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Employment Effects of Cash Transfers:
Evidence from Maricá

Rio de Janeiro, Brasil

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Dissertação apresentada ao Programa de Pós-Graduação em Economia (PPGE) do Instituto de Economia da Universidade Federal do Rio de Janeiro, como parte dos requisitos necessários à obtenção do título de Mestre em Ciências Econômicas.

Universidade Federal do Rio de Janeiro – UFRJ

Instituto de Economia

Programa de Pós-Graduação em Economia

Orientadora: Prof. Valéria Pero

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FICHA CATALOGRÁFICA

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Resumo

Programas de transferência de renda, como a Renda Básica de Cidadania (RBC) de Maricá, tem o objetivo de possibilitar a redução da pobreza, fortalecer redes de segurança social, reduzir a desigualdade econômica e combater a incerteza no mercado de trabalho. Embora seja semelhante aos programas de transferência condicional, pouco se sabe sobre como uma renda básica permanente, implementada pelo governo, com benefícios tao significativos quanto os oferecidos em Maricá, afetaria os resultados sobre o emprego local. O objetivo deste trabalho é, portanto, avaliar o impacto do programa Renda Básica de cidadania em Maricá sobre o emprego, especificamente sobre o número de trabalhadores empregados formalmente. Com base nos dados da RAIS, foi aplicado o método de controle sintético para comparar a evolução do número de trabalhadores empregados em Maricá apos a introdução da Renda Básica de Cidadania a um conjunto de municípios de controle que devem representar os resultados contrafactuais na ausência dos pagamentos da renda. Assim, foi observado um efeito positivo desse programa sobre o número de trabalhadores empregados formalmente na cidade.

Palavras-Chave: Transferência de renda, Mercado de Trabalho, Emprego, Maricá

Abstract

Cash transfers programs, such as the Basic Citizenship Income (RBC) of Maricá, aim to make possible to reduce poverty, strengthen social safety nets, reduce economic inequality and combat labor market uncertainty. Although similar to conditional transfer programs, little is known about how a permanent basic income, implemented by the government, with benefits as significant as those offered in Maricá, would affect the results on local employment. The objective of this work is, therefore, to evaluate the impact of the Citizen's Basic Income program in Maricá on employment, specifically on the number of workers formally employed. Based on RAIS data, the synthetic control method was applied to compare the evolution of the number of workers employed in Maricá after the introduction of the Citizen's Basic Income to a set of control municipalities that should represent the counterfactual results in the absence of payments of basic income. Thus, a positive effect of this program on the number of workers formally employed in the city was observed.

Keywords: Cash Transfers, Labor Market, Employment, Maricá

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List of abbreviations and acronyms

ANP   Agência Nacional do Petróleo, Gás Natural e Biocombustíveis

CAGED   Cadastro Geral de Empregados e Desempregados

CBO   Classificação Brasileira de Ocupações

CNAE   Classificação Nacional de Atividades Econômicas

COMPERJ   Complexo Petroquímico do Rio de Janeiro

ConLeste   Consórcio Intermunicipal de Desenvolvimento do Leste Fluminense

EPT   Empresa Pública de Transportes

FIRJAN   Federação das Indústrias do Estado do Rio de Janeiro

GDP   Gross Domestic Product

HDI   Human Development Index

IBAM   Instituto Brasileiro de Administração Municipal

IBGE   Instituto Brasileiro de Geografia e Estatística

IFGF   Índice Firjan de Gestão Fiscal

ILO   International Labour Organization

ISCO   International Standard classification of occupations

ISIC   International Standard Industrial Classification

LRF   Lei de Responsabilidade Fiscal

PBF   Programa Bolsa Família

PCdoB	Partido Comunista do Brasil
PDT	Partido Democrático Trabalhista
PT	Partidos dos Trabalhadores
RAIS	Relação Anual de Informações Sociais
RBC	Renda básica de Cidadania
RMRJ	Região Metropolitana do Rio de Janeiro
SICONFI	Sistema de Informações Contábeis e Fiscais do Setor Público Brasileiro

Contents

1 Introduction

If given a cash transfer, would people leave the labor force, thus leaving the economy with a lower level of employment and therefore less income per person on average? Although much of the discourse surrounding cash transfer programs is centered on the possible reduction in the labor supply, economic theory is ambiguous. On the one hand, cash transfers can create disincentives to work for two main reasons. First, an income effect can lead recipients to work less if leisure is a normal good. Second, cash transfers can reduce labor supply if beneficiaries fear they will lose the benefit by working more or taking on higher-paying roles (BANERJEE et al., 2017).

On the other hand, there are several mechanisms by which cash transfers can increase the labor supply. Giving people money could help families by unlocking liquidity constraints, allowing them to live up to a sufficient standard of living to look for a job. Second, a cash injection could ease credit restrictions for starting or expanding a business. Finally, the additional cash can have spillover effects on poor regions by providing income that can generate increases in sales for local businesses. In practice, these effects may coexist (EGGER et al., 2019; ANGELUCCI; GIORGI, 2009; BANERJEE; NIEHAUS; SURI, 2019).

Grounded as a radical proposal, the idea of guaranteeing a minimum level of income for all - regardless of employment and income status - in the form of a basic income, was promoted as a way to achieve a multitude of social and economic improvements, such as: eradicating poverty, promoting growth and development, reducing inequality, solving technological unemployment. It is a type of cash transfer that shares several properties with conditional transfers already tested and evaluated over the last decade, therefore, this work is related to studies on labor market effects of these programs (PARIJS; VANDERBORGHT, 2017; HOYNES; ROTHSTEIN, 2019; HANNA; OLKEN, 2018; BANERJEE; NIEHAUS; SURI, 2019).

Among the experiences that seek to approach a basic income, the city of

Maricá has been building an institutional environment distinguished by its vanguard in certain policies. In Maricá, a city of 160,000, about 42,000 of the city's lowest-income residents receive 130 reais (R$), about $25, per month as part of the city's basic income program called Renda Básica de Cidadania (RBC). In addition to the basic income program, initiatives include savings accounts for high school students, free public transportation, massive infrastructure investments, and a sovereign wealth fund to lower costs of capital and guarantee social programs in perpetuity. Income guarantee programs, such as the RBC in Maricá, aim to reduce poverty, strengthen social safety nets, reduce economic inequality and combat uncertainty in the labor market (PEREIRA et al., 2020).

According to the ILO (2015), the world needs to create 600 million new jobs by 2030, most of them in developing countries. This need is driven by several factors: Restoring pre-crisis employment levels, creating jobs for young people, promoting women's employment, ensuring that groups in temporary or permanent precarious situations find suitable jobs, etc. It is therefore important to understand whether a basic income program implemented at local level is capable of having a significant impact on local employment.

The difficulty of finding employment in the formal sector is commonplace in low-income countries, where informal enterprises employ a large share of the labour force and provide livelihoods for the poor (BANERJEE; DUFLO, 2007; GOLLIN, 2008). As a result, countries characterised by an abundance of informal firms suffer from low overall productivity. Similarly, the share of employment in informal firms tends to decrease as countries become richer (PORTA; SHLEIFER, 2014). This raises the question of what role policy can play in reallocating labour from these firms to the more productive, formal firms (MCCAIG, 2015).

This paper contributes to the literature by studying the effects of a unique cash transfer program on aggregate formal employment in local labor markets. This is the margin of employment most likely to be affected by disincentive effects from means testing. Formal job creation has also been a major focus of economic policies

in Latin America in recent decades, as formal jobs are more likely to provide workers with social protection and better working conditions, and are associated with higher output and total factor productivity (PERRY, 2007; ULYSSEA, 2020; LEVY, 2007).

Regarding the discussion on the causal relationship between cash transfers policies and employment, the central question is about the impact of RBC on the number of formal jobs existing in the municipality? There are several channels through which the policies implemented in Maricá can affect the quantity of jobs in the city. The hypothesis is that the Basic Citizenship Income of Maricá would have been important for the generation of jobs. From the understanding that the unconditional transfer of income results in increases in consumption that stimulate the demand for work and can mitigate potential reductions in employment (ANGELUCCI; GIORGI, 2009; EGGER et al., 2019). It is believed that the infusion of income and consumption carried out by the program had effects that spilled over to the other inhabitants of the city, something that could translate into more employment.

We use longitudinal administrative data covering the universe of formal jobs. With these data, the objective is to compare the evolution of labor market results in Maricá after the introduction of the Citizen's Basic Income to a set of control municipalities that should represent the counterfactual results in the absence of basic income payments. Regarding the typical Difference in Differences (DD) approaches, which present several treatment units, the challenge is to build a counterfactual for exactly one city, therefore, the Abadie, Diamond e Hainmueller (2010) synthetic control method and Xu (2017) extensions will be adopted.

Our main finding is that after the implementation of basic income program, formal employment is on average significantly higher than what would be expected in the absence of the program by 20 percent. The results are robust when compared to placebo interventions in other municipalities, when compared to placebo interventions in previous time periods and when covariates are added.

In addition to this introduction, the work comprises a total of seven chapters.

A brief review of the empirical literature is provided in the second chapter. The third chapter deals with characterizing the municipality of Maricá and the policies implemented there. The fourth chapter describes the databases and empirical methodologies used to assess the causality of implemented policies. Then, in the fifth chapter, the results obtained are presented. These results are discussed and interpreted in chapter six. Finally, in chapter seven, we present the main conclusions of the study.

2 Literature Review

With the rise of large-scale cash transfer programs, now being implemented in many low and middle-income countries, there has been renewed interest in related topics in development economics. A large literature has developed on the impact of these transfers using well-identified experimental and quasi-experimental designs. These studies have documented impacts on a wide range of behavioral responses among treated households, including consumption, income, wealth, food security, children's growth and schooling, self-reported health, women's empowerment, and psychological well-being (HAUSHOFER; SHAPIRO, 2016; BAIRD; MCINTOSH; ÖZLER, 2011; BASTAGLI et al., 2016). Conditional income transfer programs, such as Earned Income Tax Credit (EITC) and Paycheck Plus in the US, have contributed to improving health (FORGET, 2011), educational performance and the labor market (BASTIAN; MICHELMORE, 2018).

To get to the extent to which workers' labor supply decisions are affected by changes in pecuniary factors, Dube et al. (2020) conducted an experiment on Amazon's Mechanical Turk, a prominent online job market, hiring workers to perform tasks with salaries to determine the worker's responsiveness to changes in wages. They find that work decisions are not very sensitive to changes in their wages (such as those induced by taxes).

Banerjee et al. (2017) conducted a meta-analysis of evaluations of transfer programs and concluded that overall labor supply did not appear to be affected by seven large conditional cash transfer programs, mainly in Latin America. In many, though not all, cases, these analyses are based on a framework that focuses on labor supply responses, while the present work suggests that general equilibrium factors may be important.

Studies that find an impact usually refer to the type of work performed rather than the total amount of work. For example, several studies have documented

a shift from formal to informal work in programs that explicitly exclude formal workers (BANERJEE et al., 2017). Transfers aimed at informal workers discourage formalization. Evidence from Bolsa Família in Brazil, the National Social Emergency Care Plan (PANES) program in Uruguay, and the AUH in Argentina support this hypothesis (FOGUEL; BARROS, 2010; BRAUW et al., 2015; RIBAS; SOARES, 2011; BRAUW et al., 2015; AMARANTE; BRUN, 2018; GARGANTA; GASPARINI, 2015). These studies find a reduction in formal work; when data are available, they also find no overall effect on work. Bosch e Campos-Vazquez (2014) estimate the overall effects of extending health insurance coverage to workers outside the formal sector in Mexico. They find a decline in local formal employment due to negative (substitution) effects on the formal labor supply of beneficiaries. In-kind transfers, especially in the form of health insurance coverage, may not lead to similar multiplier effects in the local economy as cash transfers.

Specific to the Bolsa Família program, there is evidence that the program has helped reduce levels of poverty and inequality, improve nutrition and health, increase school attendance, and reduce school failure without reducing labor supply. (SOUZA et al., 2019).

