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The causal effects of regional industrial policies on employment: A synthetic control approach

Victoria Castillo[a], Lucas Figal Garone[b,c,*], Alessandro Maffioli[c], Lina Salazar[d]

[a] Observatory of Employment and Entrepreneurial Dynamics, Ministry of Labor, Employment, and Social Security, Av. Leandro N. Alem 628, Autonomous City of Buenos Aires C1001AAO, Argentina.
[b] Department of Economics, Universidad de San Andres, Vito Dumas 284, Victoria B1644BID, Buenos Aires, Argentina.
[c] Inter-American Investment Corporation, 1350 New York Ave. NW, Washington DC 20577, United States.
[d] Inter-American Development Bank, 1300 New York Ave. NW, Washington DC 20577, United States.

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ABSTRACT

Industrial policies affecting entire sectors in regions, provinces, or districts can account for large portions of sub-national government spending. Yet because of the methodological challenges related to the identification of a counterfactual when a single unit is treated, the causal effects of these policies on the growth of the industry, or specifically on employment, are seldom identified. We adopt a Synthetic Control Method (SCM) approach to analyze the long-term impact on employment of the Tourism Development Policy (TDP) implemented by the Argentinean province of Salta. We find an 11 percent average annual impact over 10 years on employment in the hospitality sector, which translated in an accumulated impact of 1376 formal jobs in the tourism value-chain. We also find that this growth did not happen at the expenses of other industries and that TDP generated positive inter-industry employment spillovers/externalities. For each job created in the tourism value-chain, an additional job was created in the rest of the provincial economy, which resulted in a total creation of 2750 formal jobs. Our results are robust across a series of placebo tests and sensitivity checks and are consistent among alternative synthetic control units.

1. Introduction

In the last decades, industrial policy has been absent from the economic policy debate. Memories of failed import substitution policies, with disappointing consequences for public finance, kept policy-makers from even contemplating industrial policy as a viable option. However, since the global crisis of 2008–2009, interest in industrial policy has re-emerged in developed and developing economies alike, particularly at the sub-national level. Given the outstanding results achieved by the early Asian Tigers of South Korea and Taiwan, industrial policies have not only been reconsidered, but even advocated by scholars such as Philippe Aghion, Ricardo Hausmann, Dani Rodrik, and Joseph Stiglitz (Aghion et al., 2011; Hausmann and Rodrik, 2006; Rodrik, 2004; Stiglitz et al., 2013). And when, in 2010, the free-market champion and former EU Commissioner for Competition Policy Mario Monti stated that "Industrial policy is no longer taboo",[1] it was clear that policy-makers had altered their perspective as well. Industrial policy was back on the public policy agenda.[2]

Policies focused on local production systems, industrial districts, networks, clusters, and regional innovation systems, with a strong emphasis on improving regional competitive advantage, have emerged as a new style of policy-making. Due to dramatic job losses after the crisis of 2008–2009, the United States and Europe introduced measures to support strategic industries (Kline and Moretti, 2013).[3] An increasing number of developing countries, particularly in Latin America, have also introduced strategic development plans targeting specific industries in certain regions,[4] and programs to support industry clusters and value chains focusing on specific local industries (Crespi et al., 2014; Maffioli et al., 2016).

Like other large-scale economic policies, industrial policies are

* Corresponding author at: Department of Economics, Universidad de San Andres, Vito Dumas 284, Victoria B1644BID, Buenos Aires, Argentina.
E-mail addresses: vcastillo@trabajo.gob.ar (V. Castillo), lfigal@iadb.org (L. Figal Garone), alessandrom@iadb.org (A. Maffioli), lsalazar@iadb.org (L. Salazar).

[1] See "The Global Revival of Industrial Policy: Picking Winner, Saving Losers." *The Economist* (Aug 5, 2010).

[2] For the purpose of this study, "industrial policy" is a policy that directs public investments to specific industries in a given economy.

[3] For instance, the U.S. government and many individual state governments have spent roughly $95 billion a year on regional development policies targeting specific industries (Kline and Moretti, 2013).

[4] See, for example, the Sector Funds Program in Brazil, the experience of CORFO and SERCOTEC in Chile, and the initiatives introduced in Mexico by the CONACYT and in Argentina by the MINCYT.

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often implemented at the regional or provincial level and determine how significant portions of federal and/or sub-national government budgets are allocated. This is because policy-makers view regional industrial policies (RIPs) as important instruments to boost job creation and productivity-based growth.

In terms of job creation, three questions are particularly relevant in the context of RIPs: (i) What is the causal effect of RIPs on employment of the target region-industry?; (ii) Does the increase in employment in the target region-industry due to the RIPs come at the expenses of other industries or as an increase of total (regional) employment?; and, (iii) Does the RIP generate positive inter-industry employment spillovers/externalities i.e. the increase in total employment is larger than the increase in the employment in the target region-industry? To date, however, little empirical evidence has been produced to answer these questions, and few studies have properly dealt with the methodological challenges related to the identification of the causal effects of RIPs.

Three issues make the evaluation of RIPs particularly challenging. First, RIPs are usually implemented at the aggregate level, affecting a single industry within a region, province, or district. This implies that all individuals or firms that belong to or are related to the treated industry within the government's zone of influence are in some way affected by the intervention. Second, RIPs often target high-growth-potential industries, which are also commonly characterized by externalities and agglomeration economies, making indirect effects an important issue to be considered when estimating a proper counterfactual (Angelucci and di Maro, 2016). Finally, RIPs usually comprise a bundle of policy instruments, including business support, tax incentives, infrastructure development, and institutional strengthening. These intrinsic characteristics of the RIP often leave the researcher with only one (aggregate) treated unit. In this context, pure time series or before-after analysis of the impacts would be clearly contaminated by changes other than those induced by the RIPs.

To answer the aforementioned questions and address the empirical challenges, this paper proposes the application of the synthetic control method (SCM) approach to identify the causal effects of a RIP. As a case study, we examine the Tourism Development Policy (TDP) implemented in the Argentinean province of Salta. The SCM, developed by Abadie and Gardeazabal (2003) and extended in Abadie et al. (2010), is an econometric technique used to devise data-driven comparative case studies. Specifically, we use a combination of other Argentinean provinces to construct a “synthetic” control that resembles Salta's tourism industry before the TDP and produces a counterfactual of what would happened in the absence of the TDP.

The TDP case is a relevant for two reasons. First, the government of Salta designed the TDP to boost job creation in the province. Second, the TDP followed an integrated, large-scale approach to tourism development that included upgrading tourism and transport infrastructure, restoring cultural heritage, strengthening institutions, and launching national and international promotional campaigns. The plan required public-private partnerships and a long-term commitment by the provincial government.

For our analysis we use data from 1996 to 2013 consisting of monthly information on different economic sectors at the provincial level. The data enable identification of the effects of the TDP in a ten-year window following its implementation and, more importantly, the creation of a counterfactual based on eight pretreatment years. The data also allow us to control for relevant confounders and seasonality and enable us to implement a battery of placebo studies and robustness checks.

Our main results show that, after the TDP was implemented, employment in the hospitality sector in Salta increased by an average of 11 percent per year, for an overall impact of around 114 percent (750 new formal jobs), between 2003 and 2013. When considering the tourism value-chain (including the hospitality sector), employment increased by an average of 2.2 percent per year i.e. an accumulated impact of 1376 formal jobs. Additional analyses show that the TDP not only did not crowd-out employment in other industries but also generated positive inter-industry employment spillovers/externalities. We find that for each job created in the tourism value-chain, an additional job was created in the rest of the provincial economy, which resulted in a total increase of 3750 new formal jobs due to the TDP. These results are robust across a series of placebo tests, robustness checks and different synthetic control groups.

This paper contributes to the existing literature in several ways. First, to the best of our knowledge, this is the first paper that examines the long-term causal effects of a large-scale RIP with only one treatment unit. The closest studies are related to a broader literature that evaluates business support policies and place-based interventions.[5] This contribution is particularly relevant to the debate on the effectiveness of tourism policy.[6]

Second, this paper is also among the first applications of SCM to assess the impact of an economic development policy.[7] Until now, SCM has been used to evaluate the effect of the introduction of reforms, events, and specific policies.[8] SCM and the exhaustive empirical exercises presented in Annexure C can be very useful for the evaluation of a variety of policies with dual focus (location and industry), such as other RIPs, cluster development programs, value chain programs, and other regional and urban development policies and reforms.

Finally, the study contributes to the debate on the design of tourism policies in developing countries. As pointed out by Crotti and Misrahi (2015), identifying priorities, upgrading infrastructure, calibrating fiscal incentives and executing national and international marketing campaigns are among the key tasks necessary to succeed in developing the tourism industry. The TDP offers a successful case study of this integrated approach.

The rest of the paper is organized as follows. Section 2 discusses the rationale behind tourism policies, the background of the TDP, and a simple framework to motivate our empirical analysis. Section 3 presents the empirical methodology, and Section 4 describes the dataset and the sample. Section 5 presents the results. This section is followed by a set of placebo and robustness tests in Section 6. Section 7 explores other characteristics of the impact of the TDP, and Section 8 concludes.

2. Background

2.1. Tourism, employment, and policy justification

Tourism is one of the world's largest industries, particularly in terms of employment. According to the World Tourism Organization (WTO), in 2013, the tourism industry provided one out of every 11 jobs in the world, represented 9 percent of the world's GDP (direct, indirect, and induced impact), and generated 6 percent of the world's exports (WTO, 2014b). Annual international tourist arrivals worldwide jumped from 25 million in 1950 to more than one billion in 2013. Also in 2013, international arrivals in developing countries outnumbered those in developed economies.

[5] See, for instance, Criscuolo et al. (2012), Freedman (2015), Kline and Moretti (2013), Romero (2009). For a detailed review and analysis of place-based policies see Neumark and Simpson (2015) and the references cited therein.

[6] The few studies that have attempted to identify impacts in this area use simulation models (Ashley and Mitchell, 2009). These approaches, however, do not directly address causality and often fail to provide convincing evidence of the policy's net effects.

[7] Gathani and Stoelinga (2013) and Barone et al. (2016) are probably the studies closest to an application of SCM to an economic development policy.

[8] California's tobacco control program (Abadie et al., 2010), trade restrictions (Garcia Lembergman et al., 2015), a mileage tax for trucks (Luechinger and Roth, 2016), economic liberalization processes (Billmeier and Nannicini, 2013), terrorist conflicts and crime (Abadie and Gardeazabal, 2003; Gautier et al., 2009; Pinotti, 2015), catastrophic natural disasters (Barone and Mocetti, 2014; Cavallo et al., 2013), German reunification (Abadie et al., 2015), energy policies (Ando, 2015; Munasib and Rickman, 2015) and childcare (Bassok et al., 2014), and spillovers from universities (Bonander et al., 2016; Liu, 2015).

Although tourism has always been considered a significant contributor to growth and economic development,[9] expanding tourism is not a development objective per se. The benefits of expanding this industry come from its positive impacts on foreign exchange earnings through tourism receipts, economic growth, and job creation (Scheyvens, 2012).

