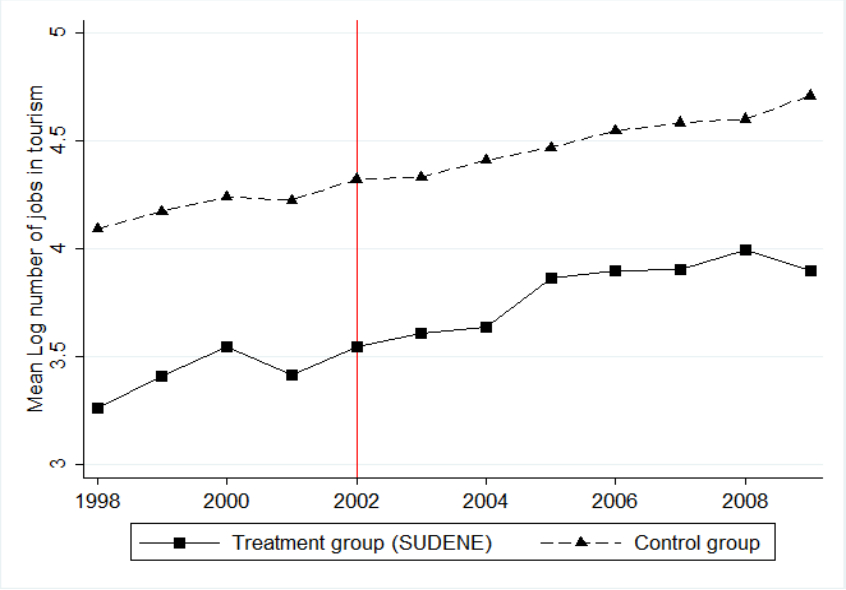


[19] Banco do Nordeste is a federal financial institution that promotes development in Northeast Brazil. Through its program PROATUR, tourism firms located in the SUDENE area can receive loans at competitive interest rates. PROATUR also facilitates access to credit to small, medium, and large businesses.

4.2. Main Results

Next, we discuss the assumption that, prior to the introduction of fiscal incentives, employment in the treatment and the control groups has parallel trends. Figure 1 shows the trends in average tourism employment for both the treatment group and the control group over the period 1998–2009. A quick visual inspection suggests that pretreatment trends are parallel. We formally test this assumption by estimating a slightly different version of equation (1) in which we allow the treatment group and the control group to have differentiated year dummy variables, as opposed to allowing them to have different trends over the whole post-treatment period. Concretely, we estimate equation (1) with an interaction term between each year dummy variable and the treatment variable (that is, the SUDENE indicator).[20] Estimate points with 90 percent confidence intervals are reported in Figure 2. These results provide evidence that before 2002, differences in trends for treatment and control groups are not significantly different from zero. In fact, before 2003, the trends difference in the two groups is essentially zero and it is only in the post-intervention period—from 2003 onward—that we observe a higher growth in the treatment group tourism employment. Thus, these findings validate the main assumption of our empirical strategy.

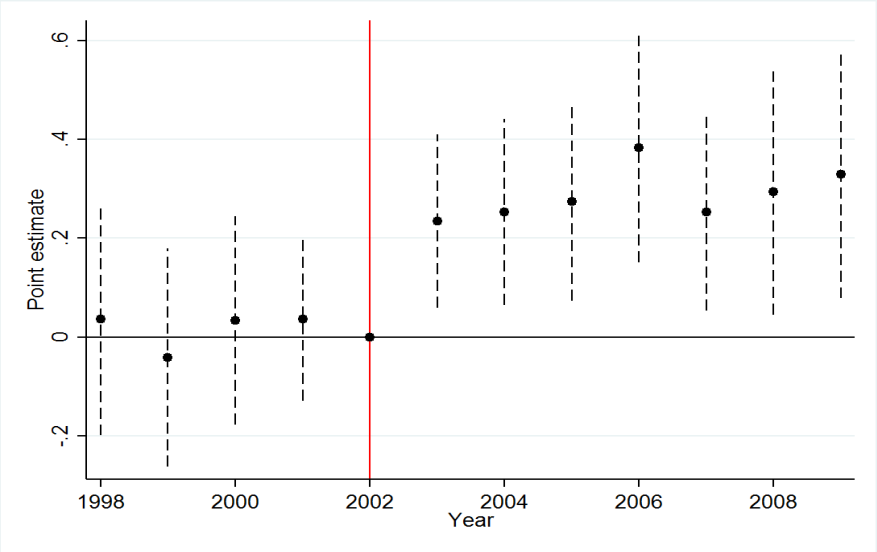
Figure 2: Tourism Employment Trends in the Treatment and Control Groups



Source: Authors' calculations based on data from RAIS database.