Tavares (2010) analyzes the possible presence of a disincentive for the labor supply of beneficiary mothers through the Bolsa Família (PBF) program. The result shows that mothers' participation in the labor market increases when they are beneficiaries. There is a wealth effect related to the value of the benefits, given that the larger the benefit, the less active beneficiary mothers are in the labor market. Nonetheless, the net effect is positive, showing that there is a substitution effect due to a reduction in the children's labor supply, a rise in the mother's available time, as well as decreasing the stigma.

Brauw et al. (2015) assessed the impact of PBF on the supply of work at home, through workforce participation and hours worked. No significant effects of Bolsa Família on labor force participation or the number of hours worked by individuals in families were found, but they did find a highly significant shift in

hours worked by families moving from the formal to the informal sector.

Gerard, Naritomi e Silva (2021) found that the expansion of Bolsa Familia in Brazil led to an increase in formal employment in the places where transfers increased the most after the 2009 reform. This occurred despite the fact that the program could reduce formal labor supply among beneficiaries, as the positive multiplier effects of the Bolsa Familia program offset any negative effects. This study analyzed the differences in the application of the Bolsa Familia program across the country (difference-in-differences design), based on the official data of the program and the national statistics on formal labor. The results showed that in the municipalities of the country where total Bolsa Familia cash assistance per capita was higher (13.2% higher on average), formal work increased by 2%, including both recipients and non-recipients of the Bolsa Familia program.

Foguel e Barros (2010) also examined the effects of conditional cash transfers on labor supply. The results suggest that the impact on female labor force participation rates is not significant and that the impact on male labor force participation rates is positive but very small.

Although similar to conditional transfer programs, knowledge of how basic income programs affects employment outcomes is incipient. As an example of a basic income program, the Iranian government gives all citizens a small dividend. Salehi-Isfahani e Mostafavi-Dehzooei (2018) studied this program and found no effect on the overall labor supply. In another study, Jones e Marinescu (2018) analyzes the impact of the largest unconditional universal transfer program in the United States, the Alaska Permanent Fund, on labor supply. The Alaska Permanent Fund was created in the 1970s and typically distributes between $1000 and $2000 per resident annually as dividends on oil reserves. Jones and Marinescu analyzed data from Alaska and other U.S. states from 1979-2015 to estimate a "synthetic Alaska," a projection of what the labor supply in Alaska would look like without the program. The results suggest that labor supply was not affected overall, and actually increased somewhat for part-time workers.

Belmonte et al. (2021) study of a local cash transfer program in Barcelona provides evidence of a relationship between public expenditure in the form of a local complementary currency - as we observe in Maricá- and the promotion and development of the local economy. The indicators analyzed by the authors favor conditions that enhance local development.

This study is also related to the recent literature that examines the impact of government spending on local economic outcomes by exploiting cross-sectional variation (NAKAMURA; STEINSSON, 2014; ULYSSEA, 2018; SERRATO; WIN-GENDER, 2016; CHODOROW-REICH, 2019).

In this sense, several studies analyzed one-off positive shocks in income and found an increase in consumption, food security and psychological well-being (HAUSHOFER; SHAPIRO, 2016). Egger et al. (2019) study the impact of a one-time non-government transfer on local recipients and rural economies in Kenya. They find large multiplier effects on consumption and wealth, but no effects on employment. (ANGELUCCI; GIORGI, 2009) emphasize the importance of considering the impact of cash transfers on the overall local economy. They find evidence of indirect effects of the Progresa program in Mexico (which is not means-tested) on the consumption of ineligible households living in the same villages.

Neri, Vaz e Souza (2013) show that transfers favoring the poorest households have the greatest multiplier effects. In short, these results support the hypothesis that social transfers aimed at the poorest – mainly those from the Bolsa Família Program – play an important positive role in the Brazilian macroeconomic dynamic, in addition to contributing to the reduction of poverty and inequality.

Examining the impact of transfers-driven municipal expenditure on local labor markets in Brazil, Corbi, Papaioannou e Surico (2019) finds that changes in local government expenditure stemming from "locally" exogenous shifts in federal transfers are associated with a significant boost in employment in the formal sector.

This work can also relate to the literature on the impact of other social protection policies, such as unemployment benefits (HAGEDORN et al., 2013;

LALIVE; LANDAIS; ZWEIMÜLLER, 2015; MARINESCU, 2017; CHODOROW-REICH; KARABARBOUNIS, 2016) and job guarantee programs. Imbert e Papp (2015) and Muralidharan, Niehaus e Sukhtankar (2017) estimate the aggregate impact of a public employment program on local labor markets in India. Such programs provide benefits in the form of (manual) employment and therefore work through a different channel, raising private sector wages and incomes by improving workers' opportunities.

3 Context

This chapter will describe how Maricá's Basic Income and Solidarity Economy work. It will also present demographic, economic and political aspects that characterize the city, since the impact of the policies implemented in the municipality of Maricá can be better understood by illustrating the context and environment in which they are embedded.

3.1 About Maricá

The Municipality of Maricá is located on the eastern edge of the Metropolitan Region of the state of Rio de Janeiro. With a total area of 361.6km², corresponding to 6.8% of the area of the Metropolitan Region, it borders Niterói, São Gonçalo, Itaboraí, Tanguá, Rio Bonito and Saquarema.

Figure 1 – Location of Maricá in Rio de Janeiro
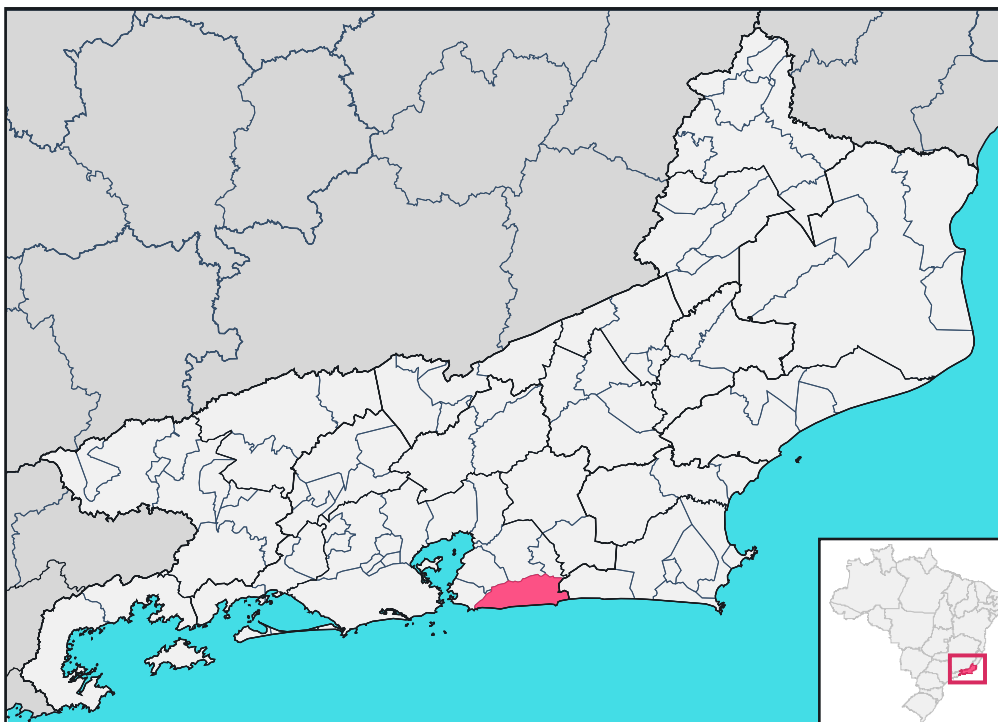
Source: Wikipedia

3.1.1 Demographic and socioeconomic aspects

The information presented here is based on data from the most recent census conducted by IBGE in 2010. Although there is an obvious data lag, this is the most complete existing survey at the municipal level.

In 2010, according to the census, Maricá had a population of 127,461, representing 1.1% of the metropolitan area contingent, with a ratio of 96.7 women to 100 men. The population density was 351.5 inhabitants per km², compared to 2,221.8 inhabitants per km² in the region. The urbanization rate corresponded to 88% of the population. The working-age population was predominantly white and brown.

The population trend of Maricá shows the peak of the growth rate between the decades 2000 and 2010, when the population of Marica grew by 66%. The IBGE population estimate for 2020 is 164,504, an increase of about 29% from the last census. Although Maricá accounts for only 1.3% of the metropolitan population, it is the municipality in the RMRJ with the highest annual growth rate (2.64%) this decade.

Although it does not cover all aspects of development, the HDI is a reference for measuring and comparing socioeconomic aspects between municipalities. Maricá achieved an HDI of 0.765 in 2010, placing it in the high development range. The dimension that contributes the most is longevity, with an index of 0.850, followed by income, with an index of 0.761, and education, with an index of 0.692. Compared to the municipalities of the RMRJ, Maricá has one of the highest HDIs, only behind Niterói (0.837) and Rio de Janeiro (0.799), and is the 6th most developed.

3.1.2 Local Economy

Petroleum and natural gas (P&G) markets are important economic factors for the state of Rio de Janeiro and Brazil. The country's main production pole, the state and its municipalities receive financial resources in return to the form of state

participation - royalties and special participation[1] (SZAPIRO et al., 2020).

Despite having been a municipality that based its economy essentially on agriculture and fishing, the main current economic activity in Maricá is oil exploration. Due to its coastline to the Santos Basin, Maricá has a strategic position in the economic chain of P&G. In 2019, thanks to the installation of production platforms in the Tupi and Búzios fields, Maricá received 1.6 billion reais, about eight times the amount of 2012. For this reason, the city is part of the Intermunicipal Consortium for the Development of Leste Fluminense (ConLeste), an association of the municipalities of Leste Fluminense to receive compensation from Petrobras for the implementation of COMPERJ.

According to the ANP (National Agency for Petroleum, Natural Gas and Biofuels), the surge is likely to continue. The agency projects that Maricá will receive R$6.8 billion between 2021 and 2024, an average of R$1.7 billion per year. On the one hand, Maricá has a high investment capacity, but on the other hand, according to the Firjan Fiscal Management Index (IFGF), it is a city with low fiscal autonomy. In practice, this means that it is not able to maintain its structure with its own revenues, but only with transfers, such as compensation paid by oil companies, mainly Petrobrás.

A possible alternative source of revenue for the municipality from the P&G production complex is through taxation (SZAPIRO et al., 2020). It should be noted that revenue from tax is currently a very small percentage compared to royalties in the case of Maricá (Figure 2).

3.1.3 Labor and income

In 2010, the percentage of economically active people in the city was 55.32%. Among the active, the unemployment rate in the community was 7.87%. Of those

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[1] Royalties are a financial compensation owed to the Union, the State and the beneficiary municipalities by the companies that extract oil and gas on Brazilian territory: a remuneration to the company for the development of these non-renewable resources. The special contribution is an extraordinary financial compensation owed by the concessionaires for the exploration and production of oil or natural gas for fields with a large production volume.