One of the main reasons of interest towards tourism in developing countries is that it generates both formal and informal employment (Sinclair, 1998). Expanding the tourism sector creates three types of employment – direct, indirect, and induced.[10] Tourism is a diverse and labor-intensive industry, and thus an effective generator of a wide range of employment opportunities (Telfer and Sharpley, 2015). Furthermore, tourism employs more women, young people, and people with low educational attainment than most industries, fostering an environment of inclusiveness and empowerment for vulnerable groups (UNDP, 2011). In addition, given its low barriers to entry, tourism provides investment opportunities for entrepreneurs to start small-scale firms and hire workers.

Despite the substantial positive effects of tourism on employment creation, economic growth, and foreign currency receipts, the sector has only recently gained relevance in the public policy debate (Hawkins and Mann, 2007; OECD, 2010). Thus, an important question to be addressed is, to what extent public intervention to promote tourism is justified.

As pointed out by Winters et al. (2013), the justification for public intervention in tourism is twofold. First, the economic benefits of tourism are unlikely to be realized at a socially optimal level if investment is left solely to the private sector. In fact, because of geographic proximity and industry complementarities, agglomeration economies and externalities are prevalent in the tourism industry.[11] Under such conditions, investment decisions become interrelated, and the profitability of a particular investment becomes a function of other complementary investments.[12] Without proper coordination among investors, the market would fail to assign resources optimally.[13]

Second, public intervention in tourism has been justified from a poverty-alleviation perspective. Particularly, as mentioned above, local tourism policy can be used as an important instrument to boost job creation. Many developing countries are endowed with natural, cultural, and historical resources that, with proper coordination and planning, can form the core of a profitable and sustainable tourism industry, generating jobs and incomes for the local population (Scheyvens, 2002).[14]

Other types of market imperfections, such as labor market frictions, can also justify regional or local tourism policies. As pointed out by Neumark and Simpson (2015), one of these imperfections is the spatial mismatch that generates mobility constraints, particularly for low-skilled workers.

2.2. Salta's tourism development policy

Following the economic collapse of 2001, the Argentinean tourism industry gained relevance. The steep devaluation of the peso was expected to increase both domestic and international tourism, as it significantly reduced the cost of Argentinean destinations relative to international locations. Under this assumption, the forecasts for medium and long-term growth in tourist arrivals in the early 2000s were overly optimistic.

In this context, the government of Salta, a province in the northwest of Argentina (see Annexure B), decided to implement a set of policy interventions to support tourism expansion, which together comprised the Salta's Tourism Development Policy (TDP). The expansion of Salta's tourism industry was expected to contribute to the revitalization of the post-crisis economy and boost local employment. The TDP was launched in June 2003 with the approval of the first loan for tourism development received by the province from a multilateral organization.

The TDP was designed and implemented as a coordinated set of interventions meant to produce a structural change in the tourism industry. The investments were made gradually over the 2003–2010 period and required a high degree of coordination and collaboration frameworks that fostered public-private partnerships.

The TDP was based on three pillars. The first was the construction and modernization of tourism and transport infrastructure, including highways to access Salta City and the main tourist destinations, an international airport, and bus terminals, as well as the restoration of the province's historical and cultural heritage.

The second pillar consisted of tax credits for the construction, expansion, and remodeling of hotels and other lodging establishments. The availability of new accommodations, resorts, and other tourism facilities gave the province a competitive advantage. This policy instrument was instrumental in meeting the growing demand for lodging. It also created a conducive environment for firms wishing to do business in this sector.

The third pillar was institutional strengthening, including additional funding for the Tourism Secretariat, the creation of a public-private Provincial Tourism Council, and the launch of an integrated national and international promotion campaign. By making clear that the sector was a high priority, the government could channel funds to the TDP and coordinate the actors and resources necessary to develop the industry. The public-private synergies proved pivotal, as they funded the integrated policy.

Finally, a fundamental feature of the TDP was its partnership with the Inter-American Development Bank (IDB), which provided the first multilateral loan to the Province of Salta in support of a specific industry. The IDB's involvement was a turning point for Salta's tourism policy, because it provided funding for key components of the TDP and it made a long-term commitment to support the development of the provincial tourism industry.

2.3. A simple framework and expected impact

The TDP was designed and implemented as a coordinated set of interventions in the tourism industry. As such, the program aimed at simultaneously boosting the demand and expanding the supply of tourism services in Salta, with the final goal of creating new employment opportunities.

For this reason, we focus our analysis on the TDP's effects on employment. We first look at the effect on employment in the hospitality sector, which includes hotels, campgrounds, and other

[9] Abundant work in economics has emphasized the link between tourism, growth, and economic development. See Scheyvens (2014) on theoretical and empirical research in this literature.

[10] Direct employment is related to direct expenditure on goods and services by tourists. It refers to employment in hotels, restaurants, transportation, and tour operators, among others. Indirect employment refers to jobs created in sectors that provide goods and services to affected firms (backward linkages), such as food suppliers, merchants, and mechanics. Induced employment refers to the additional jobs resulting from the effects of the tourism multiplier, i.e., from spending the income earned by tourism business owners and employees outside the tourism industry (Dwyer et al., 2004b).

[11] By definition, the tourism industry is geographically concentrated because of its dependence on the natural or cultural attractions of a specific area. In addition, the strong complementarities among services and products boost the effects of externalities, making coordination among local agents even more important.

[12] On this topic see the seminal work by Rosenstein-Rodan (1943).

[13] For instance, hotel owners may underinvest in accommodation capacity knowing that returns on their investment depend on the investment decisions of restaurant owners and other local investors in recreational activities. Similarly, public investment in complementary infrastructure, such as roads, water and sanitation, and public lighting, may also be hampered by the lack of coordination with the private investment needed to generate an adequate flow of visitors. For a review on coordination problems in development, see Hoff (2000). On clusters and coordination failures, see also Rodriguez-Clare et al. (2005).

[14] There is broad consensus regarding tourism's potential to alleviate poverty, particularly in developing countries (see, for example, Ashley and Mitchell, 2009; Scheyvens, 2012).

establishments providing lodging. We prioritize this measure because hospitality is the most representative sector of the tourism industry and, thus, the one that could more clearly reflect a structural change induced by the TDP (WTO, 2014a).

The conceptual framework for the interpretation of the TDP's impact must therefore consider both the demand and the supply sides of the labor market. Following Hamermesh (1986, 1993) and Kadiyali and Kosova (2013), we can describe the labor demand as a function of the wage rate, non-labor input prices, the price of outputs, the average industry-specific level of technological/production efficiency, and output demand shifters. In a context of tourism industry expansion, these output demand shifters are mainly the number of visitors, the average daily expenditure per tourist, the average number of overnight stays per tourist, and other aggregate demand shocks. On the supply side, the labor supply can be defined as a function of the wage rate, the level of labor mobility, the level of human capital, and other aggregate shocks.

The TDP was designed to activate various shifters of the demand of labor in the tourism industry. Through the infrastructure upgrade and the promotional campaigns, the TDP was expected to increase the number of visitors of the province (extensive margin). In addition, the TDP aimed at increasing the value of the tourism-related public goods, recreation activities, and natural and cultural heritage attractions. This should lead to the growth of both daily tourism expenditure and number of overnight stays (intensive margin). Finally, the TDP had also the objective to foster the supply of tourism services through the provision of fiscal incentives for the construction, expansion, and remodeling of hotels and other establishments and through a series of coordination activities. All these elements were expected to produce a significant increase in the labor demand by the tourism industry.

Despite its focus on tourism, the TDP was meant to boost the overall employment of the province, beyond the tourism and its related industries. That is, the expectation was that the increased demand and supply of tourism services would have benefited other local industries, either by direct and indirect spending or via multiplier effects, with limited or more than compensated crowding-out effects (Gretton, 2013; Kadiyali and Kosova, 2013; Vanhove, 2005). These are potential negative effects that may take place in the presence of significant factor supply constraints of labor, capital, and land (Banerjee et al., 2015; Buiter, 1976).

In terms of employment, potential negative effects might occur if the increased labor demand in the tourism sector results in higher wages and ends up diverting supply of labor from other sectors. In that case, tourism employment would grow at the expenses of a reduction in employment in other industries and would be accompanied by a general increase in wages (Todaro, 1969). However, because of the minimum wage regulation applied to all industries and the high unemployment in Salta, the increased labor demand in tourism is unlikely to cause significant pressure on wages and a consequent diversion of labor supply from other sectors.[15] In this context, the increased tourism labor demand should more likely result in a reduction of the general unemployment without significant negative effect on other industries' employment.

Similarly, we can also expect that the positive effects from increased demand of output from other sectors dominate any potential negative effects due to the pressure on other input prices (i.e. cost of capital or land), or the reduced competitiveness in export and import-competing markets through exchange rate appreciation. The former expectation is consistent with the Salta's economy being characterized by low capital intensity and high land availability. The latter with the reduced influence that Salta's tourism inflows can have on the exchange rate and the competitive devaluation that was taking place at that time in Argentina. As a result, the TDP should result in a significant overall increase in employment, above and beyond the tourism industry.[16]

In addition, as pointed out by Moretti (2011), “big push”-type policies, such as the TDP, have the potential to start an agglomeration process that can ultimately shift a certain regional or provincial industry from a bad equilibrium (small agglomeration, low productivity, low employment) to a good equilibrium (large agglomeration, high productivity, high employment). In other words, the TDP could have substantial and long-lasting effects on the equilibrium level of tourism activity and employment in Salta.

3. Identification strategy

As mentioned in Section 1, the identification of the impacts of the TDP is challenging. Pure time series or before-after analysis of the impacts would be contaminated by changes other than those induced by the TDP. To address this challenge, we use a SCM, an empirical approach developed by Abadie and Gardeazabal (2003) and extended in Abadie et al. (2010). A synthetic control is a weighted average of the available control units, constructed to approximate the most relevant characteristics of the treated one. In our case, the SCM is used to estimate the counterfactual situation of Salta in the absence of the TDP by looking at the tourism employment trend in an artificial province (i.e., synthetic Salta).

We observe $J + 1$ provinces over T periods. Among these, only Salta was exposed to the intervention of interest. The J remaining provinces serve as potential controls. This set of control units is conventionally called the “donor pool.” Our sample includes a number of pre-intervention periods, T_0, as well a number of post-intervention periods, T_1, with $T = T_0 + T_1$. In this context, it is useful to think in terms of potential outcomes in a panel setup. The treatment effect for Salta at time $t = T_0 + 1, \ldots, T$ is defined as

$$\tau = Y_{St}(1) - Y_{St}(0) = Y_{St} - Y_{St}(0) \tag{1}$$

where $Y_{St}(1)$, $Y_{St}(0)$ are Salta's potential outcomes with and without treatment, respectively.[17] We aim to estimate the vector $(\tau_{ST_0+1}, \ldots, \tau_{ST})$, that is, the impacts of the TDP over time. Because $Y_{St}(1)$ is observed, to estimate τ_{St} we just need to estimate $Y_{St}(0)$, that is, the contrafactual trajectory of tourism employment in Salta without the TDP.