[20] These estimations also include state fixed effects, municipal fixed effects, and all interaction terms between state fixed effects and year dummies.

Figure 3: Estimation Results—Interaction Year Dummies with Treatment Variable



Source: Authors' calculations.

We now estimate the average effect of the program over the period of analysis. In Table 2, we report the estimation results of equation (1).[21] We use labor market, GDP, and fiscal characteristics presented in Table 1 as control variables in our regressions.[22] However, the potential effect of these variables on tourism employment is likely to take place with some lag. For instance, federal transfers to improve local public goods might actually increase tourism business one period after they are realized, as investors take time to make their decisions. This rationale holds for the other variables of Table 1 as well. Therefore, controls used in regressions are lagged variables of labor market, GDP, and fiscal characteristics of Table 1.

Columns (1) to (4) of Table 2 exhibit the estimate points of coefficient of the treatment variable across various specifications. The estimate points are significantly positive and indicate that the tax incentives program would have generated an increase of between 30 and 39 percent in tourism employment over the 2002–2009 period. In columns (5) to (8), we report the estimation results of the same regressions except that we introduce state fixed effects and interaction terms between the latter and year dummies. Among other things, these variables control for state time-specific supply and demand shifts that might be of importance to explain employment in the tourism industry.[23] Estimate points show that, while smaller in magnitude, the effect of a tax credit is still positive and significantly different from zero. These findings suggest

[21] Note that we use a "panel data within estimator" in order to avoid estimating a fixed effect dummy variable for each municipality.
[22] We cannot use socioeconomic characteristics, as we observe these variables only in year 2000.
[23] For instance, if in a particular year consumers increase demand for tourism products in Bahia, the interaction term captures this effect.

that the program has generated an increase of between 23 and 26 percent in tourism employment.

Table 2: Difference-in-Differences Estimation Results

Dependent variable	Log tourism employment							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment	0.334***	0.265***	0.265***	0.277***	0.235**	0.211**	0.211**	0.225**
	(0.072)	(0.073)	(0.073)	(0.073)	(0.095)	(0.103)	(0.103)	(0.102)
Labor market characteristics	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Fiscal characteristics	No	No	Yes	Yes	No	No	Yes	Yes
GDP characteristics	No	No	No	Yes	No	No	No	Yes
Municipal fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State fixed effects	No	No	No	No	Yes	Yes	Yes	Yes
Interaction state and year dummies	No	No	No	No	Yes	Yes	Yes	Yes
Observations	6,509	5,004	5,004	5,004	6,509	5,004	5,004	5,004
Number of municipalities	617	615	615	615	617	615	615	615
R-squared	0.328	0.266	0.266	0.271	0.335	0.271	0.271	0.278