Figure 2 – Maricá municipality revenues by source, 2002-2019 (R$)
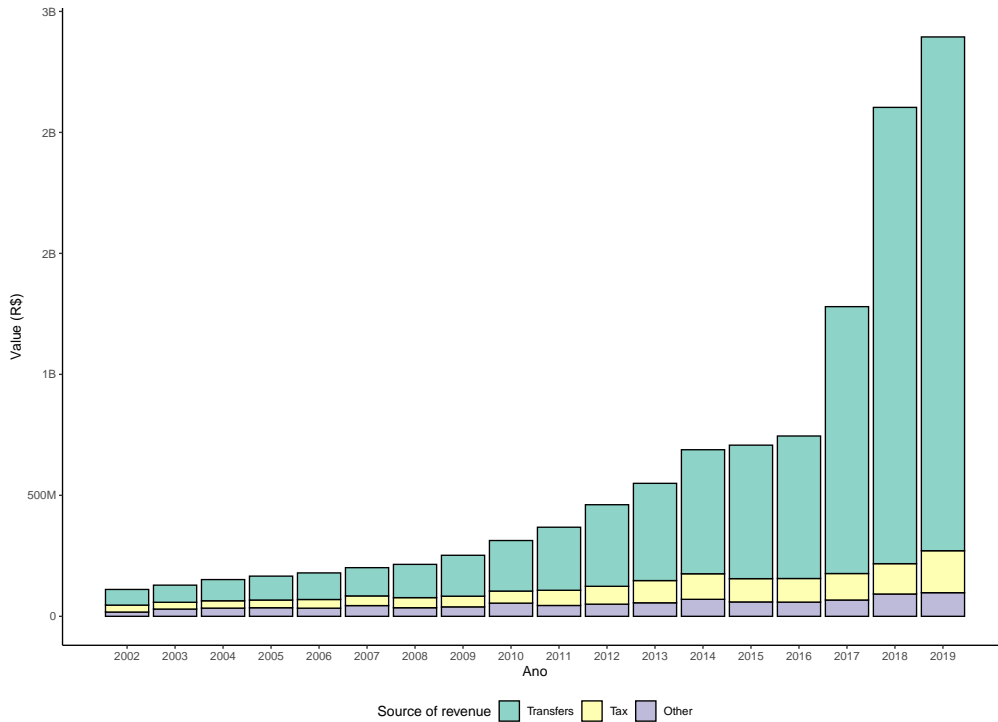
Source: From the author, SICONFI data.

in the labor force, 42.44% had a formal contract and were thus considered formal employees, except domestic workers, military, and government employees.

The average per capita total household income in the city in 2010 was 792 reais, a figure higher than the state and metropolitan average. The average salary of an employed person was 1371 reais. In the municipality, about 18.4% of people lived with a per capita household income of less than half the minimum wage (R$255.00).

Maricá was the municipality in Rio State that created the most formal jobs in the last four years. This is according to data from the General Registry of Employment and Unemployment (CAGED), published by the federal government. From January 2017 to November 2020, 6,592 new formal jobs were created in the city, representing a 52.5% increase in the number of workers in the municipality.

Table 1 shows the evolution of the number of formally employed workers by sector (CNAE/ISIC[2]). Public administration, construction, transportation and

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[2] The Classificação Nacional de Atividades Econômicas (CNAE) is the classification officially

Retail are the main contributors to the observed increase in the number of employees.

Table 1 – Employment per year, CNAE/ISIC Sectors

Sector	2013	2014	2015	2016	2017	2018	2019	2019-2013
Public administration	4640	4955	5682	2911	6785	7438	7937	3297
Construction	254	360	517	614	668	732	2765	2511
Transportation & storage	1410	2196	1677	1969	2020	1424	2518	1108
Retail trade	4763	5370	5188	4877	5041	5321	5477	714
Real estate & business	1146	1053	1093	1085	1782	3142	1426	280
Education	888	1005	1065	981	936	995	1129	241
Hotels & restaurants	614	625	613	574	605	654	706	92
Health & social work	208	203	260	267	260	282	289	81
Other	226	225	246	267	234	240	267	41
Financial intermediation	158	162	159	163	160	152	188	30
Agriculture	80	83	75	73	74	71	61	-19
Mining & quarrying	88	93	72	81	62	57	67	-21
Manufacturing	1170	1250	1174	1136	1116	1068	1025	-145

Source: From the author, RAIS data.

Table 2 shows the evolution of the number of formally employed workers by major group of occupation (CBO/ISCO[3]). Craft & related trades workers, Service & retail sales workers, Technicians and Professionals are the main contributors to the observed increase of employment.

Table 2 – Employment per year, CBO/ISCO groups

Occupation Group	2013	2014	2015	2016	2017	2018	2019	2019-2013
Craft & related trades workers	2384	3012	2773	2891	3325	3505	4628	2244
Service & retail sales workers	4352	4980	4903	4732	5163	6009	6101	1749
Technicians	2677	2617	3181	1022	3643	3974	4184	1507
Professionals	2375	2858	2958	2599	3394	3454	3853	1478
Clerks	2535	2643	2551	2401	2640	3005	3233	698
Legislators, officials & managers	582	622	656	554	686	636	904	322
Elementary occupations	217	266	285	287	297	434	451	234
Operators & assemblers	438	428	386	402	447	474	452	14
Agricultural & fishery workers	59	132	111	102	159	76	65	6

Source: From the author, RAIS data.

Table 3 shows the evolution of the number of formally employed workers by the ten subgroups of occupation (CBO/ISCO) with larger difference in employment

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adopted by federal agencies managing administrative records. CNAE is derived from the International Standard Industrial Classification of All Economic Activities (ISIC)

[3] The CBO structure consists of ten major groups at the top level of aggregation, subdivided into 47 sub-major groups, 192 subgroups, and 596 unit groups and takes as reference the latest version of the International Statistical Classification of Occupations (ISCO)

between 2013 and 2019. Building frame workers, Administrative associates and Maintenance & cleaning workers are the main contributors to the observed increase of employment.

Table 3 – Employment per year, top 10 CBO Sub-groups

Occupation Subgroup	2013	2014	2015	2016	2017	2018	2019	2019-2013
Building frame workers	225	360	422	458	617	856	1205	980
Administrative associates	1713	1441	1965	57	2347	2698	2671	958
Maintenance & cleaning	853	1023	1146	1135	1220	1682	1803	950
Health professionals	67	450	521	109	799	764	736	669
Building assistants	239	508	530	413	694	579	858	619
Salespersons & demonstrators	1831	2136	2053	1941	2028	2195	2243	412
Primary Education Teachers	1736	1751	1756	1851	1929	1958	2135	399
Health associates	47	201	218	58	403	333	377	330
Office clerks	986	1016	957	929	990	1172	1263	277
Vehicle drivers	1094	1207	896	1079	1078	1139	1363	269

Source: From the author, RAIS data.

3.1.4 Political aspects

The RBC is one of the axes of the strategy of the last four mandates of the workers' party in the City Hall for the sustainable development of the city. In 2013 the Municipal Program of Solidarity Economy, Combating Poverty and Economic and Social Development of Maricá was created by Mayor Washington Quaquá (2009-2017). The actions aim to combat social inequality through the transfer of income and the creation of opportunities to generate other sources of income.

There were gradual developments in the income transfer program of Maricá Prefecture, its most significant change in the management of Fabiano Horta elected in 2016. When it started to pay 130 mumbucas to each individual of a family, reaching 42,000 citizens in 2019.

In 2020, the Mayor of Maricá Fabiano Horta of the Workers Party was re-elected in the first round with the highest percentage of the entire state of Rio reaching 88,09% of the valid votes, totaling 76,285 votes. Of the 17 city councilors, 15 will form part of the governing base. PT, his party, elected four councilors, followed by PCdoB and PDT, each with three seats in the Chamber. This will be the PT's

fourth term at the head of city hall, indicating a high approval by population of the implemented policies.

3.2 Policy background

### 3.2.1 Maricá's Public Expenditure

It is undeniable that the extraordinary revenues from offshore petroleum reserves have enabled the city to have a bold vision of the future. But it is also true that other Brazilian municipalities that have seen new oil revenues, including the state of Rio, have not been able to formulate or implement a project that could change the typical course of predatory resource extraction and its negative externalities.

The figure 3 shows the evolution of the largest expenditures in the municipality of Maricá, broken down by function. It can be observed that the basic income expenditure is not the main expenditure of the municipality, as could be expected. Overall, Maricá's expenditures have increased significantly over the period studied due to the large increase in oil royalty revenues.

Other expenditures also increased, which may have affected the number of formal jobs created in the municipality. Construction spending has a large relative importance in terms of spending and has increased significantly over time, but this increase does not coincide with the increase in the number of formal jobs in the city that began in 2014.

To ensure that these investments outlast Maricá's oil revenues, the city launched a sovereign wealth fund in late 2017 that has already reached a total value of R$285 million ($55.7 million). The fund provides a platform for the city, where a significant portion of the population lives in poverty, to enter the financial market on favorable terms, with funds potentially exceeding R$1 billion over the next decade. The revenue from this fund is expected to enable the city to reduce the capital costs of key development projects while guaranteeing key social programs in perpetuity

Figure 3 – Maricá municipality expenditures by duty (R$), 2013-2019
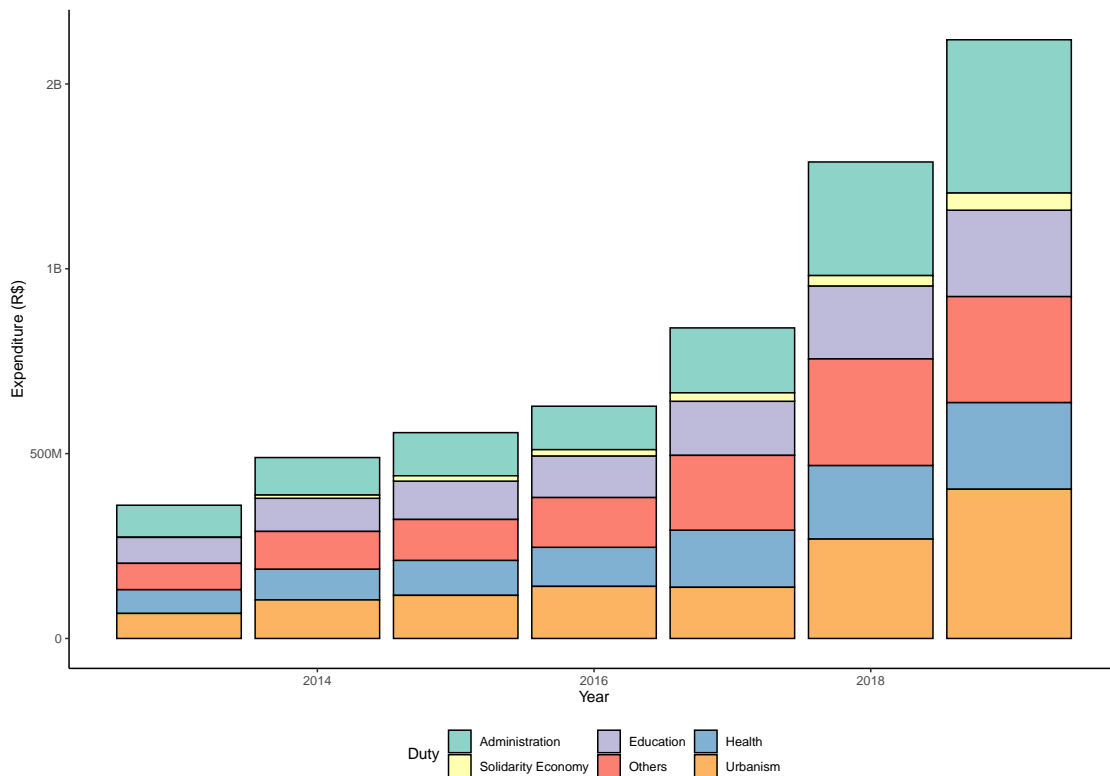
Source: From the author, SICONFI data.

as it grows.

IBAM (2020) listed some actions where Maricá's financial resources are being used: Cash transfer program through the Mumbuca community currency; financial support in Mumbuca currency for primary school students in public schools; Maricá Public Transport Company (EPT), created in 2014 to provide free transportation in the city; community vegetable garden program, which distributes lots for growing vegetables; fish truck, a vehicle in which local fishermen can sell their products directly; construction works for the municipal hospital; infrastructure works for the municipal airport to serve petroleum activities; construction of bicycle paths.