Suppose a general model for the potential outcomes of all provinces. The observed tourism employment for province i at time t is

$$Y_{it} = Y_{it}(0) - \tau_{it} D_{it} \tag{2}$$

where $i = 1, \ldots, J + 1$ and D_{it} takes the value of one when $i = S$ and $\tau > T_0$. Following Abadie et al. (2010) we express $Y_{it}(0)$ using a linear factor model

$$\begin{aligned} Y_{it}(0) &= \delta_t + \nu_{it} \\ Y_{it}(0) &= \delta_t + \theta_t X_i + \lambda_t \mu_i + \varepsilon_{it} \end{aligned} \tag{3}$$

where δ_t is a vector of common time-specific effects (factors) with constant individual effects (factor loadings) across provinces, and ν_{it} is an error that can be divided into a vector of relevant observed predictors for tourism employment X_i – time invariant or time varying, and pre- or post-treatment as long as they are not affected by the policy, a vector of unknown time-specific parameters θ_t, a province-specific unobservable μ_i, an unknown common factor λ_t, and an unobserved transitory shock at the provincial level ε_{it} with zero

[15] In Salta, the unemployment rate was around 30 percent of the economically active population (Argentina National Population, Households, and Dwelling Census, 2001), and the labor informality rate was around 50 percent in 2001–2002 (Ministry of the Interior and Transportation).

[16] As pointed out by Banerjee et al. (2015), to assess the net impact of tourism investment, country and region contexts are critical, especially the consideration of factor supply constraints, domestic capacity to service the tourism sector, and the macro-economic and fiscal policy environment (Dwyer et al., 2000, 2003, 2004a).

[17] Hereafter, “S” indicates the Province of Salta.

mean for all i conditional on (δ_t, X_i, μ_i).[18]

As defined above, synthetic Salta is a weighted average of the provinces in the donor pool. That is, synthetic Salta can be represented by a $(Jx1)$ vector of weights $W = (w_1, \ldots, w_J)'$ such that $w_i \geq 0$ for all $i \neq S$ and $w_1 + \cdots + w_J = 1$. Each value of the vector W represents a potential synthetic control for Salta, that is, a particular weighted average of control provinces. Using the linear factor model just described, Abadie et al. (2010) prove that if the number of pre-intervention periods in the data is large relative to the scale of the transitory shocks and, we can choose w^* such that

$$\sum_{j=1}^{J} w_j^* Y_{jT_0} = Y_{ST_0} \quad \text{and} \quad \sum_{j=1}^{J} w_j^* X_j = X_S, \quad \text{then} \tag{4}$$

$$\hat{\tau} = Y_{St} - \sum_{j=1}^{J} w_j^* Y_{jT} \tag{5}$$

is an unbiased estimator of τ_{St} for $t \epsilon \{T_0 + 1, \ldots, T\}$, that is, the impact of the TDP. As in the case of a common lagged dependent variables model, the identifying assumption in the SCM is independence of treatment status and potential outcomes conditional on a lagged outcome variable and other observable confounders.[19]

Since condition (4) can hold exactly only if $Z_S = (Y_{ST_0}, X_S)$ belongs to the convex hull of $Z_j = \{(Y_{11}, X_1) \ldots (Y_{JT_0}, X_J)\}$, in practice, W^* is estimated in a non-parametric fashion and is selected so that condition (4) holds approximately. Abadie and Gardeazabal (2003) and Abadie et al. (2010) propose choosing W^* as the value of W that minimizes the distance

$$\|Z_S - Z_j W\| \nu = \sqrt{(Z_S - Z_j W)' V (Z_S - Z_j W)} \tag{6}$$

where V is a symmetric and positive semidefinite matrix that reflects the relative importance assigned to each employment predictor, including pretreatment employment. Although this inferential procedure is valid for any choice of V, the choice of V influences the mean squared prediction error (MSPE) of the estimator, that is

$$MSPE(Y) = \frac{1}{T_0} \sum_{t=1}^{T_0} \left[\left(Y_{St} - \sum_{j=1}^{J} w_j^*(V) Y_{jt} \right)^2 \right] \tag{7}$$

To assign larger weights to variables that have large predictive power on tourism employment, we choose V^* as the value of V that minimizes $MSPE$ for tourism employment in the entire pretreatment period.[20] The weights for the synthetic control are then given by $W^* = W^*(V^*)$. In other words, we minimize Eq. (7), for $W^*(V)$ given by Eq. (6).[21]

Overall, the synthetic control algorithm estimates the missing counterfactual for Salta $(Y_{St}(0))$ as a weighted average of tourism employment for provinces in the donor pool. The weights are chosen so that pretreatment values of tourism employment and covariates of synthetic Salta are, on average, similar to those of real Salta. Then, if real Salta and synthetic Salta have similar behavior over the extended pretreatment period, a discrepancy in tourism employment following the intervention is interpreted as having been produced by the intervention itself, that is, as a causal effect of the TDP on tourism employment.

4. Data and sample

This analysis uses a monthly sector-level panel dataset at the provincial level for the period 1996–2013. The data were collected by the Observatory of Employment and Entrepreneurial Dynamics (OEDE) at the Ministry of Labor, Employment, and Social Security of Argentina.[22] Salta's TDP began in June 2003, providing almost 7.5 years (89 months) of pre-intervention data. The sample period begins in 1996, the year when the OEDE started collecting these data, and ends in June 2013, the last year of complete information. This period amounts to a decade of post-treatment analysis, which is a reasonable period to predict and measure the effect of this policy.

The list and description of all variables used in the empirical analysis are provided in the data appendix, along with data sources. The outcome variable is employment in the "Hotel and Other Accommodation Establishments" sector (3-digit SIC sector) as a proxy for tourism employment. For the pretreatment covariates, we rely on a standard set of tourism employment predictors: employment, number of firms, average wage, average size of firms, average age of firms, GDP, informality, population, population with university level, road paving and public lighting (see Annexure A for details).

Because synthetic Salta is constructed as a weighted average of potential control provinces, it is important to exclude from the donor pool those provinces that were subject to structural shocks in tourism employment. For this reason, those provinces that implemented another large-scale tourism policy during the period under study were not included in the donor pool.[23]

Finally, to minimize bias caused by interpolating across provinces with very different characteristics and with outcomes driven by a different structural process, we also discarded Buenos Aires, the Autonomous City of Buenos Aires, and Córdoba.[24] Therefore, the final donor pool includes the remaining 19 provinces: Catamarca, Corrientes, Chaco, Chubut, Entre Ríos, Formosa, Jujuy, La Pampa, La Rioja, Mendoza, Misiones, Neuquén, San Juan, San Luis, Santa Cruz, Santa Fé, Santiago del Estero, Tucumán, and Tierra del Fuego.[25]

5. Results

5.1. On the mechanisms of TDP impact

Although a causal assessment of the specific mechanisms that led to TDP's effects is beyond the scope of this study, we then explore potential channels through which the policy was expected to trigger growth in the tourism industry and therefore boost employment.[26] The TDP was expected to strongly increase the number of tourists, especially international tourists, as well as their daily expenditure and overnight stays.

Since 2002, the number of tourism arrivals in Salta sustainably increased (extensive margin). As shown in Fig. 1a tourism arrivals tripled in the post-policy period.[27] In particular, this increase was lead

[18] Notice that, while the traditional differences-in-differences (fixed-effects) model would restrict the impact of unobservable province heterogeneity to be constant over time –i.e. $\lambda_t = \lambda$ for all t – , the factor model presented allows the impact of these confounding unobserved characteristics to vary with time. We can think, for instance, of λ_t as the devaluation in Argentina in 2002 (common shock across provinces) and μ_i as the heterogeneous impact of the peso devaluation on province i according to its tourism potential. See Bai (2009) for panel data models with interactive fixed effects.

[19] See Dehejia and Wahba (1999) for an example of matching strategies based on lagged dependent variables. See also Chapter 5 in Angrist and Pischke (2008).

[20] We follow Abadie and Gardeazabal (2003), Abadie et al. (2010), and Billmeier and Nannicini (2013).

[21] We use the *synth()* routine developed by Abadie et al. (2011). Specifically, we use the data-driven, fully nested optimization procedure that searches among all (diagonal) positive semidefinite V-matrices and sets of W^* -weights for the best fit between Salta and a convex combination of the control units (i.e., the synthetic Salta) in terms of the pretreatment values of the outcome variable.

[22] Given the confidentiality of the data, the estimations were conducted following the OEDE microdata policy, which implies working in situ under the supervision of its staff and with blinded access to sensible information.

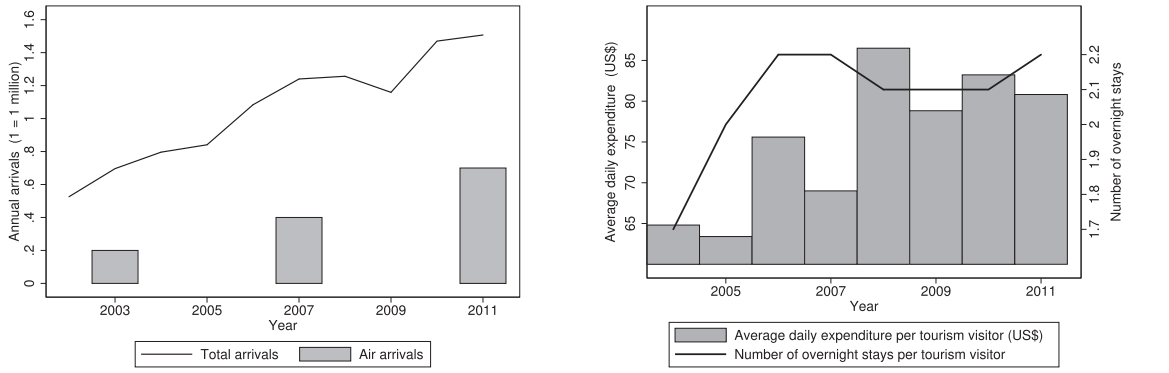
[23] This is the case of the province of Río Negro. Río Negro received three IDB programs (2003, 2005 and 2006) to support the tourism industry.

[24] These provinces are outliers and highly cyclical in terms of tourism employment.

[25] Our results are robust to the inclusion of all discarded provinces as well as other tourism employment predictors.

[26] Our main limitation for analyzing causality regarding the mechanisms through which the TDP had effects is the lack of adequate data on tourism-related indicators before the TDP and for the remaining provinces.

[27] Own elaboration based on data from the Ministry of Culture and Tourism of the province of Salta.



(a) Annual visitor arrivals. (b) Expenditure and overnight stays.

Fig. 1. Mechanisms of the TDP impact.

by the air arrivals to the Salta International Airport. Indeed, while in 2003 air arrivals represented 33 percent of total arrivals, in 2011 it represented 50 percent. This was also accompanied by a large increase in the hotel occupancy rate. Fig. B1 in Annexure B shows that, for the 2004–2011 period, the occupancy rate in Salta increased around 90 percent with respect to 2004, the best performance in this indicator among all tourist destinations in Argentina.

Finally, another relevant mechanism is the intensity of tourism activity per visitor (intensive margin). Fig. 1b shows the trend in the average daily expenditure and the number of overnight stays per tourism visitor. As expected, both tourism indicators increased in the post-TDP period. This increase is related to the greater variety and higher quality of the tourism services made available by the TDP. That is, the change in the intensity of the tourism activity was driven by both longer stays and more and higher-quality tourism options.

