Lisbon School of Economics & Management
Universidade de Lisboa

MASTER
IN ECONOMICS

MASTER´S FINAL WORK
DISSERTATION

DESPERATE HOUSEWIVES AND THE *MENINAS*: LOCAL ECONOMIC EFFECTS OF THE MOTHERS OF BRAGANÇA

JEAN AUGUSTO BRITO NOGUEIRA

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SUPERVISION:
JOÃO PEREIRA DOS SANTOS

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GLOSSARY

GDP – Gross Domestic Product

RMSPE – Raw Mean Squared Prediction Error

SEF – Serviço de Estrangeiros e Fronteiras

INE – Instituto Nacional de Estatística – Statistics Portugal

NUTS – Nomenclature of Territorial Units for Statistics

ATM – Automated Teller Machine

CAE-REV – Classificação Portuguesa de Actividades Económicas

SCM – Synthetic Control Method

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ABSTRACT, KEYWORDS AND JEL CODES

In this paper, we study the economic effects of the persecution against immigrant prostitutes that became internationally known as the Mothers of Bragança social movement. Using a synthetic control method approach, we estimate the impact on local economic conditions, namely on GDP per capita, volume of withdrawals in ATMs per habitant, number of private firms, consumption of electricity per habitant, and employment in private firms. Our findings suggest that the closure of bars and cafes involved with prostitution had a positive impact in Bragança. This result can be explained by the extensive media coverage, including the cover and the main article of *Time* magazine presenting the municipality as "Europe's new red-light district", boosting the inflow of tourists to the region and increasing GDP per capita and the number of firms, especially those related with touristic activities.

KEYWORDS: Prostitution; Bragança; Gross Domestic Product; Withdrawals; Red-Light District; Economic Impacts.

JEL CODES: C33; K42; L83, F22.

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Finally, I am also thankful to my immigrant friends, who are my local second family, and know how much the topic of this dissertation means to me, as well as bear the challenges the immigrant community deals in a daily basis.

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1 INTRODUCTION

Although the market of prostitution is permeated by stigmas, prostitution zones are frequently surrounded by a subset of small businesses, interacting in mutualistic relationship, and forming a local economic environment. Even if prohibited in many countries, indoor prostitution still grows (Cunningham & Shah, 2018), contributing to the formation of red-light districts that are often seen as immoral, neglected, and discriminated by policymakers (Ashworth et. al., 1988; Hubbard & Whowell, 2008). Thus, regulations aiming the criminalization of sex premises are not rare and the effects it generates on the local economic environment are commonly negative, once the ban of prostitutes tend to cease the chain of activities entangling the district.

Bragança, city in the north of Portugal, experienced an event that diverged substantially from the patterns usually observed in analogous situations. When men were found involved with Brazilian prostitutes inside bars and cafes known as "*casas de alterne*", wives of the cheating husbands initiated a social movement known as Mothers of Bragança, a series of protests that exposed the municipality's sex market for both local and international media. The persecution against the prostitutes, commonly known as *meninas*, reached its peak in 2003, leading the city to gain international visibility through the cover of *Time* magazine, presenting Bragança as "Europe's new red-light district".

The purpose of this dissertation is to study the effects of the Mothers of Bragança in selected economic indicators, aiming to understand how this raid against the industry of sex impacted the local economy. The existing literature indicates that the criminalization of prostitution and the closure of red-light districts can lead to negative externalities on the local business environment. We estimate the economic effects of the Mothers' persecution against prostitutes, taking into consideration the specific characteristics of this event, including the attention given by the media. To perform this event study, we use the Synthetic Control Method, introduced by Abadie & Gardeazabal (2003), and further developed in Abadie et. al. (2010). We rely on data for GDP per capita to perform a regional-level analysis, and then, move to a municipality-level analysis, analyzing possible changes in the volume of withdrawals, in the consumption of electricity, in the number of private firms and, also, employment in private firms.

Our main findings indicate that Bragança experienced a result in the opposite direction than the existing literature. First, the municipality's region had an increase in the GDP per capita compared to its synthetic control. Contributing to this result, the municipality-level analysis showed that Bragança experienced a growth in the volume of cash withdrawals per habitant, while the synthetic unit decreased in the years after the event. Moreover, we find that, while the total number of private firms fall in the synthetic control, Bragança maintained a constant number of firms, sustained by the increase in the number of private firms in the accommodation sector. This growth is in line with the observed outcome of the number of persons employed in private firms, as we verify an increase for the treated unit in comparison to its synthetic control. Also, the total consumption of electricity per habitant increased in the city, potentialized by the non-domestic consumption. These results indicate that the Mothers of Bragança triggered an improvement in local economic indicators. We consider these results are linked to the mediatic coverage over Bragança in that period, that attracted visitors pursuing sex tourism, as well as to the gradual closure of bars and cafes involved with prostitution.

This dissertation is structured as it follows: first section will review the literature about the impact that criminalization or decriminalization of prostitution have upon the local economic environment. Section two brings an institutional background, contextualizing Bragança and the settings around the prostitutes and the Mothers of Bragança. Section three will present the data, its source and the methodology used in the development of this work. Fourth section will display the results and discuss them. Finally, the conclusion provides the main findings and discussions of our work.

2 LITERATURE REVIEW

Debates about the regulation of the sex industry is widely present across countries, as the legality of prostitution varies among them (Farmer & Horowitz, 2013). However, little research is dedicated to the connections such industry has with the economic environment and fewer studies investigate the effects these regulations, either by criminalizing or decriminalizing, generate in terms of externalities (see Frondizi & Porcher, 2021; Giambona & Ribas, 2021; Sanders, 2008). For instance, while in a decriminalized market there's a decrease in voluntary prostitution when labor market's wage increase, the criminalization leads sex trade to be costlier and increase human trafficking (Lee & Persson, 2020). This paper focusses on the potential consequences criminalization can generate, taking into consideration that the persecution against Bragança's prostitutes forced bars and cafes out of business, driving women into clandestinity or to nearby cities in Spain (Pais, 2011 pp. 452).

Subsection 2.1 reviews the literature that explores the connections between the sex industry and its adjacent industries, as well as the impact changes in prostitution policies have upon the local economic environment, presenting empirical evidence from the ban of red-light districts and how it impacted nearby businesses. Subsection 2.2 reviews the theoretical models that aim to understand the role of immigrants within the sex industry, bringing light to the presence of Brazilian prostitutes in Bragança's scandal.

2.1 Prostitution and its connections to the economic local environment

Street and indoor prostitution are surrounded by a subset of agents that provide services to sex workers and form a local economic environment, as it is often possible to find shops selling drinks, food, tobacco, and other illicit substances close to prostitution zones. Sanders (2008) argues that prostitution premises are bordered by ancillary activities, such as people providing errands and shopping services, real-estate, publicity, and accountancy. The author also identified an interdependent relation with adjacent industries, such as security, recreation, and accommodation (Sanders, 2008 pp.712). Therefore, red-light districts are linked to a set of agents that facilitate prostitution and

earns from it as well. Yet, as presented by Giambona & Ribas (2021), prostitution zones often carry stigmas, as it is frequently associated to human trafficking, sexual abuse, and general violence.

Prostitution is not only connected to the local economic environment as it also generates externalities affecting it. For instance, the concentration of sex workers can generate negative externalities for the neighborhood, due to the increase in the rate of criminal activities (Bisschop et. al., 2017). On the other hand, following the findings that the sex industry is linked to ancillary activities, Frondizi & Porcher (2021) found that street prostitution in Paris during the 19th and early 20th centuries generated positive externalities to local shops and the informal economy.

In this sense, any changes to regulation, leading to the criminalization or liberalization of sex trade, will lead to an impact in the local business ecosystem. Giambona & Ribas (2021) also found a relationship between the permanent closure of brothels and house prices. The authors identified that, for the city of Utretch, in the Netherlands, the effect of shutting down brothels varies depending on the distance the affected prostitution zone is to properties and the relationship between nearby residents and the red-light district. In addition, they found that the closure of the red-light district led to a fall in the local level of employment, mainly due to the simultaneous closure of shops and the displacement of workers to other regions of the city.

The change in the level of employment is not the only impact the criminalization might have in the labor market. When prostitutes are forced out of the sex industry, there's a decrease in the level of income, which will affect their consumption patterns. As identified by Cameron et. al. (2020), the ban of prostitution in an Indonesian district of East Java led to a decrease in the ability of the ones with children to pay for their expenses, increasing the likelihood of their early entrance in the labor market, especially for boys, to complement the family income.

The decriminalization of prostitution will also generate externalities. Even if prostitution is often associated with criminality, decriminalizing the sex industry can lead to a reduction of sexual violence and to a decrease in the transmission of sexual diseases, as pointed by Cunningham & Shah (2018). According to the authors, when the sex

industry is not persecuted, there are potential savings in the costs associated with public safety, as well as gains in public health, meaning a benefit to the population at large.

We contribute to the literature by analyzing the economic effects that the ban of prostitutes, consequence of the movement Mothers of Bragança, had upon the municipality. We understand such persecution as a criminalization of prostitution and, therefore, we add to the existing research on the potential impacts criminalization might generate as externalities.