3.2.2 Solidarity Economy and Basic Income

The income transfer program "Renda Mínima Mumbuca" was created in 2013 by the Solidarity Economy Law (Municipal Law 2448), whose aim was to minimize

Figure 4 – Maricá Solidarity Economy expenditures (R$), 2013-2019
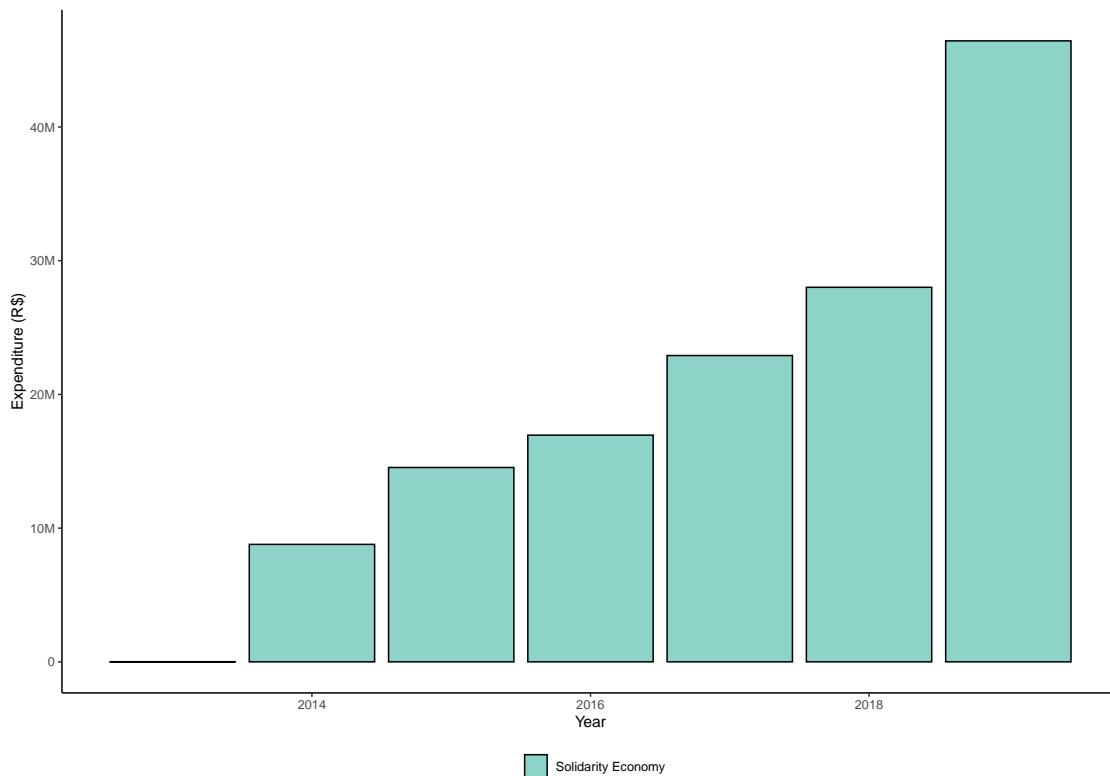
Source: From the author, SICONFI data.

social inequalities similar to the Bolsa Família program. The social currency *Mumbuca* and the Community Bank Mumbuca were created, which from the beginning served as the structure for the payment of the benefit. The City Hall finances - through a technical cooperation contract - all the operating costs of the community bank. The currency issued by Banco Mumbuca in Maricá has parity with the real and can only be used locally. This fact prevents direct transfers of the program to neighboring cities. It is possible to hold Mumbucas in a Bank Mumbuca account or to spend them with a card and the code QR, but it is not possible to exchange them for Real (PEREIRA et al., 2020; SILVA et al., 2020).

Prior to approval by the City Council, the project provided for the payment of R$50.00 converted into Mumbucas for approximately eight thousand families registered in the Cadastro Único. With the approval of the Solidarity Economy Law, the income transfer program introduced would pay R$70.00 per month to

families with a family income in the range of 1 minimum wage. Immediately after the introduction of the program, about 400 families were initially beneficiaries, with another 3,500 registered to receive the benefit (PEREIRA et al., 2020).

In 2015, the program was expanded. The family income is now 3 minimum wages that fall within the household income range of the Cadastro Único. The amount is now R$85.00 per month and two other modalities were created to benefit specific target groups: the Renda Mínima Pregnancy of 85 Mumbucas, R$85.00; and the Renda Mínima Jovem Solidário of R$100.00. The Renda Mínima Mumbuca was aimed at the responsible family, and the Renda Mínima Pregnancy focused on women in the pregnancy phase and ran until the unborn child was one year old. The Minimum Income Young Solidarity program, on the other hand, was aimed at people aged between 14 and 29. Furthermore, also in 2015, the Citizen's Basic Income Program was created, conceived as a universal right. The program started with the payment of R$ 10.00 to all fourteen thousand beneficiaries of Minimum Income programs in the municipality (PEREIRA et al., 2020).

In 2017, the values were updated. The minimum income programs now paid R$110.00 and the basic income for citizenship now paid R$20.00 - R$130.00 combined. The same year also saw the launch of the Indigenous Mumbuca Program, which paid 300 Mumbucas (equivalent to R$300.00) to all residents of the two indigenous villages in the municipality (PEREIRA et al., 2020).

In 2019, the Renda Mínima program was integrated into the new Citizen's Basic Income program and, more importantly, the benefit changes from a monthly payment of R$130 per household to a monthly payment of R$130 per person. The conditions for inclusion in the program are that one has lived in the municipality for at least three years and belongs to a household with a monthly family income of up to three minimum wages (R$3,135). be among the beneficiaries. With this expansion, one in four residents of the city will benefit from the program - about 42.5 thousand people (PEREIRA et al., 2020).

Due to the evolution in the implementation of the policy, the Maricá's Citzen

Basic Income (RBC) presented different forms and names. Since this study analyses the period before the current status of the basic income, it will be referred to as Solidarity Economy cash transfers. Figure 4 show the evolution of Solidarity Economy expenditures from 2013 to 2019. The majority of Solidarity Economy expenditures is due to the cash transfers programs implemented in the period.

3.2.3 Mumbuca Bank

Mumbuca Bank is a municipal community bank that serves the entire city. It is a government initiative to support municipal policies and is assisted by the local government in managing, financing and organizing the bank. The majority of Mumbucas' output comes from the disbursement of social benefits. The Basic Citizen Income Program (RBC) is the main cash transfer program disbursed in Mumbucas. The local government deposits the amount of the benefit into the Mumbuca bank and sends the bank the list of beneficiaries, after which the bank transfers each payment. (PEREIRA et al., 2020; GAMA; COSTA, 2021)

The work of the community bank with the support of the community made Mumbuca a unique case. The introduction of a digital social currency is also unique and innovative and represents an instrument of great dynamism and potential to promote the desired change in this locality. A large part of the population receives the Mumbuca card, which in practice is a prepaid debit card to which a monthly balance of 70 Mumbucas is deposited, which is exactly equivalent to R$70.00. This amount is expected to increase to 140 Mumbucas in the near future. The card can only be used in registered shops within the municipality. For this system to work satisfactorily, infrastructure is required to make the cards available and readable, as well as the active participation of the municipality, which is responsible for feeding the money into the system. (PEREIRA et al., 2020; GAMA; COSTA, 2021; CERNEV, 2019)

In 2018, Mumbuca joined the E-dinheiro platform of the Brazilian network of community banks. After that, any resident of Maricá could open an account

at Mumbuca Bank and carry out transactions in Mumbucas. From a business perspective, the E-dinheiro system facilitated the adoption of Mumbuca as a payment unit and registration with the bank became easier. From 2013 to 2017, businesses that accepted Mumbucas received the amount in reais for purchases made in Mumbuca thirty days after the transaction to their business account. With the Edinheiro system, the amount transacted with the businesses becomes immediately available in their accounts at Mumbuca Bank. Nowadays, there are many businesses that accept mumbuca, from large supermarket chains to small sole proprietors - formal and informal. In addition, some companies and institutions, such as Mumbuca Bank itself, have adopted mumbuca for the payment of monthly salaries. (GAMA; COSTA, 2021; CERNEV, 2019)

The Mumbuca Bank's account holders can effect various transactions, such as purchasing goods and services, paying utility bills and conducting bank transfers. Transactions can be carried out via mobile app, or via card for those users who have one. Conversion from mumbucas to reais can be done through withdrawals or bank transfers to commercial bank accounts. Since 2018, businesses that accept payment in mumbucas pay a 2% fee per sale. The amount generated by this fee feeds the Mumbuca Bank Fund, which finances its social activities and credit lines. The nine credit lines granted by the bank are divided into productive credit lines and housing credit lines, which finance small renovations and home repairs. (PEREIRA et al., 2020; GAMA; COSTA, 2021; CERNEV, 2019)

3.2.4   Theoretical remarks

The multiplier effect of an investment, first developed by John Maynard Keynes, indicates how many times an investment is spent within an economy before it leaves the area. It is a calculation of the total value of an investment to the local economy (SACKS, 2002).

Since cash transfers can have a multiplier effect related to their regenerative impact on local economic development, the question is whether there are mechanisms

that can help increase their buying local impact. At the most basic level, buying local keeps more money in the community. The concept of "buying local" links cash transfers to the economic development of local communities and assumes that private or public investments are attracted, and this money stays in the local economy (THATCHER; SHARP, 2008; BELMONTE et al., 2021). The promotion of community and complementary currencies is seen as having considerable potential in this direction (BELMONTE et al., 2021).

The local multiplier effects of complementary currencies have been shown to be higher than those of legal tender currencies (GROPPA, 2013). The fact that complementary currencies were not designed for savings purposes, as they may be perceived as weaker hedges than legal tender (GÓMEZ, 2018), implies that the marginal propensity to consume induced by complementary currencies is higher than normal currency (BELMONTE et al., 2021).

For Maricá, we observe the implementation of cash transfers in conjunction with a local currency. This allows us to expect spillover effects to neighbor municipalities to be small, as all cash transfers must be spent within the city borders, and multiplier effects to be larger.

4 Data and Methodology

We aim to compare the evolution of formal employment in Maricá after the introduction of the Solidarity Economy cash transfers to a set of control municipalities that proxy for the counterfactual outcomes in the absence of the cash transfers payments. To this end, we need to collect labor market data for all municipalities in Rio de Janeiro state.

4.1 Data Sources

We retrieve municipal public finances from the SICONFI database from the National Treasury. Population and GDP estimates are provided by the IBGE. For local labour market outcomes, we use the Relação Anual de Informações Sociais (RAIS; Ministry of Labour Administrative Dataset). The objective is to assemble a panel at the municipality level with data that allow for the characterization of the labor markets in the units of analysis, over 2002–2019.

4.1.1 Ministry of Labour (RAIS)

The Annual Social Information Report (RAIS) is an administrative record published annually and the information contained refers to the previous base year. It covers the entire national territory and can be subdivided into different geographic areas: Brazil, regions, federative units and municipalities. This is a high-quality administrative dataset assembled yearly by the Brazilian Ministry of Labour. Effectively, it is a census of the Brazilian formal labour market, containing detailed information from registered firms and contractual workers. The RAIS database includes data on all workers linked to the formal labor market in the country. This means that RAIS data indicate the stock of workers in the formal labor market in a given year. As for the limitations, the data do not include the informal market, that is, workers without a formal contract, self-employed and informal employers.

For the analysis, we use the definition of formal employment as the sum of all active employment contracts in each municipality per year. The private formal employment is the formal employment, with the public administration sector excluded. Mean wage is the average of the monthly wage received by all employees, and public mean wage is the average of the monthly wage received by public administration sector employees.

4.1.2   IBGE

4.1.2.1   2010 Census

The Census main objectives are to count the inhabitants of the national territory, identify their characteristics and reveal how Brazilians live. The 2010 Census, in relation to the content of the interviews, included questions about the characteristics of the residents (gender, age, color or race, education and income), characteristics of the households (water supply, sanitation, electricity and garbage), as well as a set of questions relating to, among other things, education, religion, disability, migration, fertility, work and income. The Census is representative for Brazil, Major Regions, Federation Units, Metropolitan Regions and Municipalities. For the analysis, we use the Unemployment Rate for people over 18 years old.

4.1.2.2   Municipalities GDP

This dataset provides estimates of the Gross Domestic Product (GDP) of the Municipalities, at current prices, and of the gross added value of Agriculture, Industry, Services and Administration, public health and education and social security, compatible with the methodologies of the Accounts Regional and National of Brazil, with the obtained estimates being comparable to each other. For the analysis, we use the GDP and the GDP per capita.