5.2. The impact of TDP on tourism employment

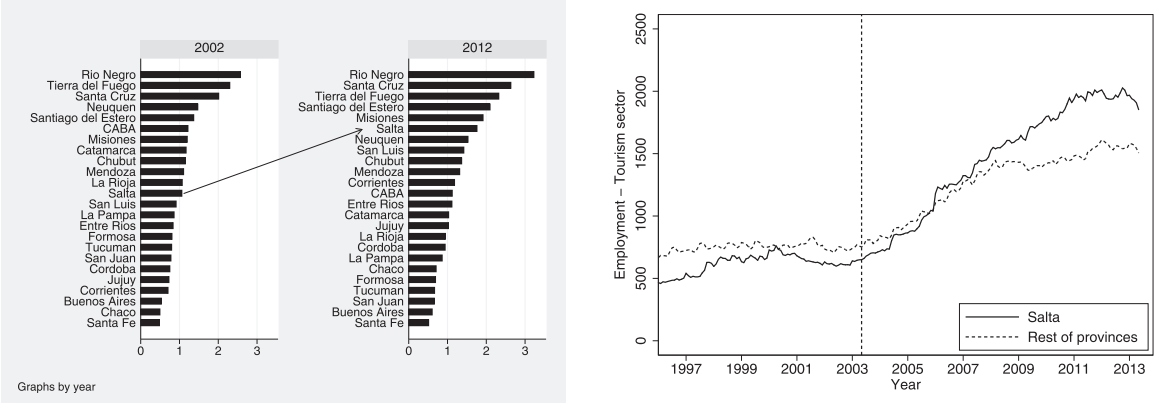
Following Sinclair (1998), we first assess the relevance of the TDP's results by looking at the evolution of tourism employment as a share of total employment in Salta relative to the other Argentinean provinces. Fig. 2a shows that between 2002 and 2012, this ratio almost doubled in Salta, increasing from around 1 percent to 2 percent. The comparison with other provinces confirms that this growth was due to a real structural change for Salta. In fact, while in 2002, Salta was 12th out of 24 provinces in terms of its share of total tourism employment, ten years later Salta had climbed up to the sixth position.

Before estimating the weights for the synthetic Salta using the SCM, Fig. 2b plots the employment trends in tourism in Salta and the population-weighted average of the rest of the provinces in the donor pool. The figure shows that the entire donor pool would not be a suitable comparison group for Salta. In fact, even prior to TDP implementation, the time series of tourism employment in Salta differed from that of the rest of the country. While pretreatment trends in employment are somewhat similar, after June 2003, trends began to diverge drastically, pointing to a potential impact of the policy.

Table 1 displays the weights for each donor province in synthetic Salta from the SCM estimation. The reported weights indicate that tourism employment in Salta in the pre-policy period is best reproduced by a combination of Jujuy, Santa Fé, Tucumán, Formosa, and Neuquén. Intuitively, these weights are quite reasonable. The algorithm constructed a synthetic Salta from a combination of some neighboring provinces with similar development indicators and tourism dynamics (Jujuy, Tucumán, and Formosa), and some provinces with a more relevant and high-potential tourism industry (Santa Fé and Neuquén).

Next, we use the estimated weights to obtain synthetic Salta and compare it to real Salta in pretreatment characteristics. The results displayed in Table 2 show that synthetic Salta is very similar to real Salta in all covariates used in the estimation. By contrast, the simple weighted average of all provinces in the country and the provinces in the northwest region, where Salta is located, would not provide a suitable control group.

Fig. 3a displays the tourism employment trajectory for real Salta and its synthetic counterfactual from 1996 to 2013. Tourism employment in synthetic Salta closely resembles the real Salta's trend during the entire pre-policy period, especially in the months before the TDP



(a) Share in total employment. (b) Trends.

Fig. 2. Tourism employment.

Table 1
Province weights in the synthetic Salta.

Province	Weights
Buenos Aires	–
Autonomous City of Buenos Aires	–
Catamarca	0
Córdoba	–
Corrientes	0
Chaco	0
Chubut	0
Entre Ríos	0
Formosa	0.114
Jujuy	0.393
La Pampa	0
La Rioja	0
Mendoza	0
Misiones	0
Neuquén	0.064
Río Negro	–
San Juan	0
San Luis	0
Santa Cruz	0
Santa Fé	0.222
Santiago del Estero	0
Tucumán	0.207
Tierra del Fuego	0

Table 2
Employment predictor means before TDP.

	Salta		Average of rest of	
	Real	Synthetic	Provinces	NOA
Tourism sector level				
Employment	617	615	750	459
Number of firms	77	75	93	46
Average Wage	510	512	557	515
Average size of firms	8	8	8	10
Average age of firms	7	8	8	7
Log of GDP	17	17	17	17
Province level				
Log of Employment	11	11	12	11
Log of Number of firms	9	9	9	8
Average Wage	608	645	664	619
Average size of firms	11	11	9	11
Average age of firms	12	12	12	13
Log of GDP	22	22	23	22
Informality	0.52	0.49	0.46	0.52
Log of Population	13	13	14	13
University level	0.02	0.02	0.02	0.02
Road paving	0.52	0.54	0.59	0.49
Public lighting	0.85	0.85	0.84	0.82

Note: Employment, number of firms, average wage, average size of firms, and average age of firms are averaged for the January1996–May2003 period (for both the tourism sector and province level). GDP is averaged for the 1993–1998 period. Informality is measured in 2002–2003, and population, university level, road paving and public lighting are measured in 2001.

began, further confirming the validity of the generated counterfactual. The estimate of the impact of the TDP on tourism employment in Salta is given by the difference between real Salta and its synthetic counterpart after policy implementation. From this date onward, the two lines diverge noticeably. The discrepancy between the two lines suggests a large positive effect of the TDP on tourism employment.

Fig. 3b plots the gap in tourism employment between real and synthetic Salta. The magnitude of the estimated impact of TDP is substantial. Between 2003 and 2013, tourism employment increased by an average 11 percent per year due to the TDP, for an accumulated impact of 114 percent from the May 2003 baseline level (Fig. 3c). Since the growth in tourism employment in the period was 184 percent, the estimated impact implies that around 62 percent of this growth was due to the TDP. In terms of job creation, the magnitude of the impact is approximately 750 new formal jobs. In dynamic terms, Fig. 3d shows that the magnitude of the average annual impact increased during the first years of treatment, followed a relatively constant path between the fourth and seventh years, and decreased in the last years of analysis (2010–2013) until it disappeared.

6. Placebo and robustness tests

To confirm that the gap shown in Fig. 3b is the true causal effect of the TDP, we need to conduct inference and provide evidence of the validity of synthetic Salta as a counterfactual. In comparative case studies such as this analysis, large sample inferential techniques are not well suited because of the small sample size of the dataset. Therefore, following Abadie and Gardeazabal (2003) and Abadie et al. (2010, 2015), we apply exact inferential techniques, similar to permutation tests, to conduct inference. By systematizing the process of estimating the counterfactual of interest, the SCM enables us to conduct a series of placebo tests and falsification tests.[28] Specifically, we use three versions of placebo tests: provinces, sectors, and in-time placebo.

The idea behind these placebo tests is that the inherent validity of the results obtained would be limited if the SCM also estimated large effects when iteratively applied to non-treated provinces, non-treated economic sectors, or to different dates of the intervention. In other words, our confidence in the large impact of the TDP on tourism employment in Salta would be undermined if this estimated effect fell inside the distribution of placebo effects or if the in-time placebo test generated impact in the pre-policy period. Using *p-values* computed under random permutations of the units (or starting dates) assigned to treatment, we can compare the placebo effects and the estimates for Salta's tourism employment.

We also perform four additional robustness checks: (i) the dependence of the results on a particular (positive weighted) control unit or a group of positive weighted donors, (ii) the exclusion of nearby provinces, (iii) the choice of V weights, and (iv) the combination with Differences-in-Differences. Finally, given the dual focus of the evaluated policy – one specific sector in one province – we construct an alternative synthetic trajectory of tourism employment in Salta using a combination of other sectors from different provinces.

Overall, the purpose of these exercises is to assess whether the gap in tourism employment might be caused by other external factors rather than the TDP or biased due to inter-province or other type of spillover effects. The results of these exercises Annexure C confirm that our main results are robust across the placebo tests and sensitivity checks and are consistent among alternative synthetic control units. In fact, the strong similarity of the results obtained through the different specifications provides robust evidence that the SCM is correctly isolating the effects of the policy. This also allows us to discard the hypothesis that these effects are overestimated (underestimated) because of potential negative (positive) spillovers. Moreover, in all cases, the synthetic control units produce counterfactuals that clearly contain more information than a simple extrapolation of Salta's pre-intervention trend. For example, the weighted control units clearly capture the cyclicality that a true counterfactual should be expected to pick up.

7. Exploring other aspects of TDP impact

7.1. Number of firms and average wage in tourism sector

On the supply side, in addition to analyzing changes in employment, we also explore the impact of the TDP in the number of establishments offering hospitality services. Fig. 4a clearly shows that,

[28] See Angrist and Krueger (1999) and DiNardo and Pischke (1997) for applications of similar falsification tests.

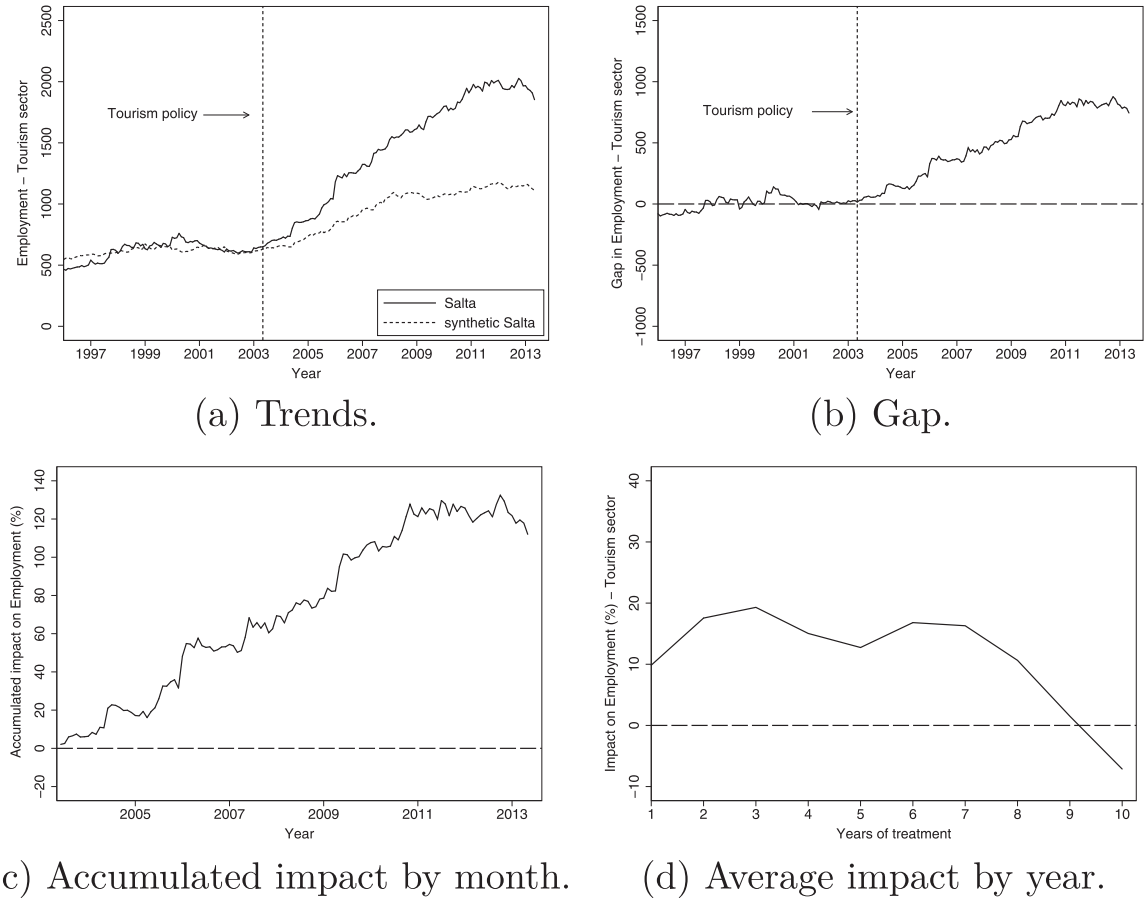


Fig. 3. The impact of TDP on tourism employment: Salta vs. synthetic Salta.

