Pontifícia Universidade Católica
do Rio de Janeiro

Lia Lorena Kale Ribeiro Braga

Electoral Impacts of Improving Primary Health Care

Dissertação de Mestrado

Dissertation presented to the Programa de Pós–graduação em Economia da PUC-Rio in partial fulfillment of the requirements for the degree of Mestre em Economia .

Advisor: Prof. Claudio Ferraz

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Abstract

Lorena Kale Ribeiro Braga, Lia; Ferraz, Claudio (Advisor). **Electoral Impacts of Improving Primary Health Care**. Rio de Janeiro, 2020. 64p. Dissertação de mestrado – Departamento de Economia , Pontifícia Universidade Católica do Rio de Janeiro.

In this study, we investigate whether the expansion of healthcare investments in Brazil, implemented through the Family Health Program (FHP), increased incumbent voting in local elections. We employ a regression discontinuity design by exploring discontinuities in funding that created a quasi-experimental assignment of FHP resources to municipalities. Using administrative data from various sources, we obtain information on program implementation, health outcomes, local-level facilities, and indicators of access, covering several aspects of the Brazilian health system to understand the evolution of underlying health conditions throughout this period. We provide evidence that FHP investments had significant effects on electoral support. Results show that for a 50% increment in FHP annual transfers, the incumbent's vote share increases by roughly 9 pp. We also show that possible mechanisms for these electoral effects were better access to primary care and consequent improved outcomes at birth. Overall, this paper contributes to a better understanding of the substantial changes the Brazilian health system has undergone and its potential electoral effects, opening many possibilities for future research.

Keywords

Political Economy; Elections; Public Service delivery; Health;

Resumo

Lorena Kale Ribeiro Braga, Lia; Ferraz, Claudio. **Impactos Eleitorais de Melhorias em Atenção Primária à Saúde**. Rio de Janeiro, 2020. 64p. Dissertação de Mestrado – Departamento de Economia , Pontifícia Universidade Católica do Rio de Janeiro.

Neste artigo, investigamos se a expansão dos investimentos em atenção primária, por meio do Programa Saúde da Família, aumentou o apoio ao prefeito incumbente nas eleições de 2008. A partir de uma descontinuidade no financiamento do programa, pudemos explorar uma variação exógena nos repasses federais e aplicar uma regressão descontínua (RDD). Usando dados administrativos de diversas fontes, obtivemos informação a respeito da implementação do programa, unidades de saúde locais e indicadores de acesso, cobrindo variados aspectos do sistema de saúde brasileiro. Resultados indicam que o programa teve impactos significativos no apoio ao incumbente. Apresentamos, ainda, evidências de que possíveis mecanismos para esse efeito foram avanços no acesso à atendimento ambulatorial e melhoras nos fatores de risco para a mortalidade infantil. Ao todo, este artigo contribui para um melhor entendimento das substanciais mudanças pelas quais o sistema de saúde brasileiro passou e seus potenciais impactos eleitorais, abrindo inúmeras possibilidades para pesquisa futura.

Palavras-chave

Economia política; Eleições; Serviços Públicos; Saúde;

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"Reality is that which, when you stop believing in it, doesn't go away."

Philip K. Dick, *I Hope I Shall Arrive Soon.*

List of Abreviations

DAB – *Departamento de Atenção Básica*
IBGE – *Instituto Brasileiro de Geografia e Estatística*
SIM – *Sistema de Informação de Mortalidade*
SINASC – *Sistema de Informação de Nascidos Vivos*
SINAN – *Sistema de Informação de Agravos de Notificação*
SIH-SUS – *Sistema de Informação Hospitalar*
SIA-SUS – *Sistema de Informação Ambulatorial*
SIAB – *Sistema de Informação da Atenção Básica*
SUS – *Sistema Único de Saúde*
TSE – *Tribunal Superior Eleitoral*
SIM – *Sistema de Informação de Mortalidade*

1

Introduction

Health care has typically ranked as a top issue for voters in Brazil, ahead of public security, education, and corruption (Gelape, 2018). It should, therefore, come as no surprise that improving access to public health services potentially increases the electoral prospects of incumbents. There is a growing empirical literature in political economy that attempts to measure voters' responsiveness to government policies. Much work suggests that government spending on welfare programs, infrastructure, and public services helps the incumbent party affect preferences and mobilize its supporters (Zucco, 2011; Firpo et al., 2012; De La O, 2013; Voigtländer and Voth, 2014).