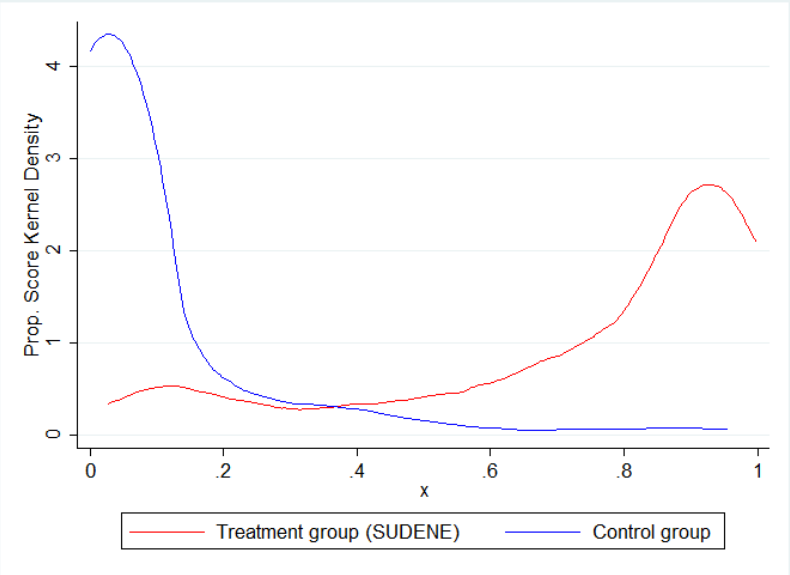
Notes: Columns 1–8 report the estimation results of equation (1) for several specifications, including the lagged control variables defined in Section 3. The dependent variable is Log number of jobs in the tourism industry. Control variables are lagged variables of labor market, GDP, and fiscal characteristics of Table 1. Robust standard errors are clustered at the municipal level in parentheses: *** p<0.01, ** p<0.05, * p<0.1

As mentioned previously, the treatment and control groups are heterogeneous in that the SUDENE area has been historically less developed. In order to ensure that observations in both groups are similar with respect to a set of observable characteristics, we replicate regression estimations of Table 2 with only observations that are about the region of common support. Concretely, from a logit model, we estimate the propensity score of belonging to the treatment group with the set of pretreatment variables presented in Table 1. To create the region of common support, we exclude all control observations that have a lower propensity score than the minimum propensity score of the treatment group and all treated observations that have a higher propensity score than the maximum propensity score of the control group.

Figure 3 shows the kernel densities of the propensity scores for the treatment and control groups. It can be seen that the overlapping region defining the common support is large, meaning that treated observations have similar control counterparts to be paired with in order to calculate the treatment effect. Table 3 reports the estimation results of equation (1) when restricting the sample to common support. Coefficients remain significantly different from zero and are even larger in magnitude than estimate points reported in Table 2. Overall, this set of

estimates indicates that tax incentives are associated with an increase of between 25 and 32 percent of tourism employment at the municipal level.

Figure 4: Kernel Densities of Propensity Score for Treatment and Control Groups



Source: Authors' estimations.

Table 3: Difference-in-Differences Estimation Results on Common Support

Dependent variable	Log tourism employment							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment	0.284***	0.238***	0.239***	0.245***	0.229**	0.265**	0.265**	0.276**
	(0.086)	(0.086)	(0.086)	(0.087)	(0.111)	(0.120)	(0.120)	(0.120)
Labor market characteristics	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Fiscal characteristics	No	No	Yes	Yes	No	No	Yes	Yes
GDP characteristics	No	No	No	Yes	No	No	No	Yes
Municipal fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State fixed effects	No	No	No	No	Yes	Yes	Yes	Yes
Interaction state & year dummies	No	No	No	No	Yes	Yes	Yes	Yes
Observations	3,000	2,259	2,259	2,259	3,000	2,259	2,259	2,259
Number of municipalities	255	255	255	255	255	255	255	255
R-squared	0.371	0.297	0.298	0.305	0.379	0.304	0.304	0.313

Notes: Columns 1–8 report the estimation results of equation (1) for several specifications, including the lagged control variables defined in Section 3. The dependent variable is Log number of jobs in the tourism industry. Control variables are lagged variables of labor market, GDP, and fiscal characteristics of Table 1. Robust standard errors are clustered at the municipal level in parentheses: *** p<0.01, ** p<0.05, * p<0.1

Finally, in Table 4, we report the estimation results of the generalized difference-in-differences matching estimator presented in Heckman, Ichimura, and Todd (1998). Following their procedure, we match the 2000–2009 difference in log tourism employment on the propensity score. Treatment effect is estimated using both a kernel density matching and a local linear matching with and without a semi-parametric regression adjustment.[24] We also impose observations on the common support. Again, point estimates are significantly different from zero and are larger in size than estimation results reported in Table 2 and Table 3. This time, these findings suggest that the tax incentives program is associated with an increase of between 75 and 88 percent in tourism employment at the municipal level.