4.1.2.3 Population

IBGE publishes municipal population estimates. The methodology adopted to estimate the population contingents of Brazilian municipalities is based on the relationship between the population growth trend of the municipality, observed between two consecutive demographic censuses, with the growth trend of a larger geographic area, the Federation Units.

4.1.3 National Treasury Secretariat (SICONFI)

The main objective of the Brazilian Public Sector Accounting and Tax Information System (SICONFI) is to improve the collection and receipt of accounting and tax information as a means of providing the National Treasury Secretariat (STN) with the information necessary to fulfill its obligations institutional, specifically those relating to the consolidation of national accounts, established by the Fiscal Responsibility Law (LRF). SICONFI is used by Federation entities as the electronic means of dissemination and publicity of accounting and tax reports, providing a channel of transparency in public management with a view to social control. The accounting and tax information contained there in is still of a declaratory nature. For the analysis, we gather total revenues, all sources of income the local government receives in each year; total expenditures, ; capital expenditures, money spent to buy, maintain, or improve its fixed assets, such as buildings, vehicles, equipment, or land; and transfers revenues, transfers of funds from one level of government to another including compensations for natural resources use - oil and gas royalties. All variables are presented in real values and also calculated in per capita terms.

4.2 Data Description

Table 4 provides summary statistics on the baseline characteristics of Maricá and the rest of municipalities in the analysis sample, comparing the pre-treatment period with the post-treatment period. To balance the panel, we restrict ourselves to municipalities with at least 20,000 inhabitants in 2019. In addition, the city of

Table 4 – Summary Statistics - Mean (St. Dev.)

	Maricá, n = 18		Other Municipalities, n = 1,152	
	Pre-treatment 2002-2013	Post-treatment 2014-2019	Pre-treatment 2002-2013	Post-treatment 2014-2019
Formal Employment	10,491 (2,708)	19,276 (3,157)	22,884 (33,550)	27,337 (37,583)
Private Formal Employment	7,472 (1,885)	13,325 (1,481)	19,187 (30,031)	22,788 (33,620)
Population	111,464 (20,156)	151,923 (6,819)	141,268 (200,450)	152,326 (209,559)
Mean Wage (R$)	1,668 (167)	2,049 (55)	1,899 (453)	2,226 (441)
Mean Wage public (R$)	1,926 (382)	3,083 (668)	2,152 (768)	2,532 (806)
Total Expenditures (R$)	151,988,282 (113,916,493)	1,037,522,178 (584,315,392)	206,583,561 (304,356,303)	439,812,694 (554,615,850)
Total Expenditures PC	2,201 (839)	7,258 (3,154)	3,498 (3,039)	4,050 (2,170)
Capital Expenditures (R$)	22,860,268 (23,382,509)	218,090,214 (155,947,719)	26,444,096 (51,391,566)	29,868,806 (58,913,675)
Capital Expenditures PC	319 (223)	1,510 (886)	477 (854)	262 (244)
Total Revenues (R$)	152,154,291 (110,477,812)	1,230,963,769 (798,556,114)	216,102,119 (321,101,774)	443,163,136 (554,199,742)
Total Revenues PC	2,200 (804)	8,527 (4,544)	3,721 (3,208)	4,199 (2,298)
Transfers Revenues (R$)	102,851,664 (84,377,971)	1,056,067,687 (744,921,489)	153,803,848 (229,615,855)	309,065,966 (357,091,101)
Transfers Revenues PC	1,443 (678)	7,268 (4,331)	2,838 (2,617)	3,179 (1,766)
GDP (R$)	2,068,837,861 (2,473,781,055)	13,748,501,377 (7,774,641,679)	3,006,540,756 (5,849,714,528)	5,135,982,040 (7,768,550,387)
GDP PC (R$)	16,417 (17,316)	89,247 (47,320)	25,010 (35,950)	36,530 (31,704)
Unemployment Rate (%)	7.8 (0)	7.8 (0)	8.7 (2.2)	8.7 (2.2)

Note: The table displays the average of baseline characteristics for municipalities in our analysis sample (65 out of 92 municipalities in Rio de Janeiro State amounting to 1,170 observations each).

Rio de Janeiro was excluded from the sample because it is an outlier in terms of population and several other aspects.

The main dependent variable for this study is Private Formal Employment, since employment in public administration sector could be directed affected by arbitrary local government decisions. For the pre-treatment predictors we rely on a standard set of variables: employment, mean wage, GDP, population, unemployment rate, Public Expenditures and Public Revenues. As covariates to be controlled for, we select Public Mean Wage, Capital Expenditure per capita, Transfer Revenue per capita and Total Expenditures per capita.

4.3 Models

4.3.1 Synthetic Control Model (SCM)

By taking a Synthetic Control Model (SCM) approach, we employ a data-driven procedure that uses a weighted average of a group of control cities to simulate or construct an artificial or 'synthetic' Maricá. The goal of the synthetic Maricá is to reproduce the trajectory of the formal employment levels in real Maricá before the cash transfers. Then, after the cash transfers, the difference in the trajectories between the synthetic and real Maricá can be summarized as the causal impact of the Solidarity Economy cash transfers policies. In a sense, the synthetic Maricá is the counterfactual formal employment evolution that Maricá would have experienced without the Solidarity Economy cash transfers policies.

Synthetic control methods involve the construction of synthetic control units as convex combinations of multiple control units. The weights that define the synthetic control unit are chosen such that the synthetic control unit best approximates the relevant characteristics of the treated unit during the pretreatment period. The post-intervention outcomes for the synthetic control unit are then used to estimate the outcomes that would have been observed for the treated unit in the absence of the intervention. Abadie, Diamond e Hainmueller (2010) provide a

formal discussion of the theoretical properties of the synthetic control method. In particular, they derive the synthetic control estimator using an econometric model that generalizes the usual difference-in-differences (fixed-effects) model commonly applied in the empirical literature.

Starting from a panel with $J + 1$ analysis units (municipalities). Without loss of generality, it is assumed that the first unit ($j = 1$) is the treated unit, that is, the unit affected by the policy in question. The units $j = 2$ to $j = J + 1$ constitute the set of donors, that is, a pool of potential comparison units.

For each unit, j, and time period, t, we will define Y_{jt}^N to be the potential response without intervention. For the unit affected by the intervention, $j = 1$, and a post-intervention period, $t > T_0$, we will define Y_{1t} to be the potential response under the intervention. Then, the effect of the intervention of interest for the affected unit in period t (with $t > T_0$) is:

$$\alpha_{1t} = Y_{1t} - Y_{1t}^N \tag{4.1}$$

where, given a set of weights $W = (w_1, \ldots, w_{J+1})$:

$$\hat{Y}_{1t}^N = \sum_{j=2}^{J+1} w_j Y_{jt} \tag{4.2}$$

We therefore seek a set of S weights, $w = (w_1, \ldots, w_S)$, in order to combine the untreated outcomes among control states and provide a reasonable approximation for the counterfactual.

$$\|X_1 - X_0 W\| = \left(\sum_{h=1}^{k} v_h (X_{h1} - w_2 X_{h2} - \cdots - w_{J+1} X_{hJ+1})^2 \right)^{1/2} \tag{4.3}$$

subject to the restriction that $w2; \ldots; wJ + 1$ are non-negative and sum to one. Then, the estimated treatment effect for the treated unit at time $t = T0 + 1; \ldots; T$ is:

$$\hat{\alpha}_{1t} = Y_{1t} - \sum_{j=2}^{J+1} w_j^* Y_{jt} \tag{4.4}$$

The positive constants $v_1, \ldots, v_k$ in reflect the relative importance of the synthetic control reproducing the values of each of the k predictors for the treated unit, $X_{11}, \ldots, X_{k1}$.

In practice, we report the average difference between the treatment unit and the synthetic control during the period where the dividend is in place in Maricá (the treatment period):

$$\hat{\alpha}_1 = \frac{1}{T - T_1} \sum_{t=T_1}^{T} \hat{\alpha}_{1t} \tag{4.5}$$

Abadieet al.(2010) describe how synthetic control methods facilitate inferential techniques akin to permutation tests that are well-suited to comparative case studies in which the number of units in the comparison group and the number of periods in the sample are relatively small. They propose inferential techniques for the synthetic control method that proceed by conducting so-called placebo studies. The basic principle is to iteratively apply the synthetic control method by randomly reassigning the intervention in time (i.e., pre-intervention dates) or across units (i.e., to control units where the intervention did not occur) to produce a set of placebo effects. Subsequently, we can compare the set of placebo effects to the effect that was estimated for the time and unit where the intervention actually occurred. This comparison is informative about the rarity of the magnitude of the treatment effect that was observed for the exposed unit. We can assess whether the effect estimated by the synthetic control method for the actual intervention is large relative to the effect estimated for a unit or date chosen at random. (ABADIE, 2019)

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 Maricá. Formally,

$$p - value = Pr(\hat{\tau}^{PL} > \hat{\tau}_S) = \frac{1}{J+1} \sum_{i=1}^{j+1} I(\hat{\tau}_{i,T}^{PL} \geq \hat{\tau}_{S,T}) \tag{4.6}$$

where $\hat{\tau}_{i,T}^{PL}$ is the estimated gap for the last post-treatment period T when province

i is assigned to placebo treatment at the same time as Maricá.

4.3.2 Generalized Synthetic Control (GSC)

Xu (2017) combines this basic approach with an interactive fixed effects (IFE) model from Bai (2009). This allows us to estimate causal effects accounting for unobserved time-varying confounders. These unobserved heterogeneous shocks, which cannot be picked up by simple unit and time fixed effects, are modeled through interactive fixed effects. The generalized synthetic control method conducts dimension reduction prior to reweighting, so, unlike the standard synthetic control approach, weights are not directly interpretable. It first estimates an IFE model using only the control group data, obtaining a fixed number of latent factors. It then estimates factor loadings for each treated unit by linearly projecting pretreatment treated outcomes onto the space spanned by these factors. Finally, it imputes treated counterfactuals based on the estimated factors and factor loadings. The main contribution of this paper, hence, is to employ a latent factor approach to address a causal inference problem and provide valid, simulation-based uncertainty estimates under reasonable assumptions.

This method is in the spirit of the synthetic control method in the sense that by essence it is a reweighting scheme that takes pretreatment treated outcomes as benchmarks when choosing weights for control units and uses cross-sectional correlations between treated and control units to predict treated counterfactuals.

First, we assume that Y_{it} t is given by a linear factor model.

$$Y_{it} = \delta_{it} D_{it} + X'_{it}\beta + \lambda'_i f_t + \epsilon_{it} \tag{4.7}$$

where the treatment indicator D_{it} equals 1 if unit i has been exposed to the treatment prior to time t and equals 0 otherwise (i.e., $D_i t = 1$ when $i \in T$ and $t > T_0$ and $D_i t = 0$ otherwise). δ_{it} is the heterogeneous treatment effect on unit i at time t; x_{it} is a (k x 1) vector of observed covariates, $\beta = [\beta_1, \ldots, \beta_k]'$ is a (k $\times$1) vector of unknown parameters, $f_t = [f1t, \ldots, f_{rt}]'$ is an (r $\times$1) vector of unobserved common

factors,$\lambda_i = [\lambda_{i1}, ..., \lambda_{ir}]'$ is an (r $\times$1) vector of unknown factor loadings, and ϵit represents unobserved idiosyncratic shocks for unit i at time t and has zero mean. It is required that the treated and control units are affected by the same set of factors and the number of factors is fixed during the observed time periods, i.e., no structural breaks are allowed.

The main quantity of interest of this paper is the average treatment effect on the treated (ATT) at time t (when $t > T_0$):

$$ATT_{t,t>T_0} = \frac{1}{N_{tr}} \sum_i [Y_{it}(1) - Y_{it}(0)] = \frac{1}{N_{tr}} \sum_i \delta_{it} \tag{4.8}$$

To recover ATT estimates, we follow the three-step procedure in Xu (2017), with i indexing municipalities, and t indexing time; t_0 denotes treatment year (i.e., 2013). Where f_t are the latent factors (time-varying coefficients) that may or may not interact and λ_i are their unknown factor loadings (unit-specific intercepts). Our main models are estimated with two latent factors as a result of the cross-validation procedure to select models before estimating the causal effect. It relies on the control group information as well as information from the treatment group in pretreatment periods.