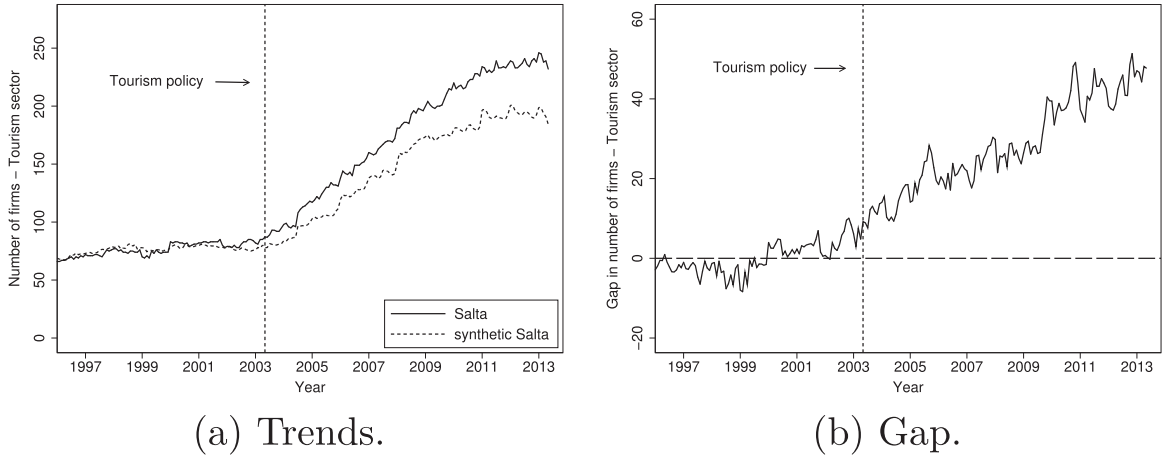


Fig. 4. Number of firms: Salta vs. synthetic Salta.

after being stagnant at around 60 units for several years, the number of hospitality establishments almost quadrupled since the beginning of the TDP, reaching 240 units in 2013. However, after constructing Salta's synthetic counterpart, we obtained that only 28 percent (50 firms) of the total change is due to the TDP (Fig. 4b). In other words, the TDP increased the number of establishments by around 10 percent per year.[29]

Second, we analyze wage dynamics in Salta's tourism industry. As mentioned in Section 2.3, given the characteristics of the local labor market, we do not expect any pressure on wages. Nevertheless, in the tourism sector, where the construction of hospitality infrastructure takes time to materialize, it may be possible that a short term effect on wages (and prices) would have occurred given that the supply may react more slowly than the demand of tourism services. This dynamic seems to be revealed by Fig. 5a, which shows the evolution of the ratio between the average wage in the tourism sector and the average wage of other sectors in Salta. The average wage ratio increased after 2004 but then decreased gradually to its previous level.

We then estimate the impact of TDP on wages applying the SCM. Fig. 5b displays the trend in average wages in Salta and synthetic Salta. The synthetic counterpart follows a very similar pattern to that of Salta.

[29] By applying the placebo test, we obtained that this effect became statistical significant at 10 percent.

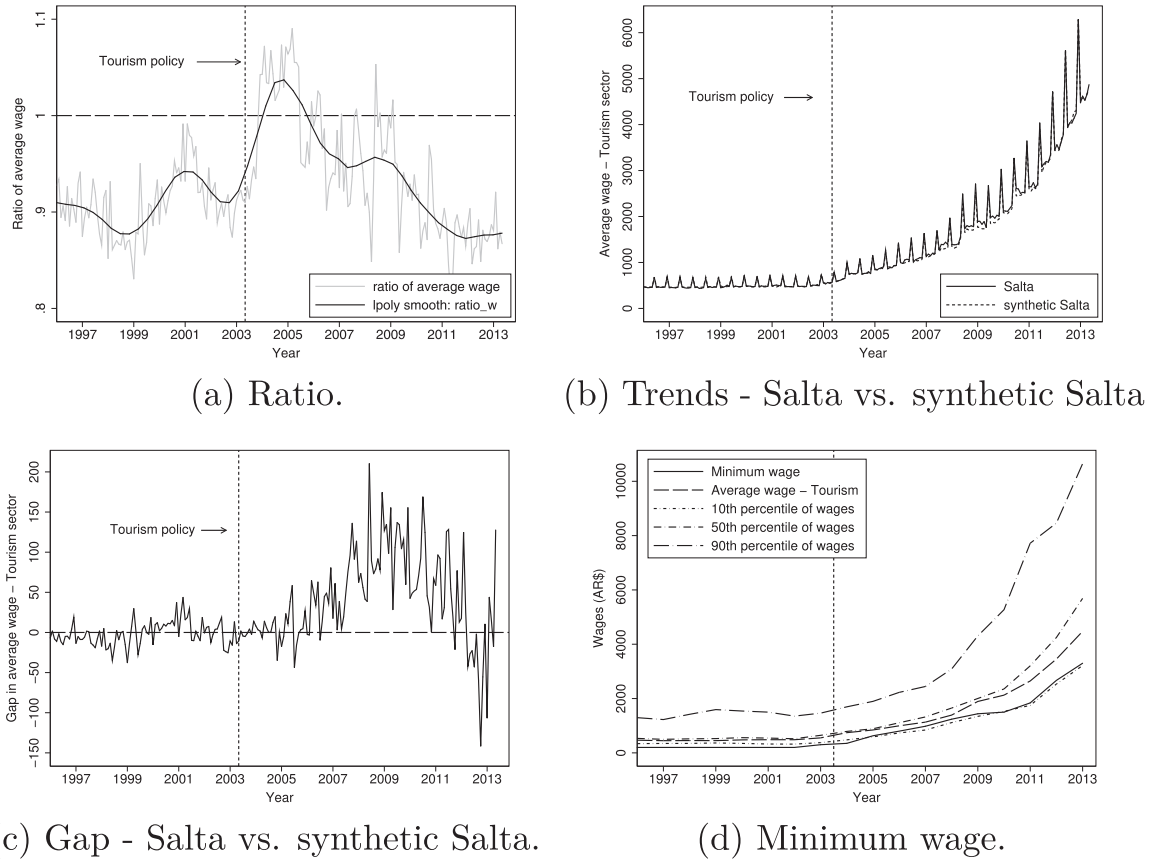


Fig. 5. Average wage.

Both trends are mainly driven by the inflationary period that began after the devaluation of the peso in 2002. Another interesting feature is the occurrence of seasonal peaks in wages. The SCM does a good job of capturing this seasonality.

When we take a closer look at the gap in average wages (Fig. 5c), we find a similar result as the one shown in Fig. 5a: a small impact in the short and medium term that disappears in the long-term. This confirms that while the TDP had a significant and long lasting effect on employment it had no long-term effects on wages in the tourism industry. This result is also consistent with the fact that the tourism sector employs a relatively large portion of low-skilled and part-time workers paid at a minimum wage. In fact, Fig. 5d shows how the average wage in the tourism sector in Salta is close to the minimum wage, and between 10th and the 50th percentile of the average wage distribution among sectors.

7.2. Tourism value-chain and provincial economy

Having identified robust positive effects on hospitality employment in Salta, another question is whether the TDP affected employment in tourism-related sectors. For this, we replicate our estimation using SCM in the tourism value-chain (including the hospitality sector). According to the WTO (2014a), the tourism value-chain includes the following sectors: accommodation for visitors, food and beverage serving activities, railway, road, water and air passenger transport, transport equipment rental, travel agencies and other reservation services activities, cultural and entertainment activities, sports and recreational activities, retail trade of country-specific tourism characteristic goods, and other country-specific tourism characteristic activities.

Figs. 6a and b represent the evolution of the employment trajectory and gap between Salta and its synthetic counterpart in the tourism value-chain, respectively. In general, the SCM algorithm matches well the pretreatment employment trends in this sector. Between 2003 and 2013, employment increased by an average 2.2 percent per year due to the TDP, for an accumulated impact of 22 percent from the May 2003 baseline level. In terms of job creation, this implies a net creation of 1376 formal jobs, from which almost the 50 percent comes from the hospitality sector.

We then analyze the impact of TDP on the overall employment of the province of Salta. Fig. 6c shows a positive effect of the TDP on the employment of the Salta economy compared with the synthetic unit. While the employment gap prior to the TDP tends to be around 0, after the TDP the gap started to be positive (Fig. 6d). This gap corresponds to a TDP impact of around 0.5 percent per year between 2003 and 2013 i.e. an accumulated impact of 5 percent. This implies that, in total, 2750 formal jobs were created in the province of Salta due to the TDP. Both the effects on the tourism value-chain and overall economy tend to appear mainly in the medium and long term.[30]

The estimated TDP impact on the overall economy has two important implications. First, it confirms that the increase in employment in tourism and its related sectors did not come at the expenses of (crowd-out) other sectors but an increase of total provincial employment. Second, the overall effect is larger than the tourism value-chain effect, pointing out that inter-industry employment spillover (crowding-in) effects actually occurred. Indeed, for one job created in the tourism value-chain, an additional job was created in the rest of the economy. This is highly consistent with the input-output matrix of Argentina, which estimates an employment multiplier of around two for the tourism industry.[31]

Finally, in terms of overall average wage, we find a negative effect of

[30] By applying the placebo tests, we obtain that these effects are statistical significant at 10 percent or 5 percent, depending on the test. Results are robust to different SCM specifications and tests.

[31] The last complete input-output matrix for Argentina refers to 1997, INDEC (2001).