[24] Standard errors of these estimates are calculated by bootstrapping as in Galiani Gertler, and Schargrodsky (2005).

Table 4: Generalized Difference-in-Differences Matching Estimation Results

Dependent variable	Log employment in tourism			
	Local linear matching		Kernel matching	
	(1)	(2)	(3)	(4)
Treatment	0.570**	0.562**	0.635***	0.634**
	(0.254)	(0.280)	(0.238)	(0.270)
Semi-parametric regression adjustment	No	Yes	No	Yes
Observations (Number of municipalities)	498	498	498	498

Notes: Columns 1–4 report the estimation results of equation (1) with a matching procedure as presented in Heckman, Ichimura, and Todd (1998). Matching is made on pretreatment variables in year 2000 defined in Section 3. These include labor market, fiscal, GDP, and socioeconomic characteristics. The dependent variable is Log number of jobs in the tourism industry. Bootstrapped standard errors are in parentheses: *** p<0.01, ** p<0.05, * p<0.1

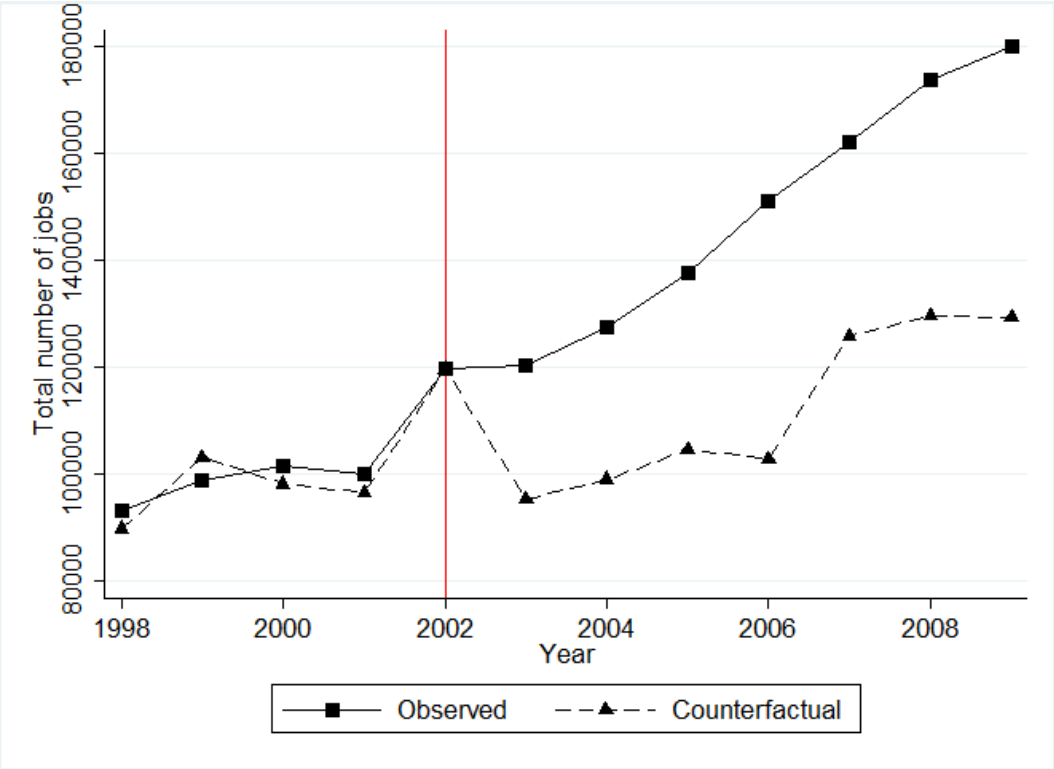
Thus, overall these estimation results provide evidence that there is a robust positive effect associated with the tax incentives program. As they control for state dummies interacted with year dummies and use a restricted sample to the common support, our preferred estimation results are columns (5) to (8) from Table 3. According to the latter, on average, tourism employment would increase by about 30 percent over the post-treatment period 2002–2009.