2.2 Prostitution and the role of immigrants

Human trafficking is embodied within the context of migrant prostitution, as the cost of communication and transportation decrease with human desire of migrate to more prosperous regions. As shown by Hernandez & Rudolph (2015), human traffic flows are positively associated with the increase of income gaps between two countries, as criminal organizations tend to recruit victims in low-income countries to exploit them in high-income countries. The authors also argue that victims are mostly found in well-established migratory routes, as in many cases they have a false job offer, which makes it difficult for authorities to identify the crime, and are only able to detect it after arriving at the final destination.

Although immigrant prostitution is strongly associated with human trafficking, voluntary prostitution has also to be accounted for. Stark & Fan (2011) studied the reasons why immigrant women choose to enter prostitution when moving abroad. As more women come from the same country to work with sex trade, there is a reduction in the sense of humiliation tending to an increase in the number of prostitutes from the same nationality in that specific region (Stark & Fan, 2011 pp. 246). Moreover, the authors suggest that people in the country of origin may take into consideration the rewards their fellow immigrants receive, possibly ignoring the demeaning characteristics of the work. By deriving a model for the market of prostitution, Edlund & Korn (2002) proposed an explanation based on marriage income and argues that prostitution must be well remunerated to compensate for the loss of income when women decide to work for the sex industry instead of getting married. Moreover, the model predicts that prostitution is linked to high levels of migration and, in a scenario where local and foreign prostitutes

coexists, ceteris paribus, immigrant prostitutes would cost less (Edlund & Korn, 2002 pp. 211).

3 INSTITUTIONAL BACKGROUND

As prostitution becomes increasingly more accessible and visible, especially in western countries (Brents & Sanders, 2010), yet it remains stigmatized, target of moral attitudes that drive its marginalization and potentialize strict regulations toward the sex industry. As a low-skilled well-paid activity (Edlund & Korn, 2002; Moffat & Petters, 2004), it attracts workers with different backgrounds, including immigrants, contributing to the stigmatization of the industry and the prejudice toward the immigrant itself. In Portugal, where prostitution is not illegal - the organization of sex activities is criminalized and there are several laws to prevent human trafficking - immigrants are frequently found within the sex industry. As an effect of the often-negative association between prostitution and immigration, immigrants played a central role in a prostitution scandal that erupted by 2003 in the municipality of Bragança, in the northern part of Portugal bordering Spain, that involved Brazilian women, local businesses, authorities and, mainly, wives and their husbands.

Brazilians have always been a great proportion of the immigrant population in Portugal, being the second largest foreign population by 2001 (SEF, 2001). As Padilla (2005) presents, Brazilian immigrants, and especially women, carry stereotypes associated with sexuality, prostitution, and for being exotic. Furthermore, the prejudice became more latent in the early 2000s, when the inflow of immigrants from Brazil increased and many of them were employed in low-skilled jobs (Padilla, 2005 pp. 5). Parallelly, the sex industry grew in the region of Bragança, with indoor prostitution becoming common in many commercial establishments. Even with most incomers from Brazil not having any connection with sex activities, it became frequent the circulation of newspaper articles connecting them with sex trade (Minga, 2020) and the city became known for its “casas de alterne”, which were bars and cafes (in effect, brothels), where women worked as to entertain men and make them consume, often involving sex trade. The large number of such places in a small town formed characteristics of a red-light district, and, as prostitution zones, were associated with degradation and crimes. These factors contributed to accentuate the stigmas against the immigrant prostitutes, that were often under the spotlight of the media, that explored the situation by raising concerns on prostitution and its practices against families.

The movement Mothers of Bragança, headed by the wives of the cheating husbands, began as a protest opposing these under-covered sex establishments. Manifestations against such bars and cafes became frequent and the prostitutes were the ones to blame, having the wives to accuse them of seducing and enchanting their husbands (Pais, 2011 pp. 447). The pressure on local authorities to act and ban the local sex industry was enforced by the church and, in May 2003, a written manifesto circulated around the region, getting hundreds of signatures. The social movement took international dimension in October 2003, when the cover and the main article of the *Time* magazine presented the municipality as a new red-light district in Europe. With such social pressure, the authorities stepped in, and began shutting down the "casas de alterne", not specifically for hosting sex practices, but mostly for employing illegal immigrants and failing to comply with local commerce legislation. Consequently, many of the prostitutes moved to nearby cities in Spain and, according to Pais (2011), attracted many residents from nearby cities, including from Bragança.

4 DATA AND METHODOLOGY

4.1 Data

Data used in this paper comes from Portuguese populational census and regional statistical yearbooks, drawn through Statistics Portugal – INE. INE is a governmental agency that collects, processes, and distributes data on Portuguese indicators. The agency provides data organized by NUTS I, NUTS II, and NUTS III – referred as macro-regions – as well as for municipalities.

This paper uses municipal and regional-level panel data for the period 1995-2008. For the macro regional analysis, we consider NUTS III region Terras de Trás-os-Montes as the treated unit, and the remaining NUTS III regions in mainland Portugal as controls in the donor pool, except for the two metropolitan areas of the country, Lisbon and Porto.

For a more detailed analysis, we also obtained administrative data at the municipality-level. In this case, Bragança is the treated unit, and the donor pool is formed by 86 municipalities that are selected according to the following criteria. These municipalities are in the macro-regions of NUTS II Norte, and in three macro-regions of NUTS II Centro, namely Dão-Lafões, Beira-Interior Norte and Beira-Interior Sul. Municipalities in the Porto metropolitan area were excluded due to the demographic and socio-economic differences. We also dropped observations for eight cities that have Bragança as the closest capital of district, due to the potential bias caused by spillover effects, considering their closeness to the treated unit. The selected municipalities in NUTS II Centro were added due to socio-economic similarities with Bragança.

We collected the dependent variables from INE, both from national census and statistical yearbooks. The interest of this paper is to estimate the impact of the Mothers of Bragança in the local economic indicators and, for that, a set of outcome variables are selected to be accounted for.

Firstly, we chose the path of regional-level per capita GDP, presented in Euro purchase power parity, taking as basis the year of 2016. Moreover, we collected municipality-level withdrawals for each municipality, provided by SIBS, the local banking network operator for ATMs. The information comprises the volume of cash withdrawn per habitant, excluding the operations made using an international card. Additionally, two of the outcome variables represent the number of private firms: one of

them represents the total number of private firms while the second represents the number of private firms of the accommodation sector. They represent the number of private firms with headquarters in the studied municipality, with the second being the ones categorized as H – Accommodation, according to the Portuguese classification of economic activities (CAE-REV. 2). Also, we considered the consumption of electricity as outcome variables, and we divided in three different indicators: the total consumption of electricity per capita, the domestic consumption per capita, and the non-domestic consumption of electricity per capita. The three indicators come as consumption in kWh per habitant. Lastly, persons employed in private firms represents the total number of people employed in private firms, but, in this specific case, post-intervention period ceases in year 2005. Table 1 presents the summary of descriptive statistic for the outcome variables.

We added to the analysis a vector of socio-demographic variables, as presented in Table A.1 along with their descriptive statistics. As these variables correspond to data collected in the Portuguese census, all are available for the year 2001 alone, except for population density by municipality-level. Population density and share of active population are the strongest ones, with at least one of them included as predictors for every outcome. For GDP per capita, for instance, these two predictors are the ones selected as independent variables. We also considered the share of foreign population as predictor for volume of withdrawals. For the total number of private firms, the rate of employment is added, although for private firms of the accommodation sector, population density alone is considered. For the consumption of electricity, the share of population with a university degree is included as an additional predictor. For persons employed in private firms, the share of active population, the share of people older than 65 years old and the share of people unemployed are predictors.

Following Abadie et. al. (2010), outcome variables are matched as predictors for pre-intervention period, to control for the heterogeneity of both observed and unobserved factors of the variable of interest. As defended by Abadie et. al. (2015), this mechanism is useful to identify units that are similar in unobserved and observed determinants of the dependent variable, including the effects those have in the outcome. Therefore, once the treated unit and the synthetic control present similar behavior in the pre-intervention period, the differences post-intervention are understood as consequences of the intervention itself.

TABLE 1 – SUMMARY OF DESCRIPTIVE STATISTICS FOR THE OUTCOME VARIABLES

PANEL A – SUMMARY OF DESCRIPTIVE STATISTICS FOR DEPENDENT VARIABLES – REGIONAL LEVEL

VARIABLE	OBSERVATIONS	MEAN	STANDARD DEVIATION	MINIMUM	MAXIMUM
GDP Per Capita (ln)	294	9.537	0.283	8.718	10.234

PANEL B – SUMMARY OF DESCRIPTIVE STATISTICS FOR DEPENDENT VARIABLES – MUNICIPAL LEVEL

VARIABLE	OBSERVATIONS	MEAN	STANDARD DEVIATION	MINIMUM	MAXIMUM
Withdrawals (ln)	1217	6.564	0.697	4.304	8.361
Number of private firms (ln)	1218	7.22	0.942	5.357	9.84
Number of private firms of the accommodation sector (ln)	1218	4.918	0.879	3.178	7.545
Domestic energy consumption per capita (ln)	1218	6.645	0.29	5.804	7.41
Non-domestic energy consumption per capita (ln)	1218	5.972	0.494	4.68	7.607
Total energy consumption per capita (ln)	1218	7.69	0.541	6.45	10.54
Persons employed in private firms	957	7.28	1.441	3.638	11.004

4.2 Methodology

This work relies on the Synthetic Control Method (SCM) presented by Abadie & Gardeazabal (2003) and further developed by Abadie et. al. (2010), to perform comparative case studies. In this approach, a convex weighed combination of comparison units from the donor pool, the synthetic control, is constructed to approximate the most similar characteristics of the treated unit, namely Terras de Trás-os-Montes as macro-region and Bragança as municipality, for the years 1995 to 2001, as the period before the treatment. Following Abadie (2021), it is assumed no anticipation effect, once we focused on the immediate consequences of the social movement, ensuring the robustness of our findings. After the event, SCM is used to estimate the counterfactual situation of the treated unit in the absence of the event, by analyzing the outcome for the synthetic control.