Despite this evidence, little is known about the electoral consequences of healthcare policy. Recent works focus mainly on the effects of local health interventions. Croke (2017) examines this question in Tanzania, which has recently implemented health programs targeting malaria. Results show that bed net distribution leads to large, statistically significant improvements in the approval levels of political leaders, especially in malaria-endemic areas. Fried and Venkataramani (2017) provide evidence suggesting that *Programa Agua Limpia* (PAL), a clean water program, produced substantial electoral returns. Using instrumental variables models, they find that a standard deviation shift in the lives saved by PAL was associated with a 2.4% increase in support for Mexico's long-ruling party (*Partido Revolucionario Institucional*, PRI) in subsequent local elections. The question remains as to whether larger-scale health policies lead to increased electoral support.

Brazil's experience over the past decades offers a particularly appealing context for exploring these questions. In 1988, when the new constitution was enacted, half of Brazil's population had no health coverage (Jurberg and Humphreys, 2010). Since then, the country has undergone substantial changes building the Unified Health System (Sistema Único de Saúde, SUS) and now is considered to be one of the most successful cases of health care system reform in developing countries (Harris, 2014).

Public policies in healthcare aimed to overcome the flaws of the former system, such as insufficient coverage in some regions of the country and limited network of primary care centers. One of the most renowned strategies that has been implemented to meet this challenge is the Brazilian Family Health Program (*Programa Saúde da Família*), a nationally scaled model of basic care services within poor communities. FHP was a milestone in the shift from a centralized model structured around public hospitals in main urban areas to a decentralized one, where the first point of contact between population and the public health system was placed in local communities (Rocha and Soares, 2010). Besides providing medical care for previously uncovered families, the program helped to lessen the pressure on public hospitals, which would then focus resources to address complex medical conditions.

In this paper, we study the impact of FHP transfers on electoral support. More specifically, exploring a discontinuous rule for program funding in 2004, we investigate if voters in municipalities that received more investment tend to reward incumbents in mayoral elections in 2008. To achieve this objective, we use administrative records from the Brazilian Ministry of Health's System of Information (DataSUS) and several sources to obtain information on program implementation, health outcomes, local-level facilities, and indicators of access. This dataset covers various aspects of the Brazilian health system, including outpatient care, mortality and birth records from DataSUS, with individual-level data since the mid-1990s. Our main source of election data is the Tribunal Superior Eleitoral (TSE), which provides us with vote totals for each candidate by municipality, besides candidate's characteristics such as education, gender, occupation, and party affiliation.

We provide evidence that FHP transfers had significant effects on electoral support. Results show that for a 50% increment in FHP annual transfers, the incumbent's vote share increases by roughly 9 pp. We also show that possible mechanisms for these electoral effects were better access to primary care and consequent improved outcomes at birth. The theory reconciles these empirical findings by showing that primary health investments increase incumbents' ability to raise support. Naturally, the magnitude of effects has to be treated carefully when applied to a more general context, as it may well depend on institutional features specific to the Brazilian case. Nonetheless, these results have significant policy implications and shed light on the incentives for national politicians to implement similar healthcare programs.

The paper proceeds as follows. We review the related literature in Section 2, and then explain the historical background and context of the Family Health

Program in Section 3. Section 4 describes the data. In Section 5, we discuss our empirical strategy. Section 6 presents the results, and Section 7 concludes.

2

Literature Review

The debate over how government policies and voters' choices interact plays an essential role in political economy literature. Conventional understandings of democratic responsiveness and rational choice interpretations of retrospective voting have typically been explored by many scholars to explain voting behavior (Kramer, 1971; Fair, 1978; Fiorina, 1981).

A commonly believed idea regarding voting choices is that aggregate economic conditions in the year of the election have strong predictive power for incumbents' reelection success. Since the seminal contribution of Kramer (1971), the study of voters' responses to macroeconomic conditions has produced extensive literature. Nevertheless, empirical evidence on the matter remains somewhat mixed and inconclusive. One explanation for the difficulty of confirming the expected relationship is that major econometric concerns arise as the existing studies depend mainly on aggregate data with few observations. Moreover, it is particularly difficult to find exogenous sources of policy variation.

Kramer (1971) provides the first attempt to actually quantify the impact of economic conditions on voting decision. The author presented a multivariate analysis of congressional elections, suggesting that fluctuations in the rate of unemployment have no appreciable effect upon elections, but that fluctuations in per capita real income are influential. In his criticism of Kramer's seminal article, Stigler (1973) showed that Kramer's results were sensitive to the particular definition of variables and sample period chosen. He argues that fluctuations in real income do not have important electoral effects and proposes an argument based upon rational voter behavior for the unimportance of general economic conditions in national elections.