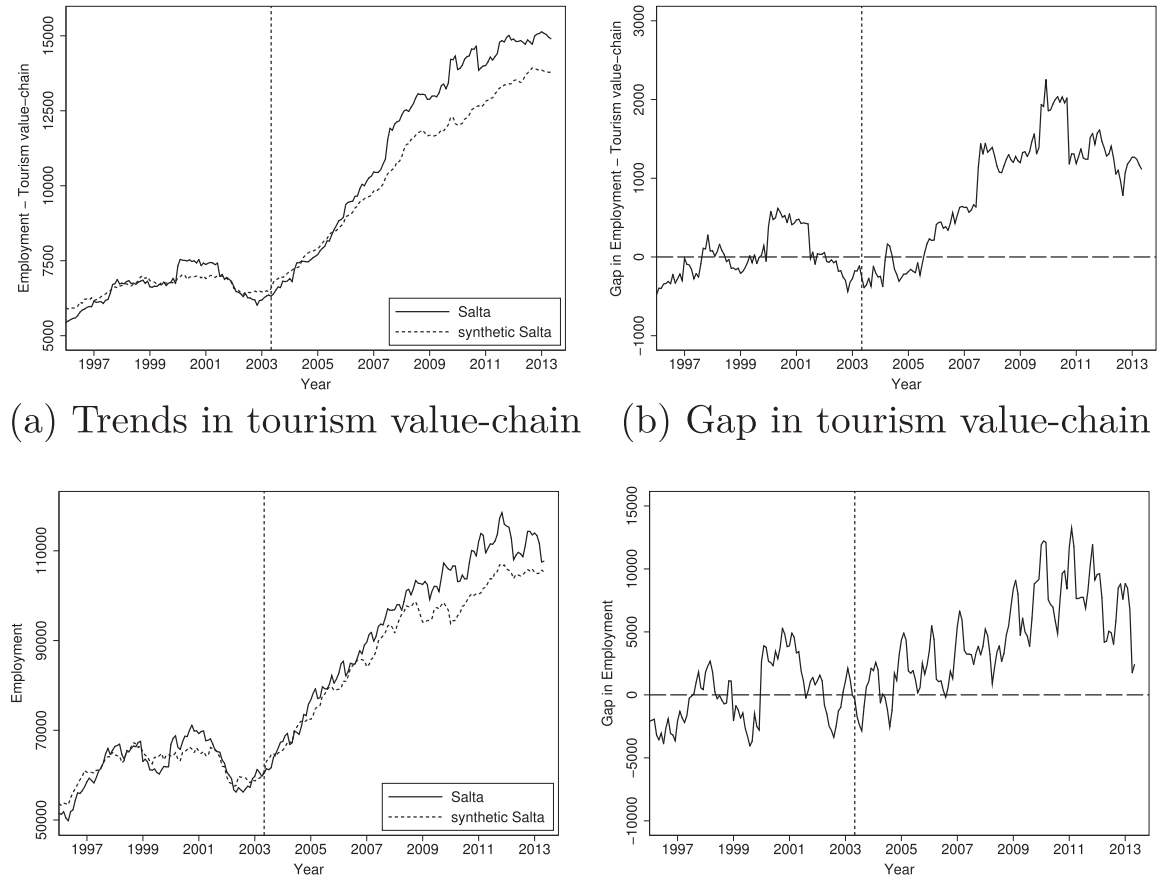


Fig. 6. The impact of TDP on employment: Salta vs. synthetic Salta.

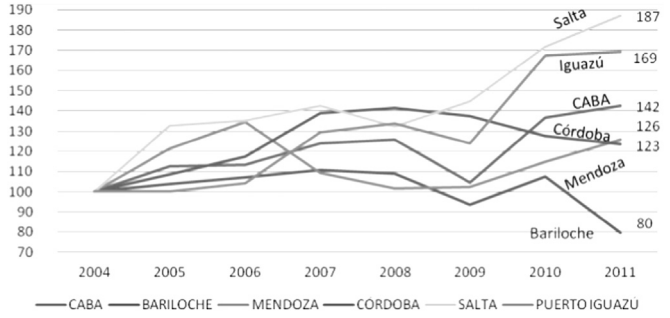


Fig. B1. Hotel occupancy index (2004 = 100) - Main tourist destinations in Argentina, *Source:* "IERAL-Fundación Mediterránea" based on the Hotel Occupancy Survey (INDEC).

the TDP, particularly in the medium and long-term (see Annexure D Fig. D1). This effect is again consistent with the hypothesis that TDP may have mostly created relatively low skill jobs for unemployed workers willing to accept wages close to the legal minimum. Over time, this constant increase in the portion of low wage jobs may have induced a growth of the average wage slower than the counterfactual trend without these new jobs.

8. Conclusion

A true revival of industrial policies has occurred. After falling out of favor for many years, a new type of industrial policies is now being globally implemented by governments to foster growth and sustain job creation, particularly at the sub-national level. In this context, many countries and regions have adopted regional policies focused on the tourism industry. In this case, governments have acknowledged the need to play an active role in the development of this industry, which is often plagued by coordination failures and requires the provision of several public goods. In addition, the ability of tourism to generate employment opportunities has made its development particularly attractive to developing countries endowed with natural, historical, and cultural resources. However, despite the renewed acceptance of this industrial policies, old issues related to their design and evaluation persist and, to date, few studies have attempted to identify their causal effects on growth and employment.

This study contributes with a rigorous analysis of the causal effects of a regional industrial policy on employment. Applying a SCM approach to the tourism development policy of the Salta province in Argentina, we find strong effects on the employment in the hospitality sector. Specifically, we find an average annual impact of 11 percent over the period 2003–2013. This corresponds to an accumulated impact of approximately 750 new formal jobs since the baseline date in May 2003. In addition, our findings show that this effect increases to 1376 formal jobs when considering the entire tourism value-chain. Given the scope of the policy, these direct effects are not surprising. However, a key question – as should be for any industrial policy – is then whether these direct effects came at the expenses of other industries. In this case, we find that the positive inter-industry employment spillovers/externalities clearly more than compensated any potential crowding our effects. That is, our results show an increase in total employment – equal to 2750 formal jobs – that clearly exceeded the direct effect on the tourism industry. That is, for each job created in the tourism value-chain, one additional job was created in the rest of the provincial economy.

Our findings confirm that well-designed and opportunely implemented regional industrial policies can effectively achieve important structural effects and boost job creation in developing regions. In the specific case of tourism, fostering coordination and overcoming financial, infrastructure, and institutional bottlenecks are key to the success of policies in this sector. Indeed, the integrated approach adopted in Salta made it possible to overcome various bottlenecks, activate several drivers of the tourism demand, while simultaneously support the supply side. All these elements allowed to initiate a process of agglomeration that is reflected in the significant results achieved over a ten-year period.

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Annexure A. Data Appendix

Source I: Observatory of Employment and Entrepreneurial Dynamics (OEDE) at Ministry of Labor, Employment, and Social Security in Argentina, 1996–2013 (province –3-digit SIC sector level).

- **Employment:** number of formal employees. Frequency: Monthly.
- **Number of firms.** Frequency: Monthly.
- **Average wage:** ratio of the sum of monthly wages of formal employees to number of formal employees. Frequency: Monthly.
- **Average size of firms:** ratio of number of formal employees to number of firms. Frequency: Monthly.
- **Average age of firms.** Frequency: Annual.

Source II: Argentina National Population, Households, and Dwelling Census, 2001 (province level).

- **Log of population:** logarithm of total population aged 14 and older.
- **University level:** share of population aged 20 and older with university level completed in the total population.
- **Road paving:** share of households with access to at least one paved road in the census area in the total households.
- **Public lighting:** share of households with access to public lighting in the census area in the total households.

Source III: Ministry of the Interior and Transportation, 1993–1998 (province –3-digit SIC sector level).

- **Gross Domestic Product (GDP).** Frequency: Annual.

Source IV: Permanent Household Survey, National Statistical and Census Institute, 2003 (province level).

- **Informality rate:** share of employees aged 18 and older without pension contributions.

Annexure B. The Province of Salta

The Province of Salta is in the northwest of Argentina (NOA). It has an area of 155,488 km^2 – 6 percent of the nation's land mass – and it borders six Argentinean provinces and three countries (Chile, Bolivia, and Paraguay). In 2001, its population was about 1 million – 3 percent of Argentina's total population – with an average population density of seven people per km^2 and an urbanization rate of 78 percent.[32] Salta was one of the least developed provinces in the country. Primary and its complementary industries were the main economic activities. Per capita GDP in 2001 was US$4,000, about half that of the country as a whole (US$7,500).[33]

Despite its stagnant economy, Salta's natural beauty and cultural heritage have made it a tourist destination. The diversity of its natural resources ranges from the Andean highland plateau (the “Puna”) and the Chaco forests to the subtropical forest in the Yungas Biosphere Reserve. The uniqueness of its landscapes, characterized by colorful hillsides, ravines, mountain peaks, volcanoes, and salt flats, can be appreciated in its numerous protected areas, covering about 18 percent of its territory. Salta is also known for winery tours through the world's highest vineyards. This unique feature led to the construction of the Grape and Wine Museum (Museo de la Vid y el Vino), located in the tourist city of Cafayate.

Salta's vast cultural heritage includes native and aboriginal communities, colonial and archaeological sites, and cave paintings. The province offers internationally recognized attractions, such as the monumental Train to the Clouds (Tren a las Nubes), one of the highest railways in the world, and the prestigious Museum of High Altitude Archaeology (MAAM). Finally, Salta's privileged location magnifies its tourism potential. Considered the main port of entry to the NOA region and sharing borders with Chile, Bolivia, and Paraguay, the province offers convenient access to regional circuits (i.e., *Qhapaq Ñan* and the Great Inca Road) that have become popular among international tourists .

[32] Argentina National Population, Households, and Dwellings Census, 2001.
[33] National Statistical and Census Institute (INDEC).

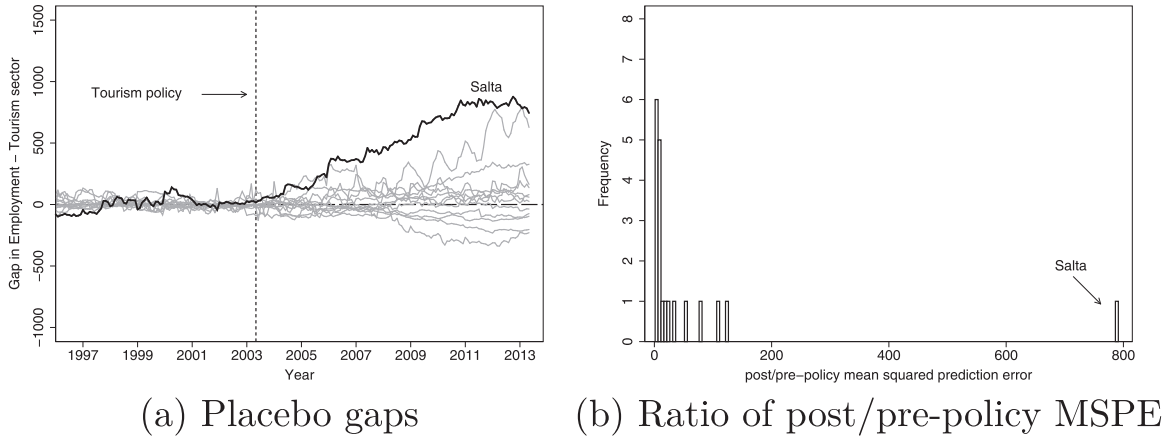


Fig. C1. Placebo of provinces.