Define the index j = (0,1,…,J) as the municipalities or NUTS III, where j=0 corresponds to the treated unit and j=(1,…,J) the potential contributors in the donor pool. Let $Z_j = \left[\{Y_{j,t}\}_{t=1}^{T_0}\right]$, t = (1,2,…, T_0), while T_0 represents the year 2001, be the k x 1 vector for each of the dependent variable Y in this study – namely GDP per capita, withdrawals, number of private firms, consumption of electricity, and persons employed – plus additional predictive covariates of the outcome, satisfying:

$$Y_{j,t} = Y_{j,t}^N + D_{j,t}$$
$$Y_{j,t}^N = \theta_t L_j + \lambda_t \mu_j + \varepsilon_{j,t} \quad (1)$$

In (1), D is the treatment effect, $Y_{j,t}$ the observed outcome variable and $Y_{j,t}^N$ the counterfactual outcome variable, θ_t the 1 x F vector of observed common factors and L_j the F x 1 vector of observed factor loadings, λ_t the 1 x R vector of unobserved common factors and μ_j the R x 1 vector of unobserved vector loadings. Finally, $\varepsilon_{j,t}$ the error term. Assume k x J as the matrix Z_1, the conjunct of the observed data vectors for each of the J municipalities or NUTS III in the donor pool.

Let W be the J x 1 weighting vector, where W = (w_1, w_2,…,w_J), such that $\sum_{j=1}^{J} w_j = 1$, $w_j \geq 0$ for j = (1,…,J), then Z_1W will be the weighted average for the selected units in the donor pool in the pre-intervention period, solving the optimization problem:

$$W^* = arg\ min \parallel Z_0 - \sum_{j=1}^{J} w_j Z_j \parallel$$
$$\text{subject to } w_j \geq 0 \text{ for j = (1,…,J), and } \sum_{j=1}^{J} w_j = 1 \quad (2)$$

Following Abadie et. al. (2010), the treatment effect, in this case the impact of the Mothers of Bragança in each of the outcome variable, is obtained by measuring the gap difference between Z_0 and Z_1W for each of the outcome variables, and analyzing the raw mean squared prediction error by applying

$$\parallel Z_0 - Z_1 W \parallel = \sqrt{(Z_0 - Z_1 W)' V (Z_0 - Z_1 W)} \quad (3)$$

where V is a k x k symmetric positive semidefinite matrix.

4.3 Inference

Following Abadie et. al. (2010), we applied the in-space placebo test to estimate inference, which will generate a rank based on the raw mean squared prediction error (RMSPE) ratios. The RMSPE for each unit j will be

$$R_j\,(t_1, t_2) = \sqrt{\frac{1}{t_2 - t_1 + 1} \sum_{t=t_1}^{t_2} \left(Y_{jt} - Y_{jt}^N\right)^2} \tag{4}$$

This will mean that the ratio for the post/pre-intervention for each unit j will be

$$R_j = \frac{R_j\,(T_0+1,T)}{R_j\,(1,To)} \tag{5}$$

The permutation of treatment status for every potential control will allow for the assessment of the statistical significance based on the post-intervention fit in relation to the pre-intervention for Bragança, compared to the same rationale for each of the municipalities in the donor pool. Using the same approach as Abadie et. al. (2010) to reduce poor pre-treatment fit in the donor pool, inference test using the placebo study was run for all units in the donor pool, as well as discarding placebo units with $R_j\ (1,\ T_0)$ substantially larger than $R_0\ (1, T_0)$.

The rank of RMSPE ratio allows for a generation of a percentile distribution, uniformly distributed by the number of units in the donor pool, being possible to determine whether the rank of the treated unit will lie in the extreme of the uniform distribution, constituting a confidence interval based on the p-value. For the purpose of this paper and considering the number of municipalities and NUTS III in the donor pool, the results are assessed on the five percent level of significance.

5 RESULTS

The main results of the empirical approach are explored in this section, with the application of the synthetic control method for the mentioned variables, while we perform the inference tests to verify the robustness of the results and show the graphics in the appendix. We begin exploring the analysis by a regional-level, and then look further into the results by a municipality-level.

5.1 GDP Per Capita

We start by presenting the application of the synthetic control method for GDP per capita, where Terras de Trás-os-Montes is the treated unit, with 20 potential macro-region controls included in the donor pool. As GDP per capita can provide an overview on the development of a region and will serve as a leading indicator providing insights for other variables, it's understood as a solid measure to examine the overall economic impact that the social movement Mothers of Bragança had upon the region.

Table A.2, in the appendix, presents the weights applied to the NUTS III selected to construct the synthetic control for Terras de Trás-os-Montes, according to the techniques described in the methodological section. Recall that, as argued by Abadie (2021), all other NUTS III in the donor pool receives zero weights and, therefore, does not provide data for the comparison. Alentejo Central and Alto Alentejo are situated in Região Alentejo, and interestingly, Alto Tâmega and Douro are not only two NUTS III from Região Norte, but also adjacent to the treated unit.

Figure 1 displays the trajectory of GDP per capita of Terras de Trás-os-Montes for the 1995-2008 period. The close fit the synthetic control has with the treated unit for the pre-intervention period evidences the similarities the control group has with the studied macro-region. The impact of the Mothers of Bragança on per capita GDP is estimated by the difference between the treated and the counterfactual, as depicted in figure 2. While the synthetic control seems to continue growing in a linear path after 2001, with an average GDP per capita growth of 2.87% between 2001 and 2008, the treated unit had an accelerated rise between 2003 and 2005, reaching 3.85% of growth from the

intervention until 2008. This behavior indicates a first contraposition to the existing literature in which the criminalization of prostitution leads to negative externalities for the local economy. We follow up with our analysis on the next subsections to identify and understand the factors that might explain this increase.

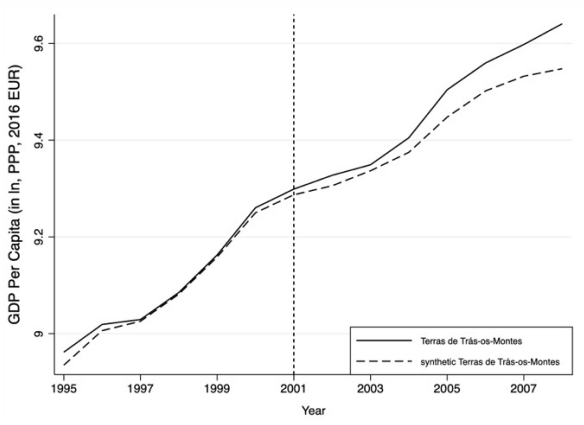

FIGURE 1 – GDP PER CAPITA

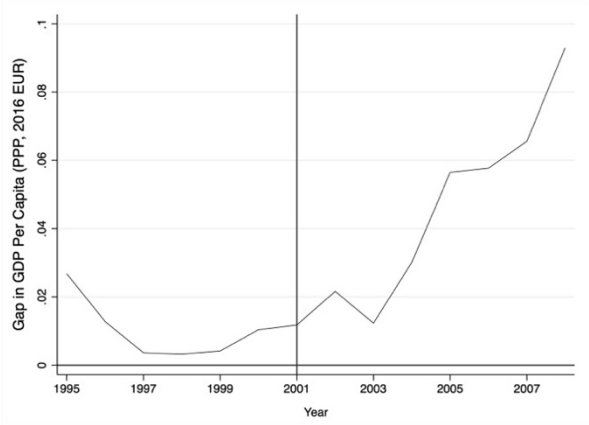

FIGURE 2 – GAP IN GDP PER CAPITA

To conduct the placebo test, we re-ran the model iteratively swapping each of the NUTS III in the donor pool as treated unit and obtained the ratio between the pre- and post-intervention raw mean squared prediction error. Figure A.1 presents the frequency distribution for the ratios. Terras de Trás-os-Montes has the highest ratio among the units of the pool, showing that the difference of the treated and the counterfactual post-treatment, in comparison with the pre-treatment period, is more significant for the studied macro-region than for the others. Moreover, the percentile distribution generated with the ranking of the ratios attributed a p-value of .04 for Terras de Trás-os-Montes, below the significance level of 0.05 and, thus, we can reject the null hypothesis. Figure A.2 deploys the gap between treated and counterfactual in GDP Per Capita for the treated unit, comparing its behavior to the municipalities in the donor pool after iterating it.

5.2 Volume of Withdrawals

We continued our analysis on a municipal level, aiming to shed light on the behavior of the per capita GDP curve. We recall that the movement of the Mothers

targeted mostly bars and cafes, known as "casas de alterne". Therefore, if men stopped frequenting those places, consumption patterns would have changed and that would translate into a change in the circulation of money. Moreover, the use of automatic payment terminals was not as usual and frequent as today, having the number of transactions across Portugal in 2001 be roughly 18% of the number registered for 2022 (SIBS, 2023), meaning a wider use of cash for purchases. We also understand that the use of physical money in such establishments would be preferred instead of debit cards, as payment in cash leaves no electronic records on the location, and this was the wish of many customers whose whereabouts were to remain anonymous. Table A.3 presents the municipalities and respective weights applied to the synthetic Bragança, while figure 3 compares the withdrawn of cash for the synthetic and the actual.