4.3. Job Creation

While the estimations of the treatment effect account for the average percentage increase in tourism employment over the whole post-treatment period, it is interesting to look at the dynamics of the effect and to calculate the absolute number of additional jobs created by the introduction of fiscal incentives. To do so, we construct the yearly counterfactual total number of jobs in the SUDENE area using the coefficients reported in Figure 2.

Figure 6 plots the observed total number of jobs in tourism industry for the SUDENE area and the counterfactual for our period of analysis, 1998–2009. Over time, trends in both groups seem to keep diverging. This provides evidence that the effect of the program is not a one-time, short-term increase in employment that would have eventually been seen in the absence of the program. This also suggests that longer-term effects of the treatment may even be stronger.

Figure 5: Observed and Counterfactual Number of Jobs in SUDENE Area (1999–2009)



Source: Authors' estimation.

Next, in 2009, while we observe 179,990 jobs in the SUDENE area, the counterfactual number is 129,398, meaning that 50,592 additional jobs were created with fiscal incentives over the period 2002–2009. Given these numbers, we can also calculate that the observed growth in tourism employment over the same period is 50 percent while its counterfactual is 8 percent, meaning that 84 percent of the former is explained by the introduction of the fiscal program.

To sum up, estimate points from our preferred estimations indicate that by 2009, about 34 percent more jobs were created in the tourism industry through the tax credit program. It also means that by 2009, approximately one job out of four in the tourism industry was the result of this particular fiscal policy. For the sector, this corresponds to an employment growth of 84 percent higher than what would have occurred in the absence of the program. Finally, in absolute terms, the total number of jobs created is 45,905.

4.4. Displacement Effect

A final point that we want to address in our empirical analysis is the displacement effect. The evidence that we have provided on a positive effect of tax incentives might be partially due to

two kinds of displacement effects. First, the fiscal policy in the SUDENE might have displaced some investments that would otherwise have taken place in the municipalities within the control group. Second, new investments might directly displace workers of those municipalities that do not benefit from tax incentives. For instance, the most productive workers might leave if they are offered higher wages, which would result in job destruction in the control group.

While it is difficult to find an appropriate setup to measure the extent of these potential displacement effects, we can argue that the latter are most likely to occur within the same state. Indeed, it is easier for workers to migrate between two municipalities in, for instance, the state of Espirito Santo than from Rio de Janeiro to Bahia. It is also likely that costs associated with displacing investments are lower within the same state, as bureaucratic procedures remain the same.

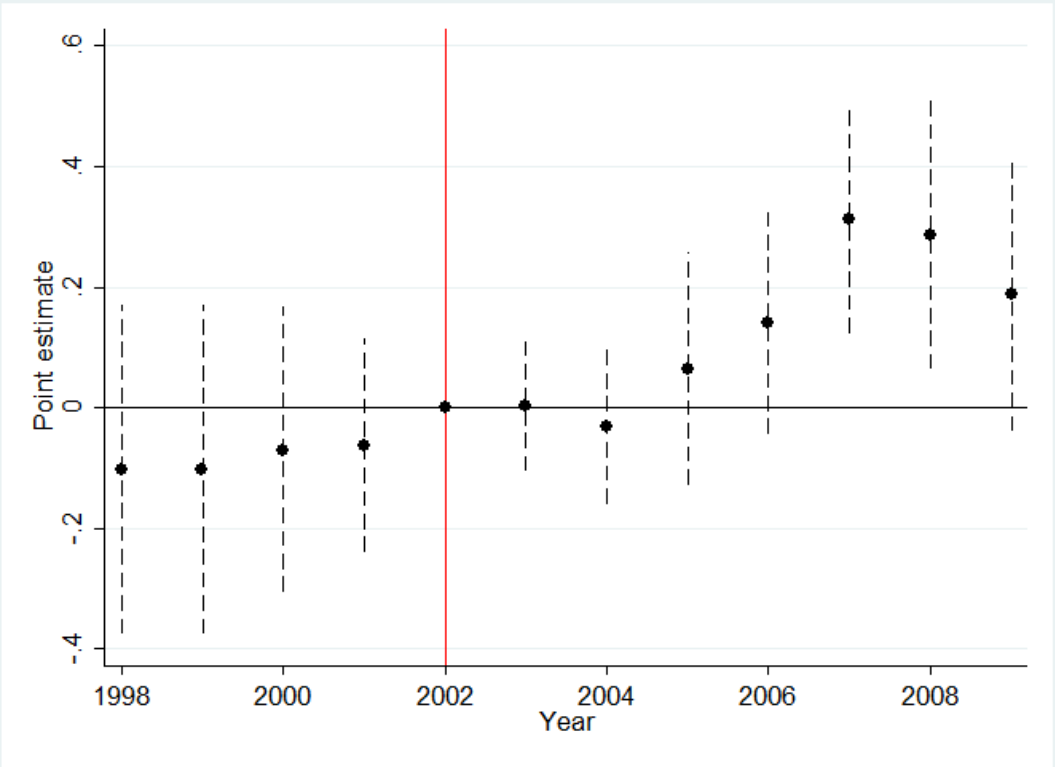
Thus, control group municipalities in the state of Espirito Santo are good candidates to be affected by such displacement effects, as the state is a relatively small and homogenous entity.[25] This makes migration and re-planning investments especially easy. On the contrary, migration or displacing investments between the state of Rio de Janeiro and municipalities in the treatment group are more costly and consequently less likely to occur.