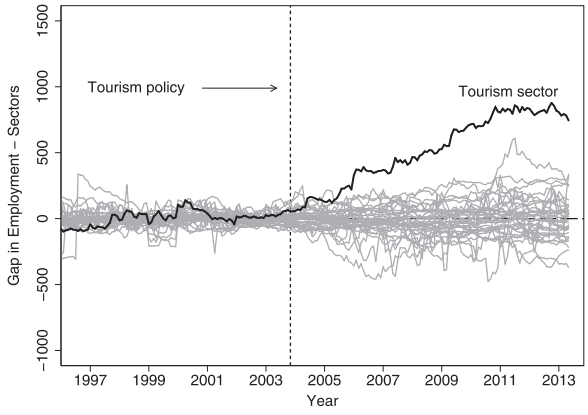


Fig. C2. Employment gap in Tourism sector and placebo gaps in 36 sectors in Salta.

Annexure C. Placebo and robustness tests

C.1. Placebo of provinces

As in classical permutation tests, the intervention was reassigned to units that were not exposed to the intervention. That is, we iteratively apply the SCM to every other control province, shifting Salta to the donor pool. Ideally, the estimated effect in real Salta should be larger than the estimated effect for any other province not exposed to the TDP.[34] Fig. C1a displays the results for this placebo test. Comparing against the distribution of gaps for the 12 remaining untreated provinces, the gap between Salta and synthetic Salta appears highly unusual. In fact, the positive effect in Salta is by far the largest of all.

In this context, *p-values* can be constructed by computing the proportion of estimated placebo gaps that are greater or equal to the estimated gap for Salta. Formally,

$$p - value = \Pr(\hat{\tau}^{PL} > \hat{\tau}_S) = \frac{1}{J+1}\sum_{i=1}^{J+1} I(\hat{\tau}_{iT}^{PL} \geq \hat{\tau}_{ST}) \tag{C.1}$$

where $\hat{\tau}_{iT}^{PL}$ is the estimated gap for the last post-treatment period T when province i is assigned to placebo treatment at the same time as Salta. In our case, given that we use 12 provinces plus Salta, the probability of obtaining a greater or equal effect to the one estimated for Salta is $1/13 \cong 0.076$.

To obviate the need to choose a cut-off for the exclusion of ill-fitting placebo runs, we look at the distribution of the ratios of post/pre-policy MSPE. A large post-policy MSPE is not indicative of a large effect if the estimated counterfactual does not closely reproduce employment in tourism prior to the policy. Fig. C1b reports the distribution of post/pre-policy ratios of MSPE for Salta and 19 provinces. Salta clearly stands out as the province with the highest MSPE ratio. For Salta, the post- policy MSPE is almost 800 times larger than the pre-policy MSPE. Because this test includes 20 provinces, if one were to assign the policy at random in our data, the probability of obtaining a post/pre-policy ratio as large as Salta's would be $1/20 \cong 0.05$.[35]

C.2. Placebo of sectors

In the second test, the SCM was iteratively applied to every other sector using our donor pool of provinces to construct the synthetic counterpart.

[34] We exclude provinces that had a pre-policy MSPE of more than 20 times Salta's.

[35] Both test levels obtained are similar to those typically used in conventional tests of statistical significance.

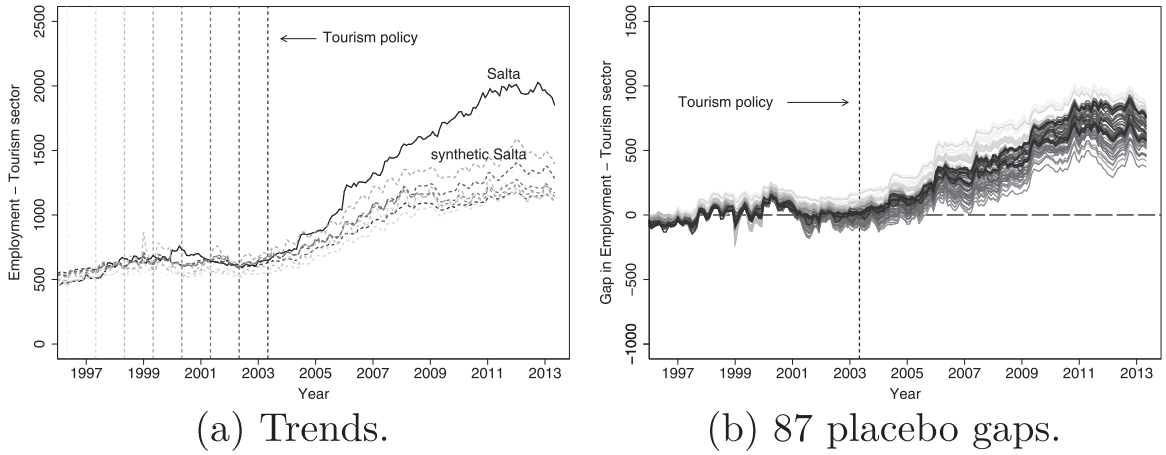


Fig. C3. In-time placebo: Salta vs. synthetic Salta.

The idea is to discard the hypothesis that the growth in tourism employment in Salta is the result of overall employment growth within the province. If this hypothesis were true, then we should find similar gaps for other sectors.

Fig. C2 displays the results for this placebo test for the tourism sector and 35 untreated sectors. The gap for the tourism sector appears highly unusual. In fact, the probability of obtaining a greater or equal effect to the one estimated for the tourism sector is 1/36 = 0.028.

C.3. In-time placebo

Another way to conduct a placebo test is to randomly reassign the time when the intervention took place (Heckman and Hotz, 1989; Bertrand et al., 2002). Ideally, no impacts will be found in the pretreatment period. To construct *p-values*, and given that the frequency of our outcome variable is monthly, we can choose, for instance, a 24-month window after a placebo starting date to compare the estimated gaps.[36]

Fig. C3a displays the results of applying SCM using a set of pretreatment dates (i.e., our placebo dates). We find no evidence of diverging trends between Salta and synthetic Salta in a two-year window of placebo months. We find consistent evidence that synthetic Salta predicts very well the trends of tourism employment for Salta over the entire pretreatment period (January 1996-May 2003). This result is maintained despite the lower pretreatment information on predictors that SCM uses to predict.

Because the TDP started in June 2003, to conduct inference, we can then use each of the 87 pretreatment months as placebo dates of the beginning of the policy and iteratively apply the SCM to Salta.[37] Fig. C3b reports the gaps using all pretreatment months considered plus June 2003.

The darkest gaps of Fig. C3b correspond to placebo estimates computed using a starting date closer to the actual one. As expected, these gaps are quite similar to the one obtained in our main estimation. On the other hand, the lightest gaps, that use a starting date farther away from the true one, slightly overestimate the impact. This is probably related to the fact that the algorithm uses fewer years of pretreatment information in those cases. Finally, the intermediate grey lines represent gaps that use information near the 2001 crisis as the last period of information. As expected, these gaps tend to slightly underestimate the impact of the TDP.

Nevertheless, in all cases, synthetic Salta fits well to real Salta in the actual pretreatment period, generating no gap in this timespan. Furthermore, the estimated gaps after June 2003 are similar to the gap estimated using the actual starting date of the TDP. If a month is chosen randomly, the probability of obtaining, after two years of a placebo starting date of the TDP, a greater or equal effect to the one estimated using the month when the policy actually started is $1/88 \cong 0.011$.

C.4. Leave-out tests

In this test, we first iteratively apply the SCM to Salta, omitting in each iteration one of the provinces that received a positive weight. Second, this exercise is extended to the rest of the provinces in the donor pool. Finally, we iteratively apply the SCM first omitting the two provinces with highest weights, then the three provinces with highest weights, and so on.

Fig. C4 displays the results of this leave-out test. This figure shows that results are robust to the exclusion of any positive or non–positive weighted province from our donor pool as well as to the exclusion of the groups of positive weighted provinces.

C.5. Excluding Salta's nearby provinces

One of the main concerns regarding the main estimation is the fact that the SCM may overestimate (underestimate) the effects on tourism employment due to negative (positive) spillovers produced by the TDP on Salta's nearby provinces. That is, our estimation might be biased due to inter-province spillover effects. Although in Section 6 we show that this is not actually the case, we run the same SCM specification but excluding from our donor pool all of Salta's nearby provinces, that is, Catamarca, Chaco, Formosa, Jujuy, Santiago del Estero, and Tucuman.

Fig. C5a and b present the results. As expected, we find an impact on tourism employment equal to the one obtained in our main estimation. This finding reinforces the hypothesis that the benefit enjoyed by Salta due to the TDP is not biased by potential spillover effects to nearby provinces. Moreover, it signs that these spillovers did not in fact occur.[38]

[36] Results are robust to different choices of this time window.

[37] We do not use the first two months (January and February 1996) as placebo months because we need at least two pretreatment periods to apply the SCM.

[38] We also apply the same SCM specification to each of Salta's nearby province, excluding Salta from the donor pool. Consistent with our main results, we find that the effects on tourism employment in Salta's nearby provinces are not statistically significant different from zero.

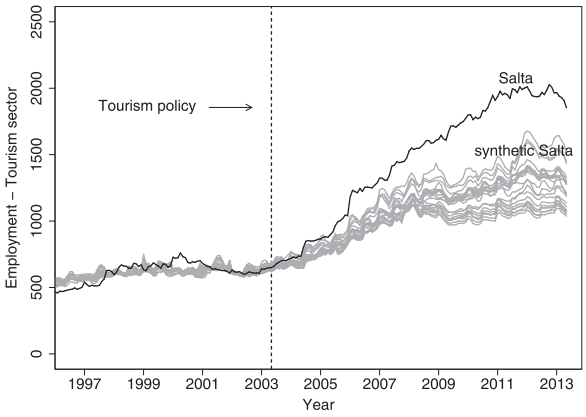


Fig. C4. Leave-one-out distribution of the synthetic control for Salta.

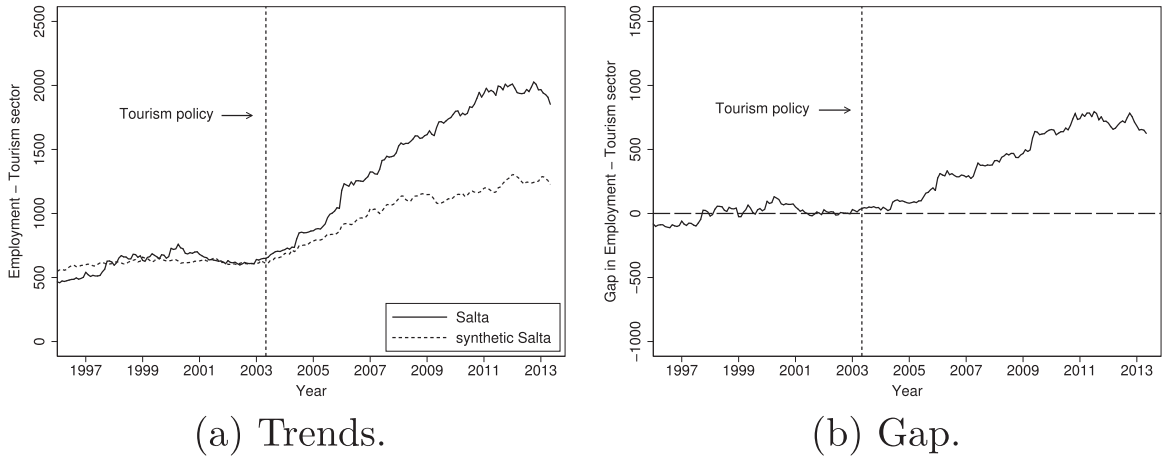


Fig. C5. Tourism sector: Salta vs. synthetic Salta without nearby provinces.