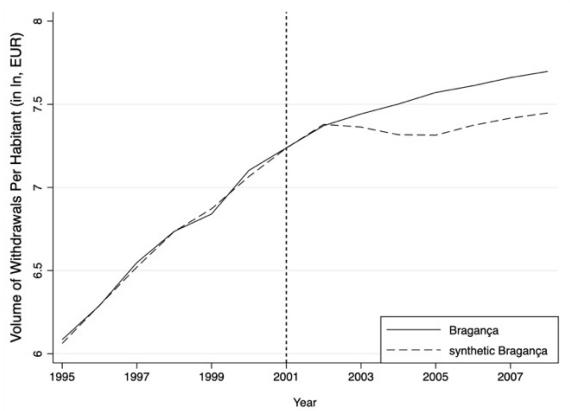

FIGURE 3 – VOLUME OF WITHDRAWALS PER HABITANT

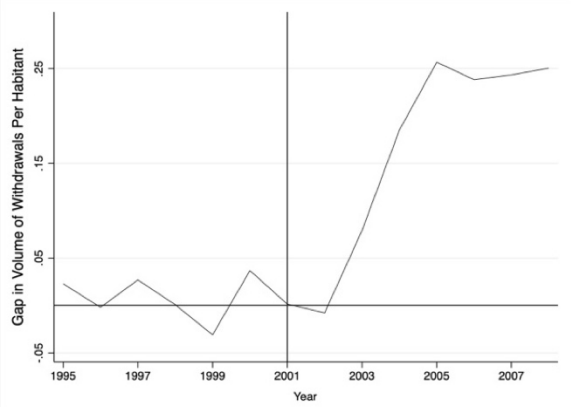

FIGURE 4 – GAP IN VOLUME OF WITHDRAWALS PER HABITANT

While the synthetic control experienced a decline in the volume of cash withdrawn starting in 2002, Bragança seemed to keep a constant growth, explaining the difference depicted in figure 4. Prostitution in the region was widespread up to the moment the Mothers of Bragança movement took shape in 2003. The gap leads to an understanding that the circulation of cash in the municipality continued in the same pattern, even after the movement gained the lights of the media. The "casas de alterne" were not closed immediately and continued to receive customers in the following months after the event, which might have contributed to the circulation of cash and, potentially, to the increase in the region's GDP per capita.

Additionally, the placebo inference showed the raw mean squared prediction error ratio between the post- and pre-intervention period for all units. After iterating the 85 possible controls in the donor pool, Bragança has the highest ratio, as presented in the figure A.21. Considering the percentile distribution, this gives the treated unit a p-value of 0.01, meaning statistic relevance. As for the gap between the treated and the counterfactual, we also compared Bragança with the potential contributing municipalities, as figure A.22 shows, and, following Abadie et. al. (2010) for a clearer view, figure A.23 presents the same comparison, but removing the outlier municipalities in the pre-treatment period.

5.3 Number of Private Firms

The synthetic control method was likewise applied to the number of private firms, comparing Bragança to the selected municipalities in the donor pool. As subsection 5.1 showed, Terras de Trás-os-Montes presented an increase in GDP per capita compared to its peers. Subsection 5.2 indicated that the volume of withdrawals per person does not decrease in the municipality as it did in the control group. Now we test if there was a variation in the number of private firms in the municipality in comparison with the synthetic control. For that, we analyzed both the total number of private firms and the number of private firms of the accommodation sector. Tables A.4 and A.5, in the appendix, present the selected municipalities in each of the analysis, and the weights attributed.

The decision to segmentate the analysis from the total number of private firms to the number of private firms of accommodation sector was to possibly identify a subcategory that expressed a significant change in the overall data. Bragança was on the spotlight of the media during the year 2003, having received an international focus when *Time* magazine presented the city as "Europe's new red-light district". Therefore, it might have attracted visitors in search of sexual tourism in the following months after the outbreak of the movement Mothers of Bragança, contributing to an expansion of the accommodation segment. Figures 5 and 7 presents the comparison of Bragança and the synthetic control for both variables.

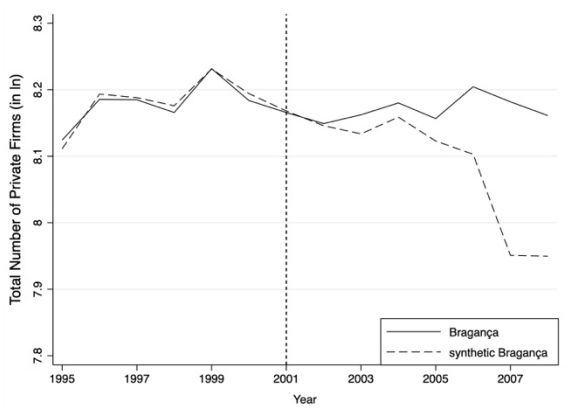

FIGURE 5 – TOTAL NUMBER OF PRIVATE FIRMS

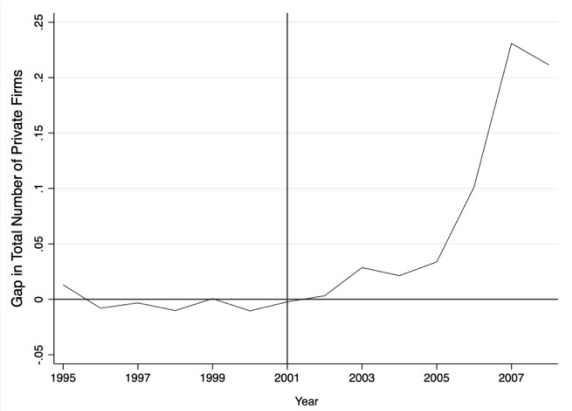

FIGURE 6 – GAP IN TOTAL NUMBER OF PRIVATE FIRMS

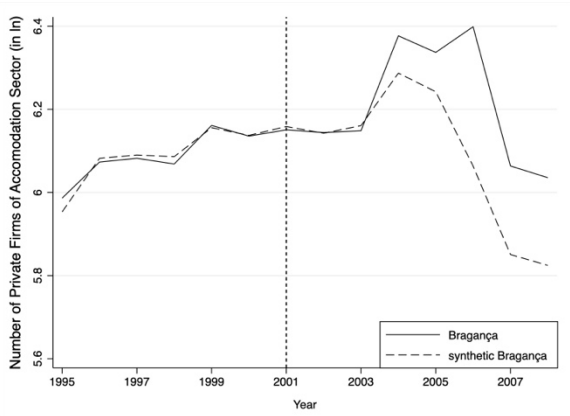

FIGURE 7 – NUMBER OF PRIVATE FIRMS OF ACCOMMODATION SECTOR

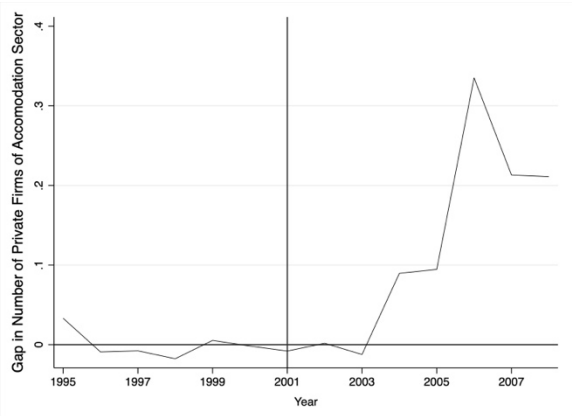

FIGURE 8 – GAP IN NUMBER OF PRIVATE FIRMS OF ACCOMMODATION SECTOR

The similarities between the treated unit and the control groups are demonstrated by the close fit for the pre-intervention period. Actual and synthetic diverge in the total number of private firms from the intervention year, shown in figure 6, as Bragança seems to keep a constant number throughout the following years while the synthetic control experienced a 10% decline between the years 2002 and 2008, explaining the difference in the gap between treated and counterfactual.

One of the segments that might have contributed to this behavior on the level of total private firms is the accommodation sector, that presented an increase in the same period, as expressed by figure 7, compared to a timid increase, followed by a fast decline of the synthetic control. Although Bragança also had a decline in the number of private

firms of accommodation sector in the post-intervention period, it came later than the control group, maintaining a higher level, as depicted by figure 8. Therefore, the media attention given to the prostitution in the region may have contributed to the increase in the inflow of tourists, as the number of guests increased by 52% between 2001 and 2008 and the number of overnight stays in Bragança's hotel establishments increased by 54% in the same period, while the national growth was of 16% (INE, 2023), evidencing the growth of the local accommodation segment.

We performed the placebo tests for both variables. Considering the RMSPE ratios and the percentile distribution, the two outcomes presented a p-value of 0.04, which is below the significance level and, therefore, statistically significant. In the appendix, figures A.31 and A.32 show the ratio distribution of the raw mean squared prediction errors, and figures A.33 and A.34 present the gap in the number of private firms of the treated unit compared to the gap each of the donor pool municipalities would have had if in the treated unit's position. For a clearer view, we removed outliers in the pre-treatment period, and figures A.35 and A.36 shows the behavior of the gap between the treated and the counterfactual for Bragança compared to the donor pool.