The first step recovers $\hat{\beta}$ and $\hat{f}$. The second step estimates factor loadings, $\hat{\lambda}$, and the third step estimates the counterfactual for treated units in post-treatment periods. The linear interactive fixed effects models we estimate are of the following general form:

$$PrivEmployment_{it} = \delta_{it} D_{it} + PubWage\beta_1 + CapExp\beta_2 + TransfRev\beta_3 + \lambda_i' f_t + \epsilon_{it} \tag{4.9}$$

$$PrivEmployment_{it} = \delta_{it} D_{it} + PubWage\beta_1 + TotalExp\beta_2 + \lambda_i' f_t + \epsilon_{it} \tag{4.10}$$

where $D_{it} = 0, 1$ is our binary indicator of the Solidarity Economy cash transfers program's beginning in 2013 at Maricá. The vector of control variables X_{it}' includes

Public Mean Wage, Capital Expenditure per capita, Transfer Revenue per capita and Total Expenditures per capita.

We use a jackknife bootstrap procedure with 1,000 runs to generate 95% confidence intervals around the ATT estimates as implemented in the synthetic control method.

5 Results

5.1 Synthetic Control Results

As explained, synthetic Maricá was constructed as the convex combination of municipalities in the donor pool that best reproduced the values of predictors for formal employment in Maricá in the pre-policy period. Table 7, in the appendix, displays the weights for each donor municipality in the synthetic Maricá.

Next, the estimated weights are used to obtain the synthetic Maricá and compare it with real Maricá in pre-treatment characteristics. The results displayed in Table 5 show that synthetic Maricá is very similar to real Maricá in all covariates used in the estimation. In contrast, the sample average of all municipalities in the State do not seem to provide a suitable control group.

Table 5 – Employment predictor means before treatment

	Treated	Synthetic	Sample Mean
Formal Employment	$10,491.08$	$10,491.08$	$28,396.39$
Population	$111,463.80$	$111,463.80$	$174,496.50$
Mean Wage (R\$)	915.26	974.69	$1,085.06$
Expenditures (R\$)	$151,988,282$	$151,988,276$	$250,212,063$
Revenues (R\$)	$152,154,291$	$159,643,868$	$260,783,660$
GDP (R\$)	$2,068,837,861$	$2,068,837,896$	$3,696,264,918$
Unemployment Rate	7.78%	7.78%	8.84%

Figure 5a displays the formal employment trajectory for real Maricá and its synthetic counterfactual from 2006 to 2019. Formal employment in the synthetic Maricá closely resembles the trend of this variable for real Maricá during the entire pre-policy period. This confirms that the combination of municipalities in the donor pool can effectively reproduce Maricá's characteristics before the policy implementation.

The estimate of the impact of the policy on formal employment in Maricá

Figure 5 – Maricá and Synthetic Control Estimates
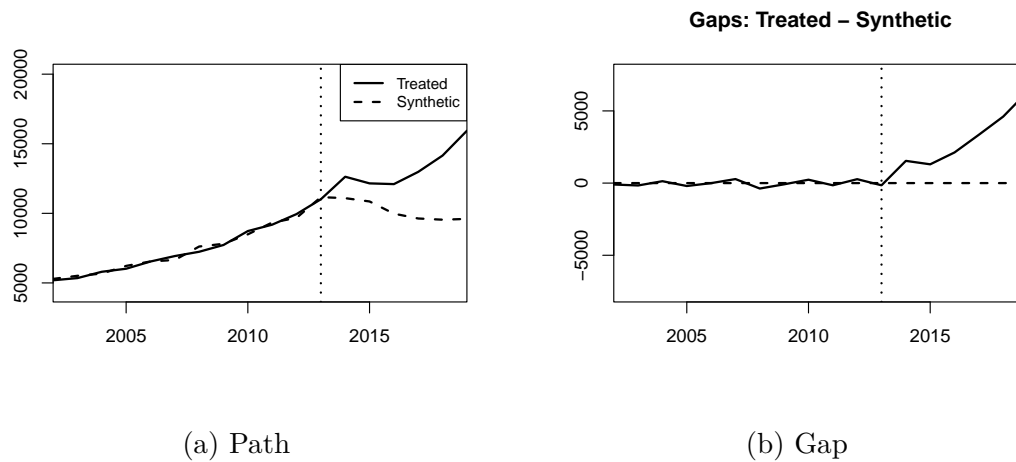
(a) Path

(b) Gap

	Effect	p.value
2014	1539.6	-
2015	1300.0	-
2016	2122.8	-
2017	3349.6	-
2018	4608.6	-
2019	6334.1	-
ATT	3209.1	0.0196

(c) Effect by Year

is given by the difference between real Maricá and its synthetic counterpart after policy implementation, which was considered to be 2013. From this date onward, the two lines diverge noticeably. The discrepancy between the two lines suggests a large positive effect of Solidarity Economy cash transfers on formal employment.

Figure 5b plots the yearly gaps in formal employment between real and synthetic Maricá. The magnitude of the estimated impact of RBC is substantial. Over the 2014- 2019 period, the ATT was 3209.109 per year. The average impact in annual formal employment was smaller in the first years of treatment, followed by a significant increase after 2015.

5.2   Robustness Checks

In this section we conduct the following robustness checks. First, we check for the validity of the model through placebo estimation. In particular two versions of placebo tests will be applied: municipalites and in-time placebo. Second, we implement the generalized synthetic control method, in order to control for unobserved factors, unit fixed effects, time fixed effects and time-variant Maricá's specific observed variables.

5.2.1   Placebo Tests

To confirm that the gap shown in Figure 5b is the true causal effect of the policy, we need to conduct some inference and provide evidence on the validity of synthetic Maricá as a counterfactual. In comparative case studies such as this analysis, large sample inferential techniques are not well suited because of the small sample nature of the data. Then, following Abadie, Diamond e Hainmueller (2010) and (2015), exact inferential techniques, similar to permutation tests, to conduct inference will be applied.

By systematizing the process of estimating the counterfactual of interest, the synthetic control method enables to conduct some placebo experiments known in the literature as placebo tests. These tests involve applying the synthetic control method after reassigning the intervention in the data to units and periods where the intervention did not occur.

Figure 6a plots yearly gaps of placebo estimates. Placebo tests evaluate the significance of estimates by answering the question: under the null hypothesis of no treatment effect, how often would we obtain an ATT estimate of a certain large magnitude purely by chance? Essentially, a placebo test involves demonstrating that the effect does not exist when it is not expected to exist. In other words, our confidence in the large impact of the policy on formal employment in Maricá would be severely undermined if this estimated effect fell inside the distribution of placebo effects.

Figure 6 – Placebos

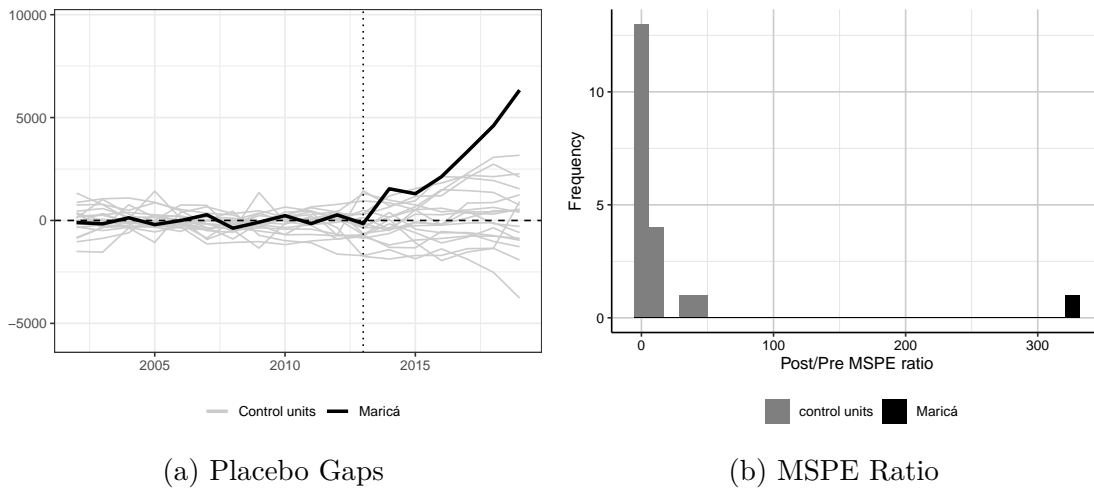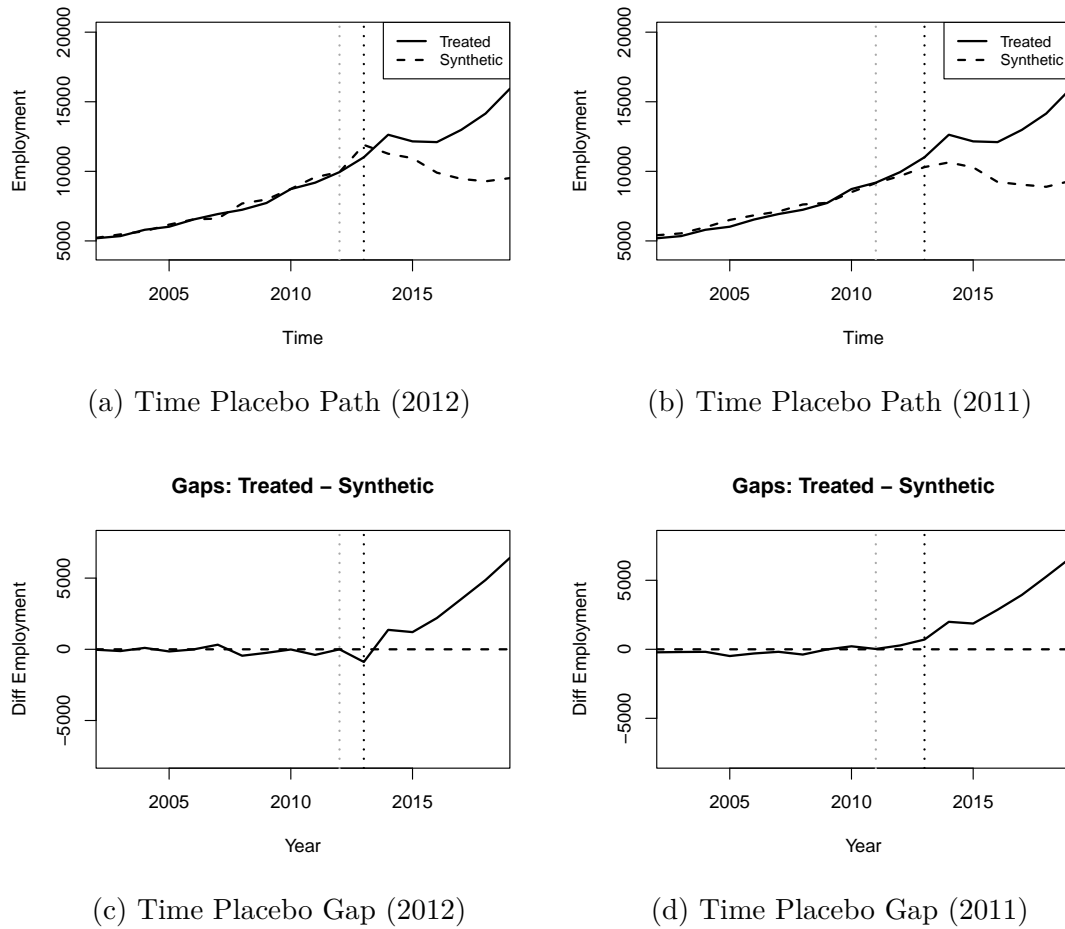

(a) Placebo Gaps	(b) MSPE Ratio

Figure 6b computes the distribution of the ratio of post- to pre-treatment Mean Squared Prediction Error (MSPE). The MSPE measures the expected squared distance between what the synthetic control predicts for a specific unit and what the actual value is. As recommended in Abadie et al.(2010) we exclude municipalities with a poor fit for the pre-treatment period (i.e., municipalities with a MSPE that is five time higher than for the Maricá). The resulting figure demonstrates that when we reassign exposure to the treatment to other municipalities, there is a very low probability of obtaining a gap as large as the one obtained for the Maricá. Precisely, the p-value obtained was 0.0196.