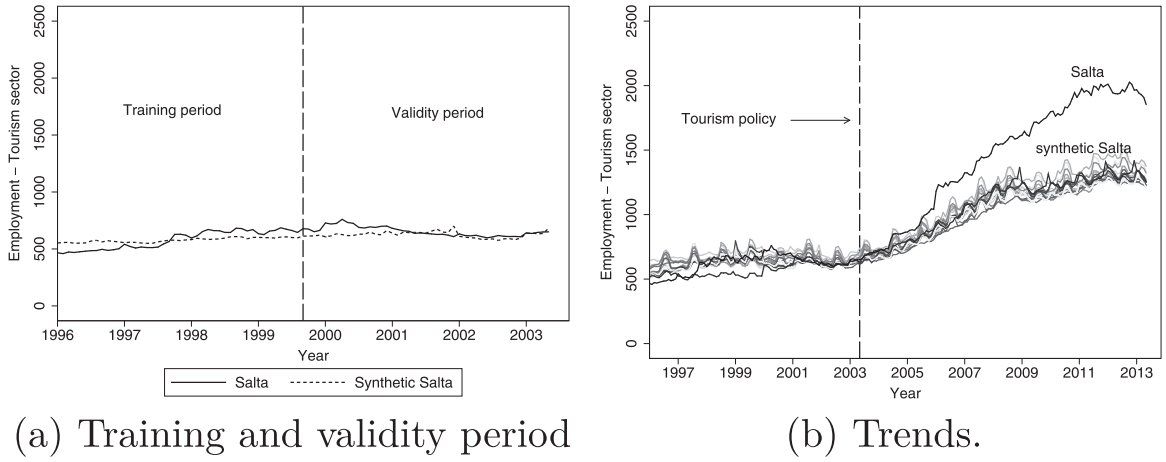
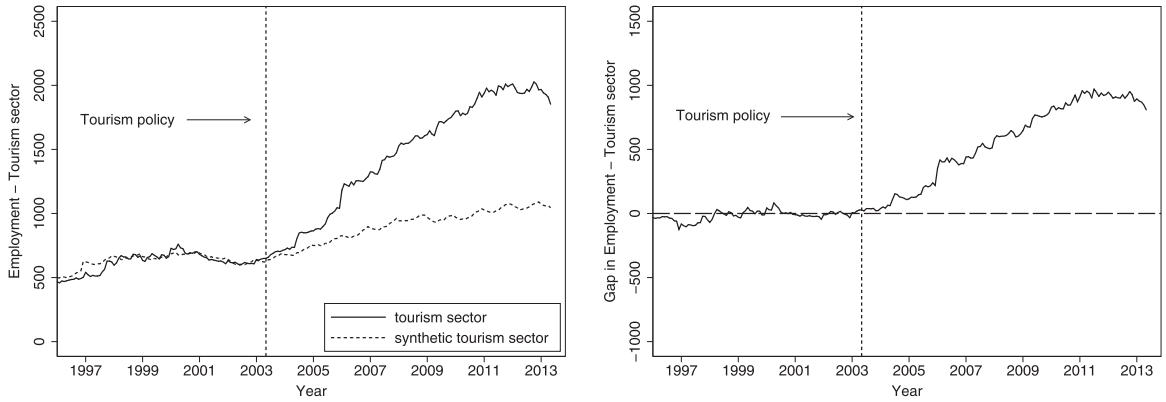


Fig. C6. Cross-validation procedure to choose V weights.

C.6. Cross-validation procedure to choose V weights

We then check the sensitivity of the results to the V weights. To do this we divide the pretreatment period originally used to identify the V^* matrix of weights into an initial training period and a subsequent validation period. Then, using predictor data in the training period, the V weights were chosen to minimize the MSPE of the outcome variable in the validation period. Finally, with these latter V weights and the predictors observed in the validation period, we estimate a synthetic Salta.[39] This cross-validation procedure allows us to test the robustness of the estimated gap to different choices of V weights while testing how well the synthetic control fits Salta over different validation periods.

[39] This cross-validation procedure is applied by Abadie et al. (2015).



(a) Trends in employment (b) Employment gap

Fig. C7. Tourism sector vs. synthetic tourism sector – Donor pool of other sectors-provinces-.

Fig. C6a shows an example of the first stage of this procedure. Using the first half of the pretreatment period, we obtain the V weights and construct a synthetic control that minimizes the MSPE in the second half, the validation period. As shown in this figure, the synthetic control provides a good fit for employment trends in tourism in the validation period. Fig. C6b displays the employment trends in tourism for Salta and several versions of synthetic Salta that result from 15 different partitions of the pretreatment period.[40] As shown in this figure, this cross-validation procedure to choose V weights produces results that are almost identical to the results obtained in Section 5. The darker lines correspond to estimates using a longer training period.

C.7. SCM and Diff-in-Diff

Even though the SCM chooses the optimal weights to minimize the pretreatment MSPE for tourism employment between Salta and its synthetic counterpart, there might still be differences in levels in the pretreatment period. Consequently, to account for this potential problem, we also use a differences-in-differences approach (Diff-in-Diff); that is, we subtract pretreatment differences from post-treatment differences between Salta and synthetic Salta.[41] Then, to obtain the TDP's impact on tourism employment, we compute:

$$\widehat{\beta}_{St} = \left(Y_{St} - \sum_{j=1}^{J} w_j^* Y_{jt} \right) - \frac{1}{T_0} \sum_{t_0=0}^{T_0} \left(Y_{St_0} - \sum_{j=1}^{J} w_j^* Y_{jt_0} \right) \tag{C.2}$$

for $t \epsilon \{T_0 + 1, \ldots, T\}$.

The first term of Eq. (C.2) is the difference between Salta and its synthetic counterpart after the TDP, and the second term is the same difference but averaged for the pretreatment period. Note that the second term of the equation approximates zero when the synthetic control unit adjusts better to tourism employment in Salta before the TDP's implementation.

As an additional robustness check, we apply this post-SCM correction to all our results. In practical terms, if the SCM works well, this correction implies only subtracting a small pretreatment average difference between the real unit and its synthetic counterpart to the effect (gap) estimated through SCM. Results are robust (remains unchanged) to the inclusion of this Diff-in-Diff correction.

C.8. An alternative synthetic control group

So far, the empirical analysis has focused on the comparison of tourism employment between Salta and synthetic Salta constructed on a donor pool of non-treated Argentinean provinces (within the same sector). However, another way to construct a synthetic tourism sector for Salta is using other sectors from different provinces as the donor pool. In this case, the number of control units in the donor pool rises considerably (to around 900 sector-province units).[42]

Fig. C7a and b show the evolution of the employment gap between the tourism sector and this second synthetic tourism sector. This gap corresponds to a TDP impact of around 12.6 percent per year between 2003 and 2013. This alternative synthetic sector is mainly a combination of sectors from Jujuy (other business activities, maintenance and repair of motor vehicles, real estate activities on a fee or contract basis, wholesale, machinery, equipment and supplies, repair of personal and household goods, other mining and quarrying, and activities auxiliary to insurance and pension funding) and Tucumán (manufacture of wood and wood and cork products except furniture, other mining and quarrying, and activities auxiliary to insurance and pension funding).[43]

[40] Partitions result from setting the threshold in the months of June and December from June 1996 to December 2002.
[41] We follow Garcia Lembergman et al. (2015).
[42] We do not include other sectors from Salta, and the tourism sector and the main tourism-related sectors of other provinces previously discarded.
[43] We run the main placebo tests (C.1 tests) for this alternative. We obtained a *p-value* of 0.005 for the case of sector-province donors. For the sake of brevity, we do not present the graphs of these tests in the paper.

Annexure D. Average wages

Fig. D1.

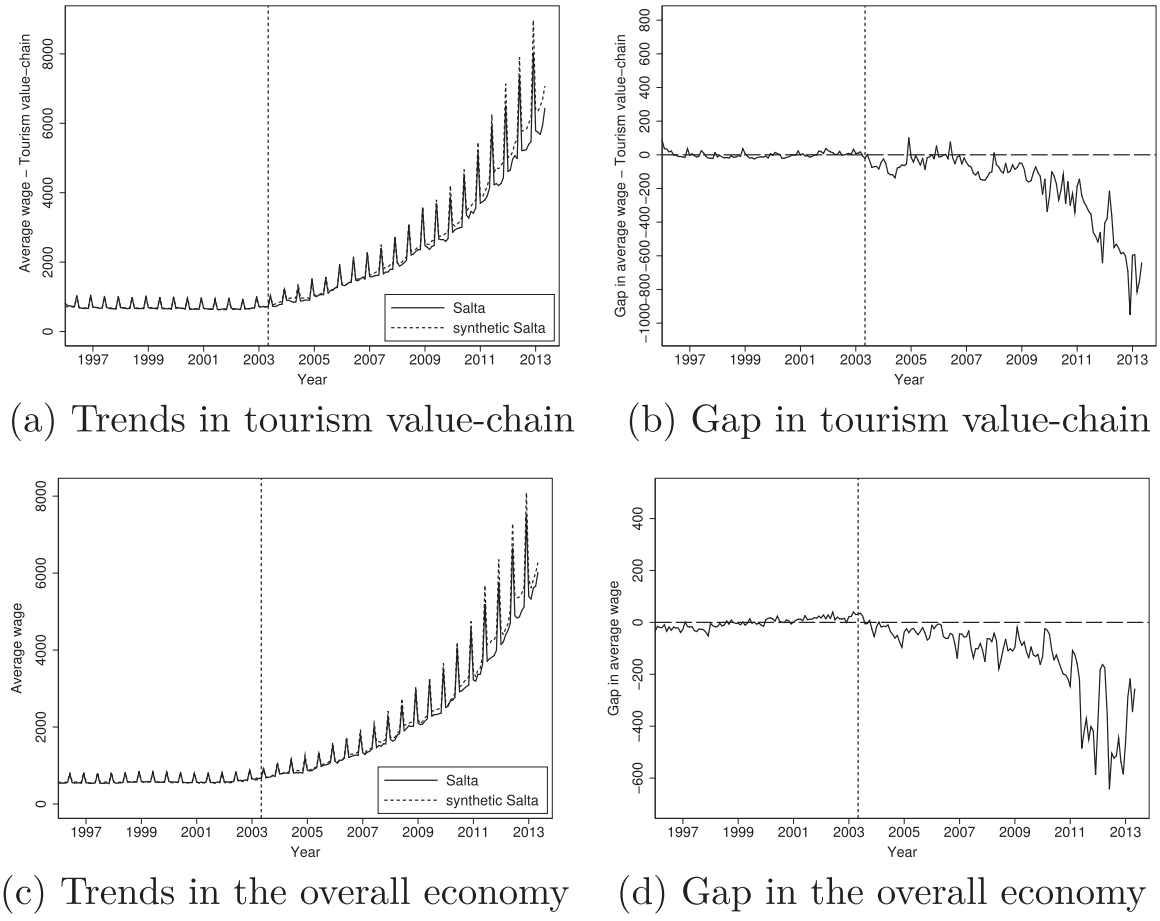


Fig. D1. The impact of TDP on average wage: Salta vs. synthetic Salta.

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