5.4 Consumption of Electricity

We next consider the consumption of electricity, to estimate the economic impact of the movement Mothers of Bragança and to assess its contribution to the analysis in the preceding subsections. As the Mothers' protests targeted prostitution-related commercial establishments in the municipality, we aim to understand whether the externalities generated affected the consumption of electricity, compared to the selected control municipalities in the donor pool. More than looking to the total consumption of electricity per habitant, we also look at the domestic and non-domestic consumption of electricity. Tables A.6 to A.8 present the selected controls and weights attributed to construct the synthetic Bragança for each of the three outcomes.

Figure 9 plots Bragança's total consumption of electricity per habitant and the synthetic control's. In year 2002, Bragança seems to have an increase in the consumption of electricity compared to the control municipalities. Although the difference reduces after 2003, as shown in figure 10, Bragança continues in a higher trend compared to the

synthetic control for the years post-intervention. This increase in the total consumption of electricity can be explained by the increase in the domestic consumption of electricity, as shown in figure 11. Similarly, this variable also increased in 2001, as depicted in figure 12, with the difference between the treated and the benchmark counterfactual having some variation in the subsequent years, maintaining a constant gap.

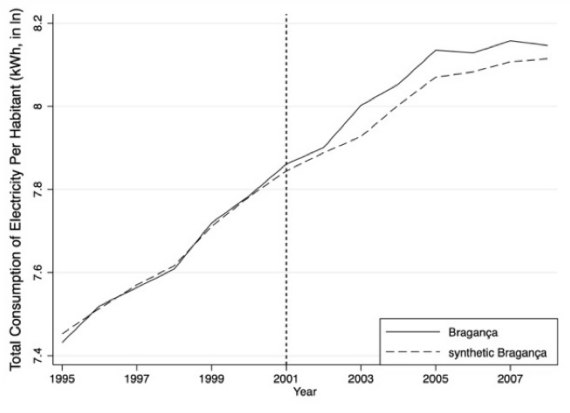

FIGURE 9 – TOTAL CONSUMPTION OF ELECTRICITY PER HABITANT

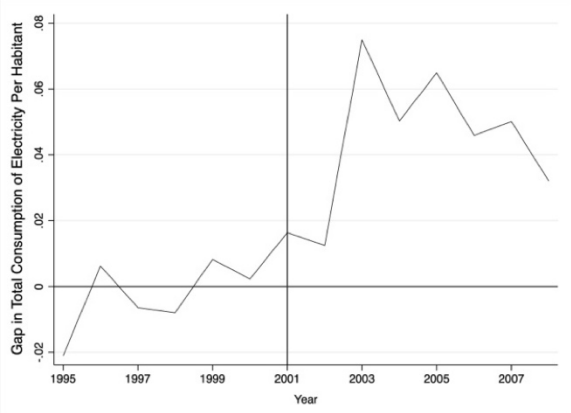

FIGURE 10 – GAP IN TOTAL CONSUMPTION OF ELECTRICITY PER HABITANT

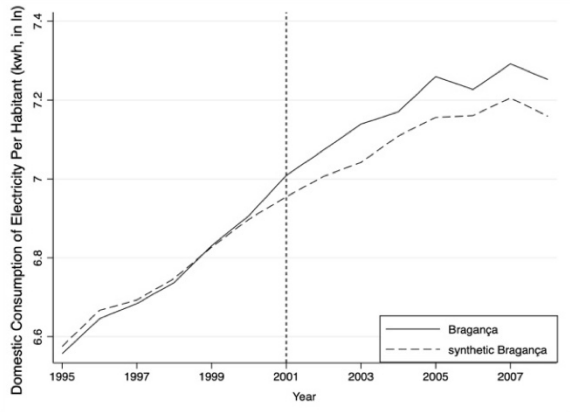

FIGURE 11 – DOMESTIC CONSUMPTION OF ELECTRICITY PER HABITANT

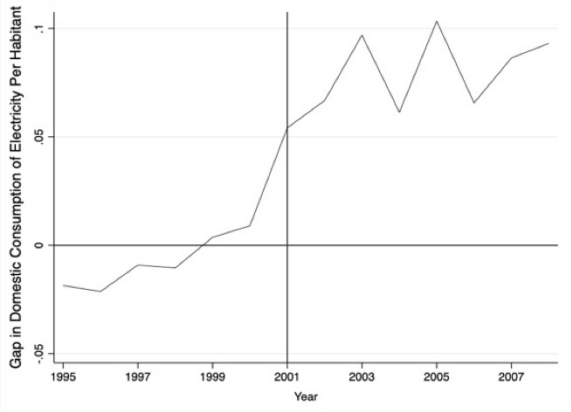

FIGURE 12 – GAP IN DOMESTIC CONSUMPTION OF ELECTRICITY PER HABITANT

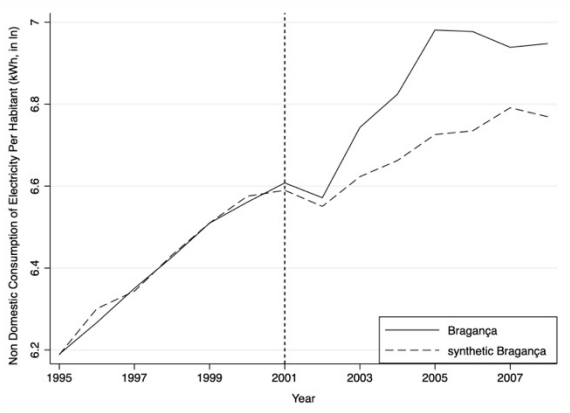

FIGURE 13 – NON-DOMESTIC CONSUMPTION OF ELECTRICITY PER HABITANT

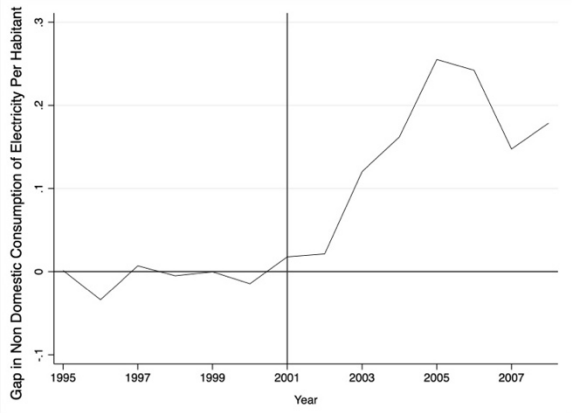

FIGURE 14 – GAP IN NON-DOMESTIC CONSUMPTION OF ELECTRICITY PER HABITANT

Still, the non-domestic consumption of electricity seems to have had a more substantial contribution to the increase in the total consumption of electricity. As shown in figure 13, from year 2002 until 2005, the non-domestic consumption of electricity in Bragança had a higher increase than in the municipalities of the synthetic control. As section 5.3 showed, the increase in the number of hotels and pensions might have contributed to the rise in consumption of electricity, as more tourists were coming to the region. Besides, the "casas de alterne" had their highest operations by 2002 and began their closure from the start of the social movement in 2003, but many remained their operations for months after the event. The reduction of the gap in 2005 between treated and counterfactual, demonstrated in figure 14, might be a consequence of the initial closure of the commercial establishments, although the higher pattern in the consumption of electricity remained, even with this decrease in the gap.

We performed the placebo tests for the three variables, in which the raw mean squared prediction error rank and the following percentile distribution gave the treated unit a p-value of 0.02 for the total consumption of electricity per habitant and for the non-domestic consumption of electricity. For the domestic consumption of electricity, the p-value associated was of 0.04. In all the three cases the p-value attributed is below the significance level and, therefore, statistically significant. We present the ratio distribution in the appendix, in figures A.41 to A.43, while the gap between the treated and

counterfactual for Bragança and each of the municipalities, along with the clearer view, corresponds to figures A.44 to A.49.

5.5 Persons Employed in Private Firms

Finally, we estimate the effects of the social movement Mothers of Bragança in the employment in private firms. The protests claimed for the closure of bars and cafes associated with prostitution. As they shut down in the following months after the event, but the previous subsections evidenced a positive effect in the number of private firms and a higher circulation of cash, we analyze if the movement led to a variation in the total headcount of workers in the treated municipality. Recall that this indicator is analyzed for the period 1995-2005, therefore we investigate the main impact right after the social movement's emergence, when Bragança was put under the spotlight of the local and international media.

Figure 15 shows the behavior of the treated unit and the synthetic control. The municipalities selected for the synthetic control to best approximate the characteristics of Bragança are presented in table A.9 and the close fit in the pre-intervention period is evidence of the balanced similarities among them and the treated unit. As for the post-intervention period, while the synthetic control seems to keep a constant growth in the following couple of years after the event, Bragança presents a higher increase, evidencing an expansion in the number of people working for private firms.