We therefore investigate whether employment trends in *control group* municipalities of the states of Espirito Santo and Rio de Janeiro are different. As just explained, the displacement effect is likely to disproportionately affect municipalities in Espirito Santo that do not benefit from the incentives program. We estimate the interaction term between year dummies and state dummy variables for this restricted sample.

Estimate points with 90 percent confidence interval are reported for each year in Figure 7. We observe that, if anything, the trend in tourism employment in control municipalities of Espirito Santo is not significantly different from the trend in (control) municipalities of Rio de Janeiro until 2006. Then, tourism employment appears to grow faster in Espirito Santo. As we do not observe negative coefficients, these results at least suggest that we can rule out potential displacement effect between municipalities in the treatment and the control groups. The positive signs of the coefficients in the post-2006 period might be the effect of positive spillovers. While this is beyond the scope of this paper, future research might investigate whether such mechanisms are really at work.

[25] Of the 26 Brazilian states, the state of Espirito Santo is the fourth smallest and represents less than 1 percent of the total area of the country.

Figure 6: Estimation Results: Trends of Control Municipalities in Espirito Santo and Rio de Janeiro



Source: Authors' estimation.

Another piece of evidence that tends to show the absence of displacements is that the tax incentives program seems to have had no effect on real wages. As assumed above, if job creation in the treatment group is the result of job destruction in the control group, it must be because of a wage difference induced by the treatment.

Therefore, we replicate the estimations of Table 2 with the (municipal) average wage as a dependent variable.[26] Table 5 reports these estimation results. Overall, they are inconclusive. Some point estimates are significantly positive at the 10 percent level. However as we control for state fixed effects and interactions with year dummies in columns (5) to (8), the estimated coefficients have a no significant negative sign.

[26] This variable is the inflation-adjusted minimum wage.

Table 5: Difference-in-Differences Estimation Results of Effect on Wages

Dependent variable	Log average municipal wage in tourism industry							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment	0.028	0.047*	0.047*	0.045*	0.019	-0.013	-0.013	-0.013
	(0.025)	(0.027)	(0.027)	(0.027)	(0.033)	(0.038)	(0.038)	(0.038)
Labor market characteristics	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Fiscal characteristics	No	No	Yes	Yes	No	No	Yes	Yes
GDP characteristics	No	No	No	Yes	No	No	No	Yes
Municipal fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State fixed effects	No	No	No	No	Yes	Yes	Yes	Yes
Interaction state & year dummies	No	No	No	No	Yes	Yes	Yes	Yes
Observations	6,509	5,004	5,004	5,004	6,509	5,004	5,004	5,004
Number of municipalities	617	615	615	615	617	615	615	615
R-squared	0.290	0.243	0.244	0.245	0.302	0.258	0.258	0.259