Another way to conduct a placebo test is to reassign the time when the intervention took place (BERTRAND; DUFLO; MULLAINATHAN, 2004). Ideally, no impacts will be found in the pre-treatment period. Figure 7 displays the results of applying SCM using 2011 and 2012 as our placebo dates. We find no evidence of diverging trends between Maricá and the synthetic Maricá in a two-year window before the policy implementation. We actually find consistent evidence that the synthetic Maricá predicts very well the trends of formal employment for Maricá's over the entire pre-treatment period.

Figure 7 – Date Placebos

(a) Time Placebo Path (2012)　　　　(b) Time Placebo Path (2011)

(c) Time Placebo Gap (2012)　　　　(d) Time Placebo Gap (2011)

5.2.2 Generalized Synthetic Control Results

The change in formal employment level is consistent with the Solidarity Economy cash transfers implementation, but it is unclear whether the cash transfer was the cause of the increase. Instead, it could also be that there were mechanisms other than cash transfers that happened to coincide with its implementation (unit specific time-variant variables). We take into account the possible local government shocks caused by raising public employees wages and increasing capital expenditures. To do so, we use the generalized synthetic control framework that allow us to include time fixed effects, unit fixed effects and control for covariates.

The generalized synthetic control (GSC) method unifies the synthetic control

method with linear fixed effects models under a simple framework. It first estimates an IFE model using only the control group data, obtaining a fixed number of latent factors. It then estimates factor loadings for each treated unit by linearly projecting pretreatment treated outcomes onto the space spanned by these factors. Finally, it imputes treated counterfactuals based on the estimated factors and factor loadings.

Table 6 – Models Results

	Dependent variable: Private Formal Employment			
	SC	GSC		
	(1)	(2)	(3)	(4)
ATT.avg	3209.109**	3364.394***	2526.979***	2306.994***
		(385.833)	(448.815)	(599.365)
Public Mean Wage			0.318	0.289
			(0.249)	(0.242)
Capital Expenditure			0.114	
			(0.229)	
Transfer Revenue			0.108	
			(0.184)	
Total Expenditures				0.2418*
				(0.141)
Unobserved Factors	N/A	2	2	2
Municipality FE	N/A	Yes	Yes	Yes
Year FE	N/A	Yes	Yes	Yes

Note: The table displays the ATT estimates on the Private Formal Employment. In column (1) the synthetic control model ATT is presented. In columns (2), (3) and (4) estimates for the generalized synthetic control method are presented. Covariates coefficient indicates correlation with the dependent variable. Strandard errors are reported in parenthesis. *p<0.1; **p<0.05; ***p<0.01
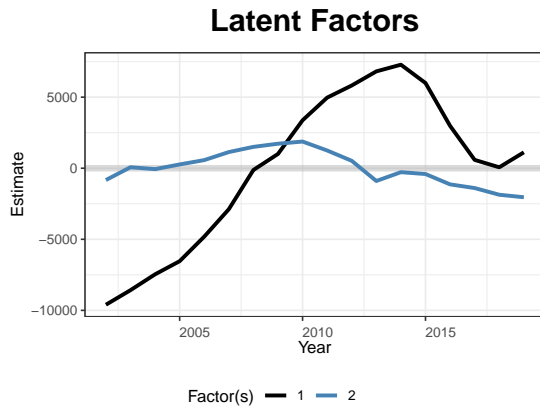
Table 6 columns (2), (3) and (4) summarizes the results. All specifications impose additive municipality and year fixed effects. In column (2), no covariates are included, while in column (3), public sector average wage, capital expenditures and

Figure 8 – Generalized Synthetic Control Estimates - Model (3)
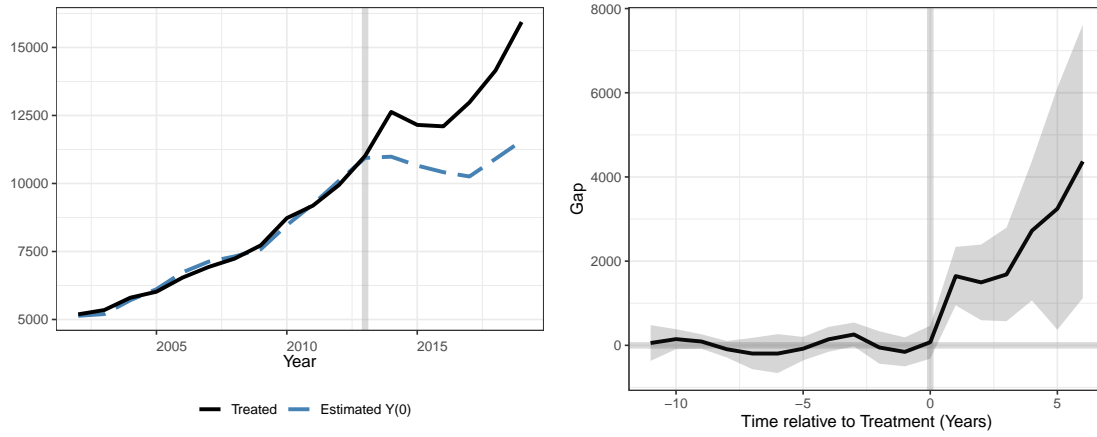
(a) Path

(b) Gap

(c) Factors

	ATT	S.E.	p.value
2014	$1,645.048$	359.496	0
2015	$1,495.553$	556.027	0
2016	$1,684.184$	759.769	0
2017	$2,723.669$	$1,198.553$	0.011
2018	$3,245.733$	$2,088.368$	0.045
2019	$4,367.690$	$2,375.787$	0.034

(d) Effect by Year

revenue from transfers are controlled for. In column (4), public sector average wage and all kinds of municipality expenditures are controlled for. The cross-validation scheme finds two unobserved factors to be important and after conditioning on the factors and additive fixed effects, the estimated ATT based on the GSC method is around 3364 for the first specification, 2527 and 2307 after the covariates addition. The bootstrap based standard errors for the treatment effect, averaging over post-treatment periods, is 386 and 449, resulting in less than 0.01 p-values for both specifications.

This means that Solidarity Economy cash transfers policies are associated with a statistically significant increase in formal employment. The figure 8 and

Figure 9 – Generalized Synthetic Control Estimates - Model (4)

(a) Path

(b) Gap

(c) Factors

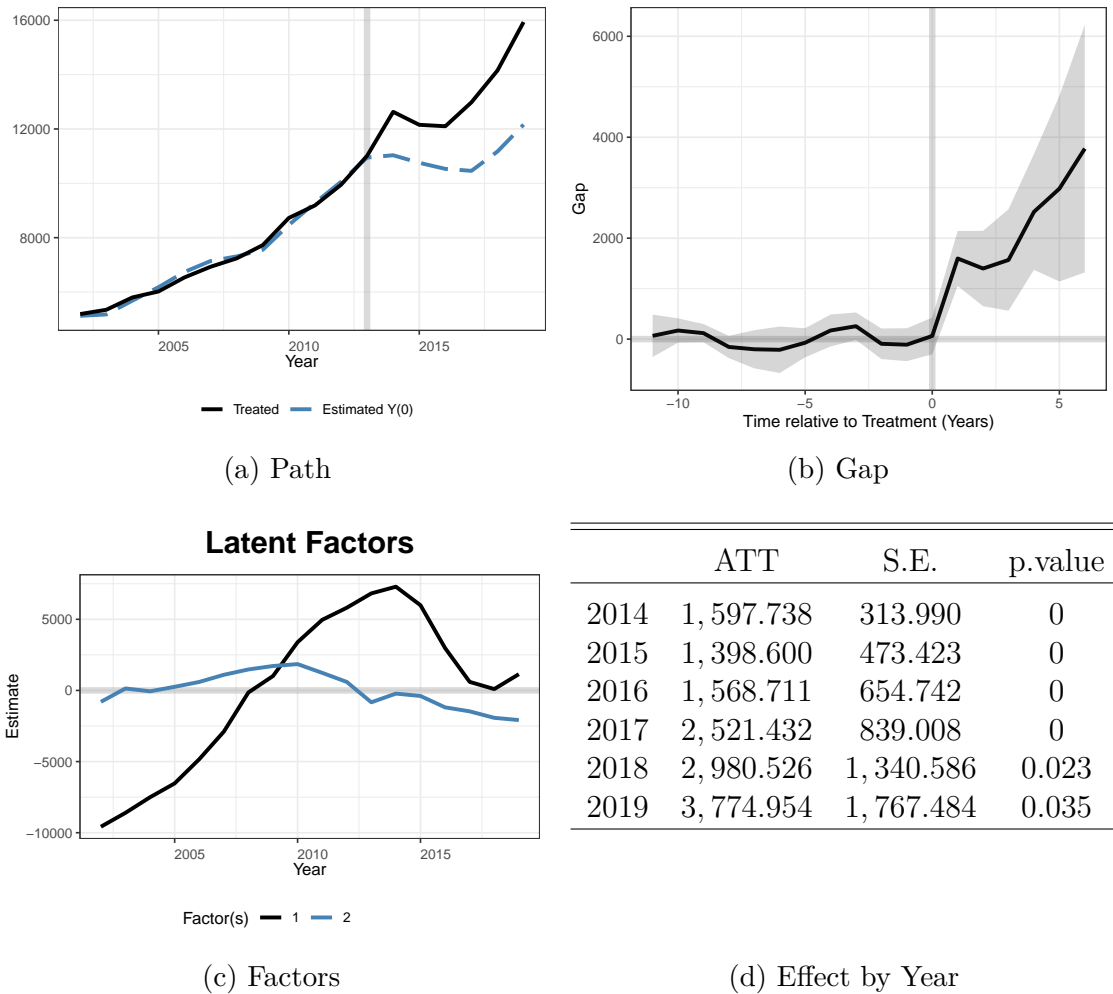|	ATT	S.E.	p.value
2014	$1,597.738$	313.990	0
2015	$1,398.600$	473.423	0
2016	$1,568.711$	654.742	0
2017	$2,521.432$	839.008	0
2018	$2,980.526$	$1,340.586$	0.023
2019	$3,774.954$	$1,767.484$	0.035

(d) Effect by Year

figure 9 show the dynamics of the estimated ATT for models (3) and (4).

Again, in the figures, averages are taken after the actual and predicted formal employment are realigned to the timing of the policy. With the GSC method, the average actual formal employment and average predicted formal employment match well in pretreatment periods and diverge after the policies took effect. The figures show that the gaps between the two lines are virtually flat in pretreatment periods, and the effect takes off right after the adoption of Solidarity Economy cash transfers.

Figures 8c and 9c presents the estimated factors produced by the GSC method. The x-axis is the year and they -axis is the magnitude of factors (rescaled by the square root of their corresponding eigenvalues to demonstrate their relative

importance)

6 Discussion

This chapter provides a discussion of the main findings in the context of the literature on cash transfers, fiscal incentives and income shocks. It also discusses what implications might be useful for legislators and policymakers. The chapter concludes with an analysis of the limitations of the study, areas for future research, and a brief summary.

6.1 Interpretation of Results

The objective of this study was to determine the impact of the implementation of cash transfers and the Solidarity Economy policy in Maricá on formal employment. The results suggest that after the introduction of cash transfers programs in the context of the Solidarity Economy in 2013, formal employment got significantly higher than what the synthetic control predicted for all models observed. The synthetic control represents what Marciá's formal employment would look like in the absence of the cash transfers and Solidarity Economy programs.

The traditional synthetic control method suggests an average of 3209 jobs by year beyond expected. This result is robust when compared to placebo interventions in other municipalities and to placebo interventions in previous periods, implying that this result is not observed in any other municipality and in any other period.