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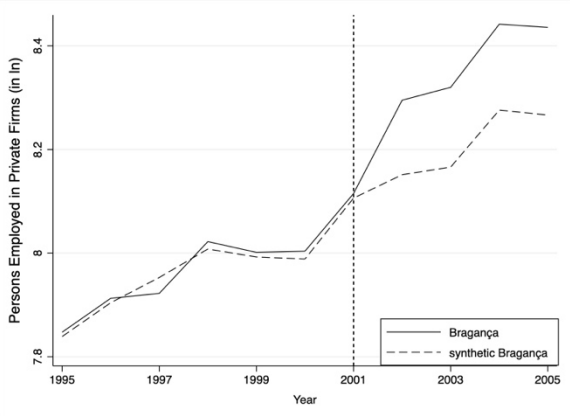

FIGURE 15 – PERSONS EMPLOYED IN PRIVATE FIRMS

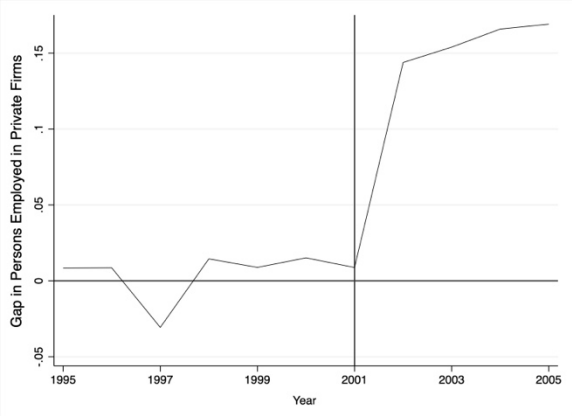

FIGURE 16 – GAP IN PERSONS EMPLOYED IN PRIVATE FIRMS

The gap shown in figure 16 contributes as evidence to the behavior found in subsection 4.3. As the number of private firms of the accommodation sector increased in the years after the event, so did the number of persons employed. Moreover, the closure of bars and cafes associated with prostitution did not generate enough negative effect to impact the total number of workers in the municipality. The increase in the number of hotels and pensions might indicate an increase in the number of visitors for the studied municipality, that prevent the decline in the number of workers, even after the closure of the "*casas de alterne"*.

We performed inference test for this variable, and compared the gap in the number of persons employed in the treated municipality with all the other municipalities in the donor pool acting like they were the treated unit, as presented in figure A.51. Figure A.52 shows this gap without the outliers for the pre-intervention period. Figure A.50 presents the RMPSE ranking frequency distribution and the percentile distribution attributed Bragança a p-value of 0.02, below the level of significance of 0.05 and, therefore, rejecting the null hypothesis.

6 CONCLUSION

Bragança experienced a shock with the social movement Mothers of Bragança, as wives of cheating husbands, supported by a conservative society, pressed authorities to intervein and abolish prostitution, even if at the cost of shutting down local business and affecting the economic environment. Thus, the raid against the immigrant prostitutes in Bragança can be characterized as a criminalization of the sex industry once it forced many of the *meninas* into clandestinity or drove them to nearby cities where they would be less persecuted.

In this paper, we rely on data for the region Terras de Trás-os-Montes and the municipality Bragança, performing the Synthetic Control Method as presented by Abadie & Gardeazabal (2003) and Abadie et. al. (2010) to estimate the economic effects that the movement of the Mothers trigged upon the local business environment. Throughout our analysis, we observed outcomes that deviates significantly from the existing literature, and we attribute these unconventional results to the attention given by the media, putting a spotlight on the diffused prostitution of the municipality.

Prostitution premises are often surrounded by ancillary activities, as we explored in the review of the literature, and Bragança was no different. Yet, the immediate regional effects of the persecution against the local sex industry were positive, as data showed an increase in GDP per capita. One of the potential contributors was the volume of withdrawals recorded for the municipality in comparison to its synthetic control. The protests initiated by the Mothers led authorities to shut down the “casas de alterne”, but this closure was not immediate and happened gradually, throughout the following months. Our findings suggest that bars and cafes continued its operations, with a high number of customers continuing to search and benefit from them.

Moreover, it was observed an increase in the headcount employed in private firms during the following years after the social movement. This increase may be connected to the expansion in the number of private firms, especially as our analysis suggests a significant growth in the private firms of the accommodation sector for the same period, indicating that Bragança received more visitors, many in search for sex tourism. This increase in tourism is connected to the mediatic coverage of the event, as not only local

but also international media explored intensively the conflict between the Mothers against the prostitutes and, by doing so, placed the municipality in the route for adult entertainment, as *Time* magazine exposed Bragança in its cover page as "Europe's new red-light district".

We also identified a growth in the total consumption of electricity, connected to a similar increase of the domestic consumption of electricity, but potentialized by the non-domestic consumption. This increase corroborates our findings in the number of private firms, as more hotels and pensions might lead to an increase in electricity usage. Moreover, this serve as evidence for the good performance of bars and cafes, as the "casas de alterne" received more visitors and, therefore, were thriving before their closure.

Finally, while the findings in this paper point to a positive impact of the Mothers of Bragança, we argue that the effects were most likely a consequence of the popularization of the municipality. This analysis contributed with valuable insights by shedding light in a less-explored subject and, also, for integrating an economic perspective to Bragança's clash between the Mothers and the prostitutes, considering their interactions with the surrounding context.

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9 APPENDIX

TABLE A.1 – SUMMARY OF DESCRIPTIVE STATISTICS FOR INDEPENDENT VARIABLES

VARIABLE	OBSERVATIONS	MEAN	STANDARD DEVIATION	MINIMUM	MAXIMUM
Population density (ln)	1218	4.257	1.049	2.116	7.915
Population density for NUTS III (ln)	21	4.192	0.966	2.757	5.761
Share of active population	87	0.629	0.042	0.495	0.703
Share of active population for NUTS III	21	0.647	0.025	0.596	0.689
Share of unemployed population	87	0.029	0.008	0.014	0.052
Share of population with university degree	87	4.236	2.221	2.09	12.2
Share of population older than 65 years old	87	21.389	6.427	10.2	40.6
Employment rate	87	43.777	8.504	20.3	64.8
Share of foreign residents	87	0.009	0.003	0.003	0.017

TABLE A.2 – WEIGHTS FOR THE SYNTHETIC CONTROL METHOD FOR GDP PER CAPITA

NUTS III	WEIGHT
Alentejo Central	0.063
Alto Alentejo	0.343
Alto Tâmega	0.338
Douro	0.256

TABLE A.3 – WEIGHTS FOR THE SYNTHETIC CONTROL METHOD FOR WITHDRAWALS

MUNICIPALITY	WEIGHT
Almeida	0.115
Manteigas	0.411
Póvoa de Lanhoso	0.019
São João da Madeira	0.247
Vila Velha de Ródão	0.208

Table A.4 – Weights for the Synthetic Control Method for Number of Private Firms

Municipality	Weight
Carrazeda de Ansiães	0.290
Castelo Branco	0.091
Moimenta da Beira	0.032
Oliveira de Azeméis	0.587

Table A.5 – Weights for the Synthetic Control Method for Number of Private Firms of Accommodation Sector

Municipality	Weight
Almeida	0.451
Braga	0.466
Guimarães	0.083

Table A.6 – Weights for the Synthetic Control Method for Total Consumption of Electricity Per Habitant

Municipality	Weight
Castelo Branco	0.574
Montalegre	0.047
São João da Pesqueira	0.125
Vila Real	0.255

Table A.7 – Weights for the Synthetic Control Method for Domestic Consumption of Electricity Per Habitant

Municipality	Weight
Castelo Branco	0.874
Vila Real	0.126

TABLE A.8 – WEIGHTS FOR THE SYNTHETIC CONTROL METHOD FOR NON-DOMESTIC CONSUMPTION OF ELECTRICITY PER HABITANT

MUNICIPALITY	WEIGHT
Caminha	0.371
Guarda	0.611
Valença	0.018

TABLE A.9 – WEIGHTS FOR THE SYNTHETIC CONTROL METHOD FOR PERSONS EMPLOYED IN PRIVATE FIRMS

MUNICIPALITY	WEIGHT
Monção	0.093
Mortágua	0.339
Oliveira de Azeméis	0.159
São João da Pesqueira	0.030
Viana do Castelo	0.198
Vila Flor	0.123
Vila Nova de Cerveira	0.057