Notes: Columns 1–8 report the estimation results of equation (1) for several specifications that include the lagged control variables defined in Section 3. The dependent variable is Log average municipal wage in the tourism industry. Control variables are lagged variables of labor market, GDP, and fiscal characteristics of Table 1. Robust standard errors are clustered at the municipal level in parentheses: *** p<0.01, ** p<0.05, * p<0.1

5. Concluding Remarks

Our empirical analysis provides evidence that the fiscal incentives put in place by the federal authorities in Brazil led to an increase in tourism employment in one of the less advanced regions of the country. This job creation is substantial. We calculated that in 2009, one job out of four was the result of this fiscal policy. In addition, other findings suggest that this job creation was not the result of either displacement effect or job destruction in neighboring municipalities that could not benefit from the tax incentives.

However, while our results highlight the net benefits of this fiscal package, we did not establish that it was efficient, let alone cost-effective. We showed that job creation would not have occurred in the absence of tax incentives, but it might be that part of it could have happened anyway with a lower tax credit. As we mentioned previously, the 75 percent tax credit offered to firms is large and its marginal cost in terms of foregone revenues might be higher than its marginal benefit in terms of job creation.

Addressing this question requires calculating tax price elasticity with respect to employment at different tax rates. By doing so, we could determine the optimal tax credit to apply by comparing the benefits of job creation with the costs of foregone fiscal revenues. Although challenging, using firm-level tax forms data might be a promising step for future research.

Additionally, from a general equilibrium point of view, this type of fiscal policy might also turn out not to be cost-efficient. Other development policies targeted at increasing the provision of public goods, such as infrastructure, human capital, public safety, and others, might achieve the same target in terms of job creation while also generating welfare-increasing externalities that seem absent from tax credit programs. Estimating the job creation of other programs and comparing the results to the findings of this paper might be an important building block for further understanding of this question.

Finally, it is important to highlight that the tax incentives program did not take place in a vacuum. As we explained, industries other than tourism were also subject to fiscal support even before 2002. These incentives might have created a particularly dynamic environment that allowed tax credits in the tourism industry to have such large effects. The extent to which the economic performance of other sectors plays a role in the effects of the tax incentives program is another promising avenue for future research that could be undertaken in this particular context.

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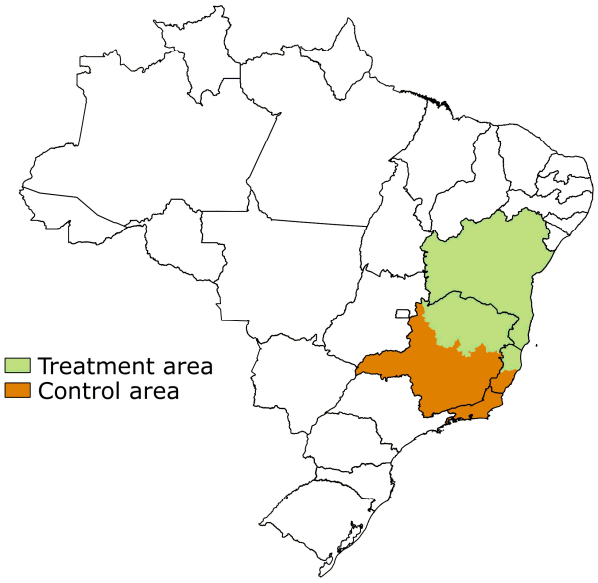
Appendix

Appendix A. Treatment and Control Areas in Brazil



Appendix B. List of Representative Activities of Tourism

Representative Activities of Tourism (Atividades Caraterísticas do Turismo)	National Classification of Economic Activities (Classificação Nacional de Atividades Econômicas – CNAE)
Lodging services	55.1
Catering services	55.2
Rail public transport	60.1
Road public transport	6024, 6025
Maritime public transport	61115, 61123, 61212
Air public transport	62103, 62200
Other public transport	63.2
Travel agencies	63.3
Car rental agencies	7110, 7121, 7122, 7123
Cultural industry	9252, 9253
Sport and recreational services	9231, 9232, 9239, 9261, 9262

Source: Instituto Brasileiro de Geografia e Estatística (IBGE)