The generalized synthetic control method was used to control for time-variant Maricá specific covariates that could affect formal employment. First, through the same mechanism as cash transfers, City Hall could influence consumption by increasing wages in public administration. Second, the City Hall could increase its spending on public works so that the construction sector could employ more people. Due to regulations for sharing oil royalties, Maricá receives a disproportionately higher amount of intergovernmental transfers than other municipalities in the

sample that could explain it labor market performance. In fact, the wages of public employees and the capital expenditures of the municipality increased, which required controlling for these variables. We also controlled for the total local government expenditure, since all kinds of money spending could have a multiplier effect in some manner. Using the GSC method without covariates, the ATT was 3364 formal jobs per year, consistent with the traditional synthetic control estimative. Controlling for the effect of these covariates on formal employment, we estimate an average ATT of 2527 formal jobs per year and 2307 formal jobs per year when all expenditures are considered. Although only Total expenditures is statistically significant, all the covariates have a relevant size effect on formal employment.

The hypothesis of positive effects of cash transfers on formal labor markets seems to hold in the Maricá's Solidarity Economy context. The effect would have happened through a consumption response that leads to an outward shift in labor demand, offsetting possible negative effects on beneficiaries' labor supply. Regarding this mechanism, sectors related to consumption of necessity goods should have grown more, as would be expected in the face of an income shock to low-income families. Egger et al. (2019) documents large direct effects on households that received transfers, including increases in consumption expenditures and ownership of durable assets. Table 1 shows that, after Public administration, Retail and Trade sector is the largest sector in terms of employment and exhibits a growth path consistent with the cash transfers policies implementations.

The data also shows construction as was one of the main drivers sector of private formal employment increase, but its employment raise happens only after 2018 and our evidence show significant effects since 2014, suggesting that other sectors might have an important role. The construction sector employment outcome might be due to public spending, but could also be a result of private investments. IBAM (2020) show, in a technical diagnosis ordered by Maricá's local government, concerns over the most recent movement of condominiums construction in the city, between 2017 and 2020, 3,599 new building units were registered (IBAM, 2020). Additional results implementing the GSC without covariates for each CNAE sector

can be found at Figures 10 and 11 in the appendix.

The results are consistent with Angelucci e Giorgi (2009) on how a positive income shock to one group of households can benefit the entire village, which is consistent with what we know about informal credit and insurance markets in developing countries. This is also consistent with Gerard, Naritomi e Silva (2021), which found that an expansion of Bolsa Familia in Brazil, one of the largest cash transfer programs in the world, led to an increase in formal employment in places where transfers increased the most after the 2009 reform. This occurred despite the fact that the program could reduce formal labor supply among beneficiaries.

Results diverge in parts from Jones e Marinescu (2018) findings that the Alaska cash transfer had no effect on employment, and increased part-time work by 1.8 percentage points. Egger et al. (2019) do not observe meaningful changes in total labor supply among recipient households in response to cash transfers in rural Kenya. One plausible possibility for our results is that the labor market in Brazil was slack for the period (SICSU, 2019). Buchheim, Watzinger e Wilhelm (2020) found investments programs in Germany created significantly more jobs in slack labor markets characterized by high unemployment than in tight labor markets with low unemployment.

In this sense, Auerbach, Gorodnichenko e Murphy (2019) estimated local fiscal multipliers and spillovers and the evidence points to the relevance of Keynesian-type models that feature excess capacity, either at the firm level or the level of individual workers. Their focus on spillovers adds to a body of evidence that finds positive effects of fiscal stimulus on local labor markets.

6.2 Potential Limitations

As there were several concomitant policies in Maricá, it is difficult to identify the effect of just one of them. This study identifies the effect of a set of policies, whose main one is the citizenship basic income program.

The implemented cash transfers were improved several times in a short period of time until they reached the current format, so the time to evaluate the results of the measures is short, not to mention the structural breaks caused by the pandemic. Therefore, further research is needed to assess the long-term impact of the implemented measures.

While our estimates are based on a high-quality administrative dataset that covers almost all formal employment contracts of registered firms, they do not capture the informal economy. Given the importance of the informal economy in several emerging economies and the possibility that public spending affects the size and growth of the unregistered economy, our study exhibits a limitation.

Synthetic controls offer many practical advantages for estimating the effects of policy interventions and other events of interest. However, as with any other statistical procedure, the credibility of the results depends on how carefully the method is applied and whether the context and data requirements are met in the empirical application at hand.

6.3   Implications

The findings of this paper have broader implications for our understanding of social policies in developing countries. Our findings have implications for policies that aim at creating formal jobs in developing countries.

In terms of external validity, Maricá is an ordinary medium-sized municipality in Brazil, despite the oil royalties that have enriched the city's budget. The results represent the effect of a large fiscal incentive through cash transfers in an average municipality. Moreover, the measures implemented are not an experiment, but are in full swing. These results could be replicable for municipalities with a similar investment capacity to that of Maricá.

Further research on the effects of cash transfers in local complementary currencies should be conducted to analyze which factors enhance or are detrimental

to the effectiveness of such public policy instruments. One question is the extent to which targeting certain types of households and the distribution of propensity to spend across households affect the results: for example, the spillover effects might be more muted if the program had also targeted some better-off households that have a lower marginal propensity to spend on local goods than the poor households we study. Another question is how the results would be different when analyzing women or black population only. Finally, collect and study detailed data on the informal sector would be an interesting further step on the research agenda to measure the impact of cash transfer policies on the local economy.

7 Conclusion

Using synthetic control as method, this study aimed to assess the impact of cash transfers policies implemented by the city of Maricá in the state of Rio de Janeiro on local formal employment. Thus, a positive effect of these policies on the number of workers formally employed in the city was observed, so that at the end of 2019, Maricá had significantly more formal jobs than it would have in the absence of the Solidarity Economy cash tranfers programs. Concerns that cash transfer programs like the one we study could have adverse labor market consequences were not borne out in our setting. However, further empirical investigation is needed to quantify the longer run impacts of cash transfers on local economy.

In summary, the analysis of our study provides results that should be evaluated in the specific context of the experience of the solidarity economy. There are also data and methodological improvements that should be addressed in further research. Nonetheless, the results of the solidarity economy case study in Maricá represent an important contribution, as they demonstrate the potential of new mechanisms for public policies to promote the local economy. The study shows that paying cash support in a complementary currency can lead to a significant increase in formal employment.

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Appendix

APPENDIX A – Additional Results

Table 7 – Synthetic Control Unit Weights

Unit Code	Unit Names	SC Weights
3300100	Angra dos Reis	0
3300209	Araruama	0
3300233	Armação dos Búzios	0.18
3300258	Arraial do Cabo	0
3300308	Barra do Piraí	0
3300407	Barra Mansa	0
3300456	Belford Roxo	0.14
3300605	Bom Jesus do Itabapoana	0
3300704	Cabo Frio	0
3300803	Cachoeiras de Macacu	0
3301009	Campos dos Goytacazes	0
3301306	Casimiro de Abreu	0.27
3301702	Duque de Caxias	0
3301850	Guapimirim	0
3301900	Itaboraí	0
3302007	Itaguaí	0
3302205	Itaperuna	0
3302254	Itatiaia	0
3302270	Japeri	0
3302403	Macaé	0
3302502	Magé	0.07
3302601	Mangaratiba	0
3302858	Nilópolis	0
3303203	Niterói	0

|		
3303302	Nova Friburgo	0
3303401	Nova Iguaçu	0
3303500	Paracambi	0
3303609	Paraíba do Sul	0
3303708	Paraty	0
3303807	Petrópolis	0
3303906	Queimados	0
3304144	Resende	0
3304201	Rio Bonito	0
3304300	Rio das Ostras	0
3304524	Santo Antônio de Pádua	0.04
3304706	São Francisco de Itabapoana	0.29
3304755	São Fidélis	0
3304805	São Gonçalo	0
3304904	São João da Barra	0
3305000	São João de Meriti	0
3305109	São Pedro da Aldeia	0
3305208	Saquarema	0
3305505	Seropédica	0
3305554	Tanguá	0
3305752	Teresópolis	0
3305802	Três Rios	0
3306008	Valença	0
3306107	Vassouras	0
3306206	Volta Redonda	0
3306305	Mesquita	0

Figure 10 – GSC path estimates by CNAE sector (no covariates)
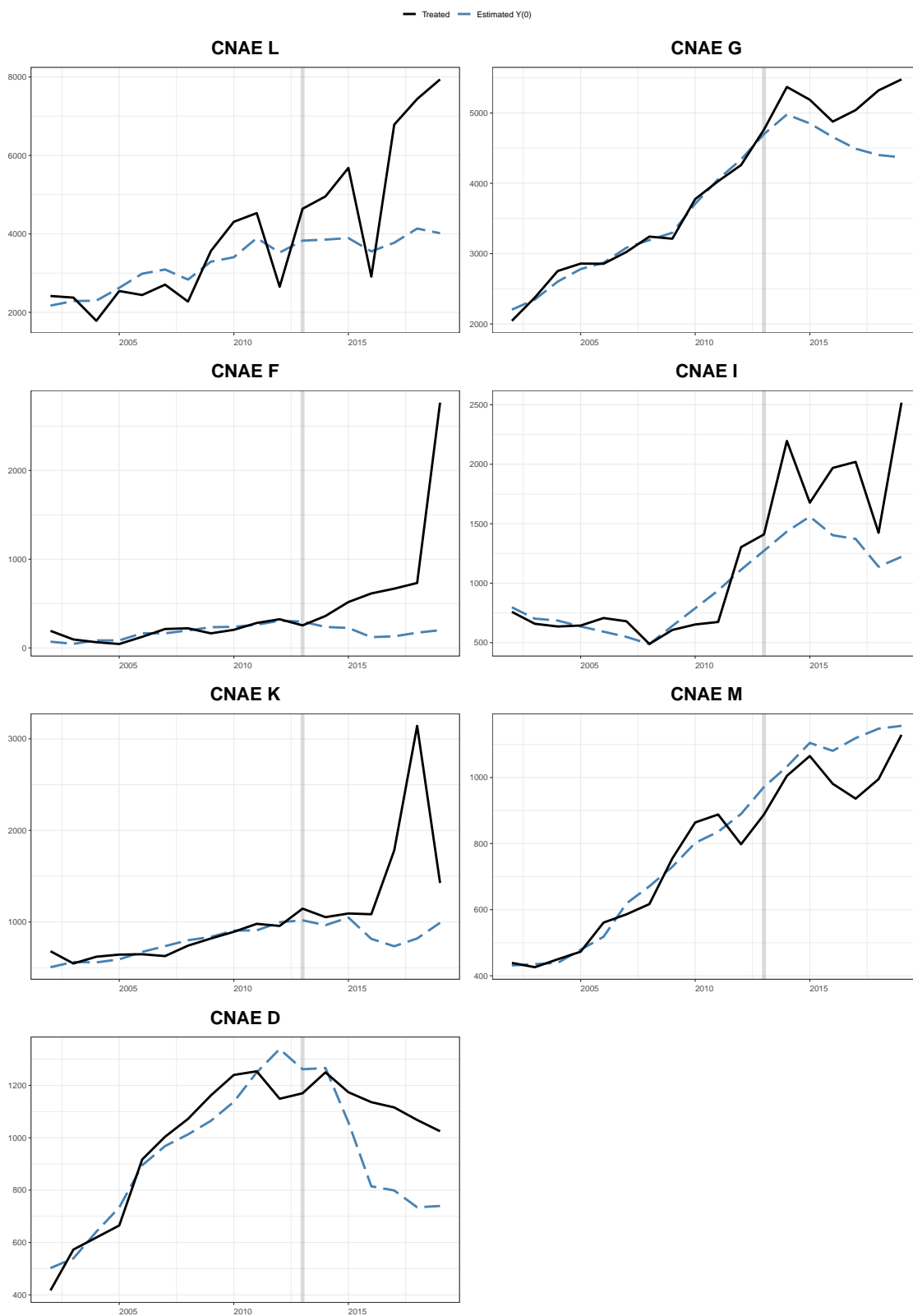
Figure 11 – GSC gap estimates by CNAE sector (no covariates)