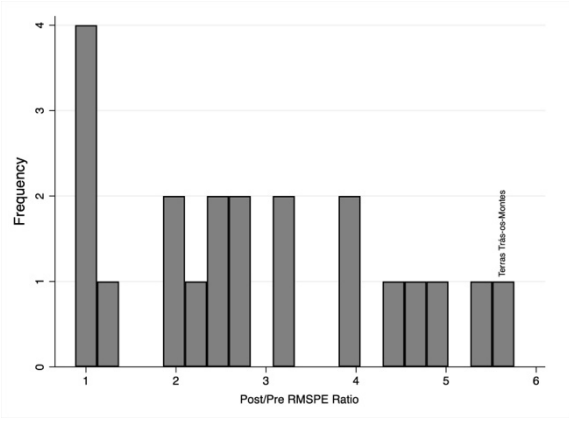

FIGURE A.11 – RMSPE RATIO GDP PER CAPITA

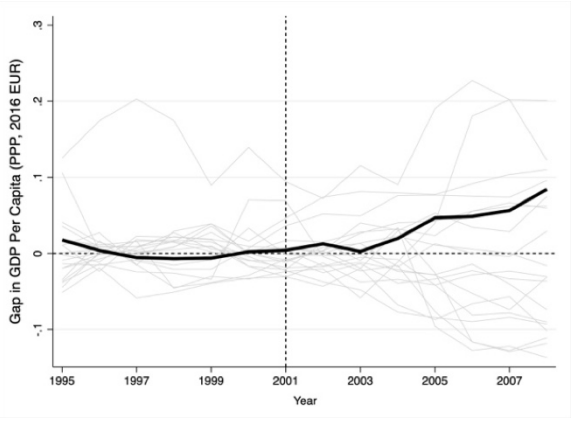

FIGURE A.12 – PLACEBO GAP IN GDP PER CAPITA

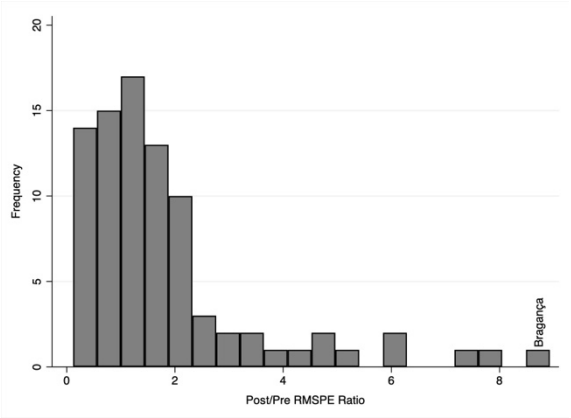

FIGURE A.21 – RMSPE RATIO DISTRIBUTION WITHDRAWALS

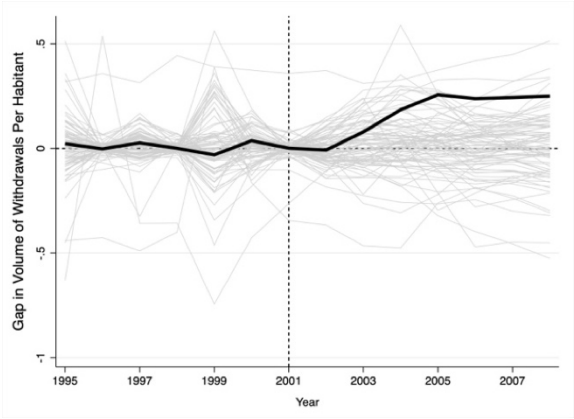

FIGURE A.22 – PLACEBO GAP IN WITHDRAWALS

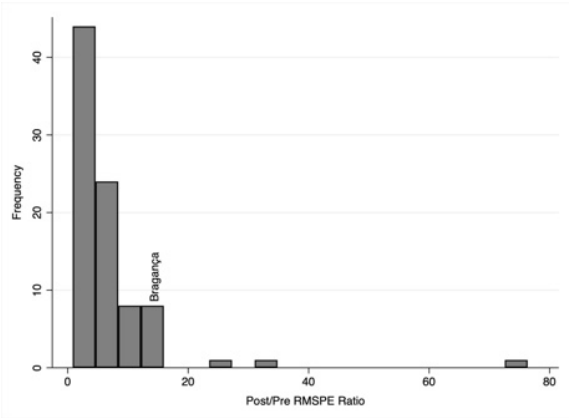

FIGURE A.31 – RMSPE RATIO NUMBER OF PRIVATE FIRMS

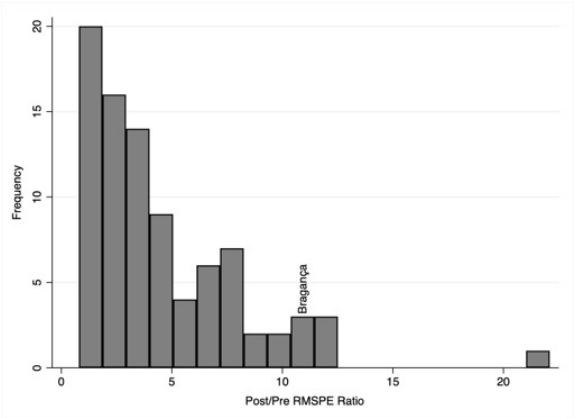

FIGURE A.32 – RMSPE RATIO NUMBER OF PRIVATE FIRMS OF ACCOMMODATION SECTOR

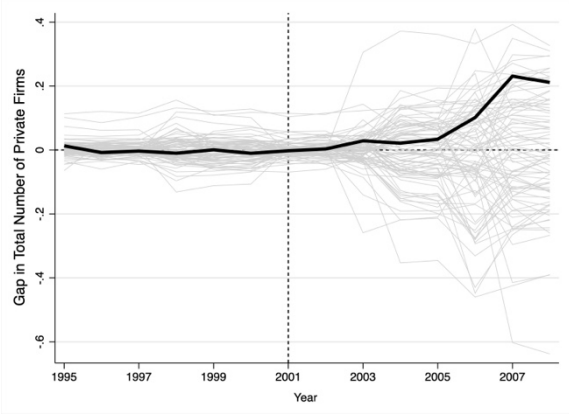

FIGURE A.33 – PLACEBO GAP IN NUMBER OF PRIVATE FIRMS

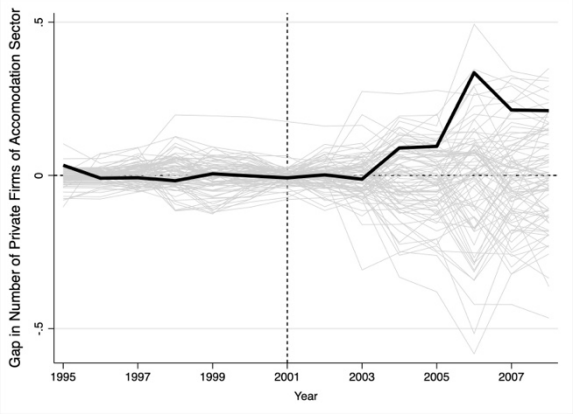

FIGURE A.34 – PLACEBO GAP IN NUMBER OF PRIVATE FIRMS OF ACCOMMODATION SECTOR

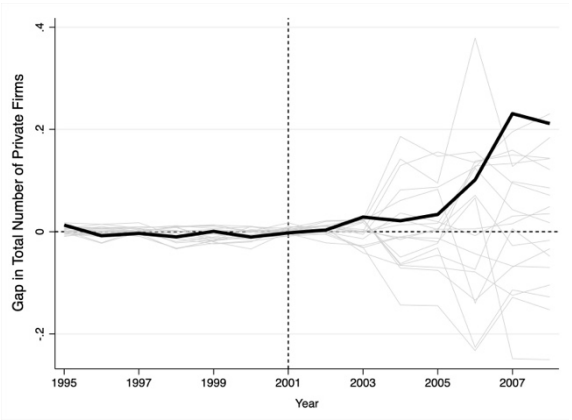

FIGURE A.35 – PLACEBO GAP IN NUMBER OF PRIVATE FIRMS WITHOUT OUTLIERS

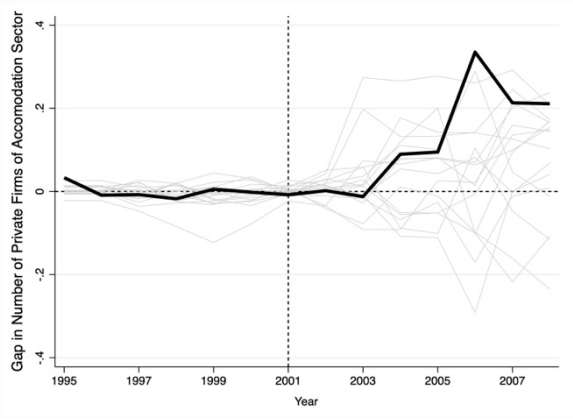

FIGURE A.36 – PLACEBO GAP IN NUMBER OF PRIVATE FIRMS OF ACCOMMODATION SECTOR WITHOUT OUTLIERS

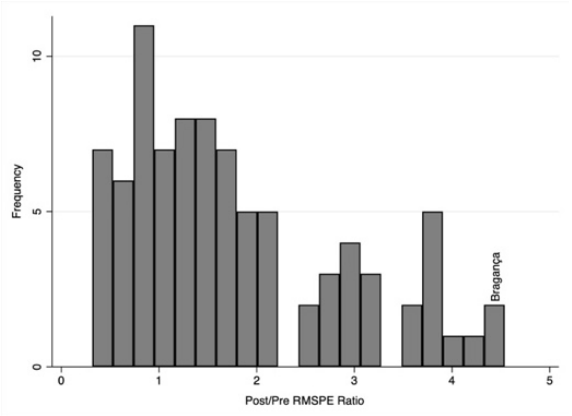

FIGURE A.41 – RMSPE RATIO TOTAL CONSUMPTION OF ELECTRICITY PER HABITANT

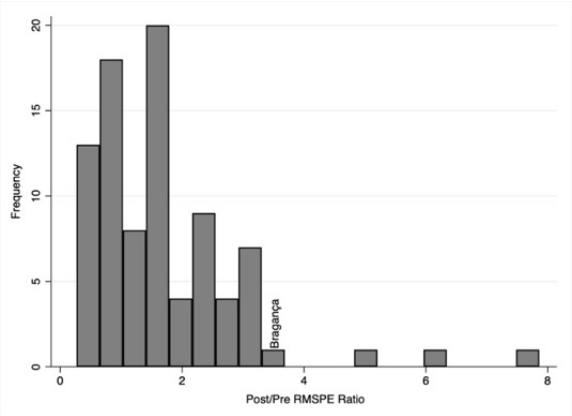

FIGURE A.42 – RMSPE RATIO TOTAL DOMESTIC CONSUMPTION OF ELECTRICITY PER HABITANT

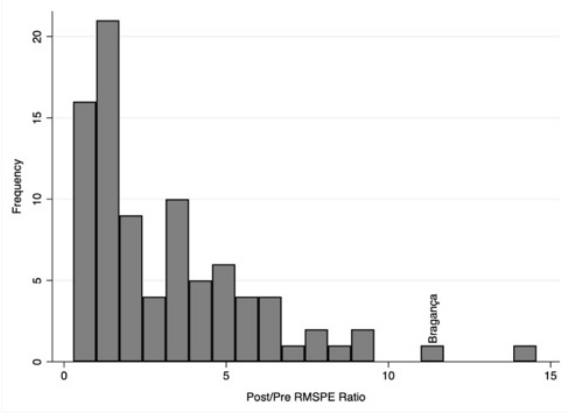

FIGURE A.43 – RMSPE RATIO NON-DOMESTIC CONSUMPTION OF ELECTRICITY PER HABITANT

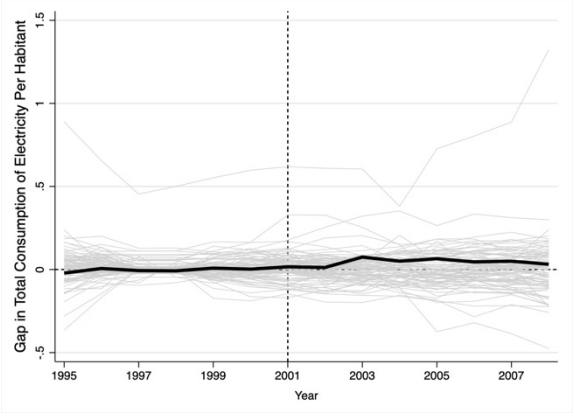

FIGURE A.44 – PLACEBO GAP IN TOTAL CONSUMPTION OF ELECTRICITY PER HABITANT

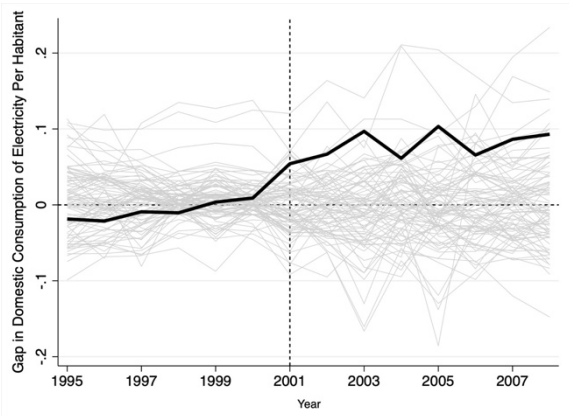

FIGURE A.45 – PLACEBO GAP IN DOMESTIC CONSUMPTION OF ELECTRICITY PER HABITANT

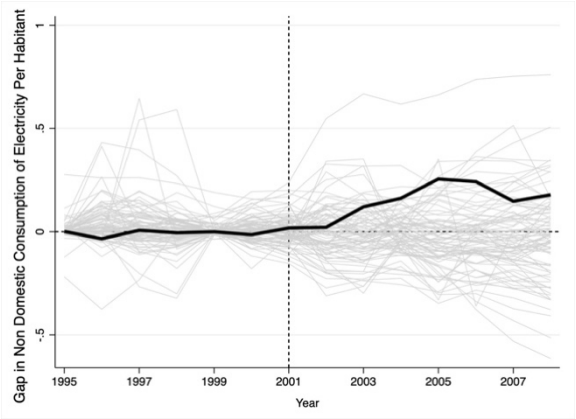

FIGURE A.46 – PLACEBO GAP IN NON-DOMESTIC CONSUMPTION OF ELECTRICITY PER HABITANT

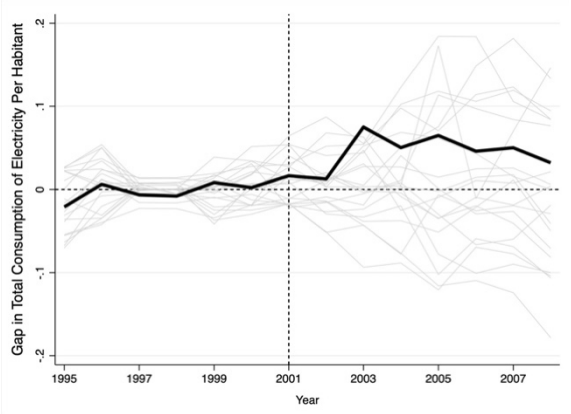

FIGURE A.47 – PLACEBO GAP IN TOTAL CONSUMPTION OF ELECTRICITY PER HABITANT WITHOUT OUTLIERS

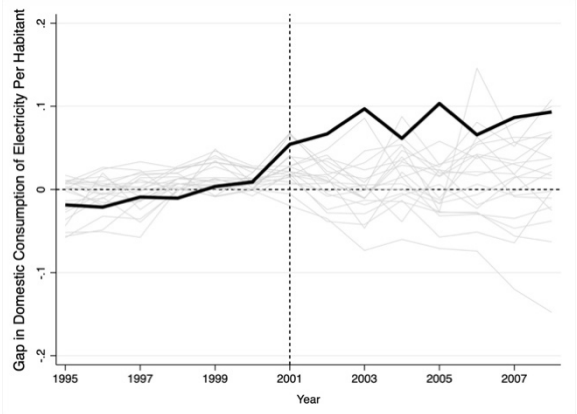

FIGURE A.48 – PLACEBO GAP IN DOMESTIC CONSUMPTION OF ELECTRICITY PER HABITANT WITHOUT OUTLIERS

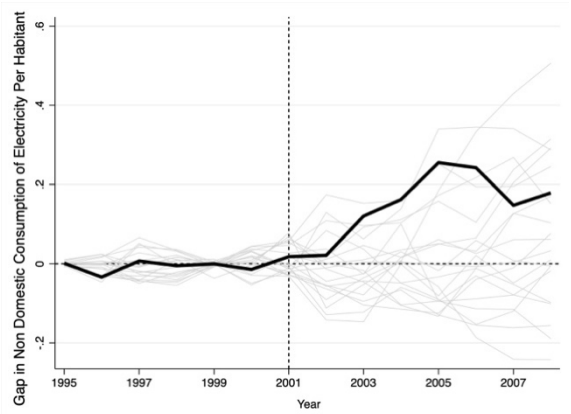

FIGURE A.49 – PLACEBO GAP IN NON-DOMESTIC CONSUMPTION OF ELECTRICITY PER HABITANT WITHOUT OUTLIERS

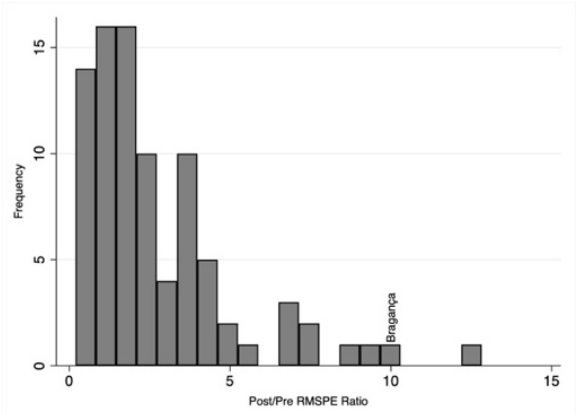

FIGURE A.50 – RMSPE RATIO PERSONS EMPLOYED IN PRIVATE FIRMS

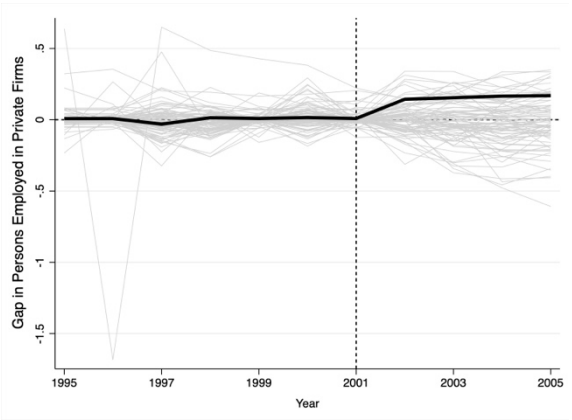

FIGURE A.51 – PLACEBO GAP IN PERSONS EMPLOYED IN PRIVATE FIRMS

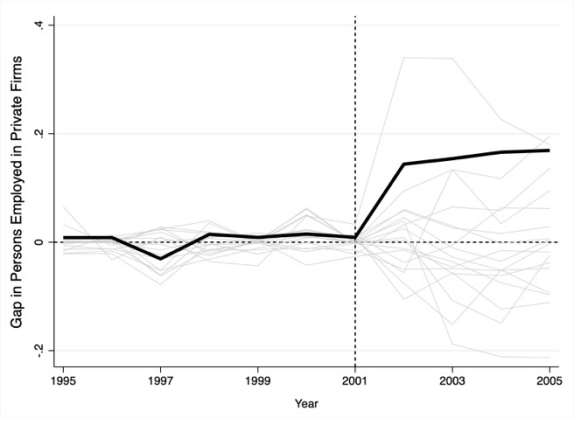

FIGURE A.52 – PLACEBO GAP IN PERSONS EMPLOYED IN PRIVATE FIRMS WITHOUT OUTLIERS