Following studies shed light on the debate, but did not provide definitive answers. Contrary to Stigler, Tufte (1980) finds a clear impact of economic conditions on congressional voting. Further, he found that transfer payments to individuals provide a weapon for politicians seeking reelection. Using instrumental variables, Levitt and Snyder Jr (1997) find strong evidence that non-transfer federal spending benefits congressional incumbents. The authors argue that previous studies were contaminated by the fact that incumbents who expect to have difficulty being re-elected are likely to exert greater effort in obtaining federal outlays. As this variable is usually omitted from the specification, a downward bias is introduced in the estimations. The idea that voters reward politicians for additional spending or employment has found support among many scholars (Akhmedov and Zhuravskaya, 2004; Sakurai and Menezes-Filho, 2008; Litschig and Morrison, 2010). In contrast, some of the evidence is not supportive of voters' responsiveness to macroeconomic conditions (Feldman and Jondrow, 1984; Stein and Bickers, 1994). Peltzman (1992) found that the American voter is a fiscal conservative. Using state-level election returns for presidential, senatorial, and gubernatorial elections from 1950 to 1988, he found that voters penalize federal and state spending growth. His explanation for this phenomenon is that the tax system is progressive, and voters are wealthier than non-voters. Thus, well-informed self-interested voters could be expected, on balance, to oppose marginal expansion of government budgets. He argues that voters are well informed about fiscal data and use this information when casting their ballots.

Over the past decades, a growing literature has attempted to understand whether voters reward politicians considering their overall performance (Key et al., 1966; Kinder and Kiewiet, 1979; Fiorina, 1981; Popkin and Popkin, 1994), their spending or services provided to community (Mayhew, 1974; Levitt and Snyder Jr, 1997), or whether they are more likely to vote according to prior loyalties, social interactions, or partisan attachments (Campbell et al., 1980; Achen and Bartels, 2017). Most recent studies in developed countries are concerned with the effect of strategic allocation of goods and services on voting behavior. Although it seems natural that government programs targeted to a specific subset of the population raise support for the incumbent, the empirical evidence also remains mixed.

Most recent studies in developed countries are concerned with understanding clientelist distribution patterns and establishing whether political or ethnic favoritism affects the allocation of goods and services (Golden and Min, 2013). The response of voters to these strategies is a relatively small part of this literature. Yet they note that where this has been successfully analyzed, "studies overwhelmingly find that incumbent politicians are rewarded by voters for distributive allocations, and in particular for those that are clientelistic and from which recipients can be excluded."

Cerda and Vergara (2008) investigates the effect of government subsidies on voters' decisions in presidential elections in Chile during the period 1989–99. Results indicate that government subsidies have a positive effect on the votes obtained by the incumbent. Exploring a discontinuous rule for program assignment, Manacorda et al. (2011) finds that beneficiaries of large anti-poverty cash transfer program, the Uruguayan *PANES*, were significantly more likely to support the current government than non-beneficiaries. For the Brazilian conditional cash transfer (CCT) program, *Bolsa Família*, Zucco (2011) reports that program enrolment increases the probability of voting for the incumbent by 30 and 43% among the two lowest brackets of income, respectively. De La O (2013) provides evidence from *Oportunidades*, the Mexican CCT, showing that early enrolment in the program led to substantive increases in voter turnout and the incumbent's vote share in the 2000 presidential election. For the Honduran CCT, *PRAF*, Linos (2013) verifies that the program increased an incumbent mayor's reelection probabilities by 39%, without significantly influencing voting behavior in presidential elections. Moving away from cash transfers to infrastructure spending, Voigtländer and Voth (2014) reports the effects of the construction of the Autobahn in Nazi Germany on electoral outcomes. The results suggest that the construction of the world's first high-speed road reduced electoral opposition to the Nazis: where the Autobahn was being built by the time of the 1934 plebiscite, electoral support for the dictatorship increased significantly.

In contrast, Levitt and Snyder Jr (1997) document a positive effect of non-transfer federal spending on the incumbent's vote share in the United States, but surprisingly expenditures such as social security, Medicare, low-income housing payments, and veterans' retirement benefits produce no electoral returns. Imai et al. (2018) finds that neither *Seguro Popular de Salud* (SPS) nor *Oportunidades* has a causal effect on voter turnout or electoral support for the incumbent party in Mexico, as opposed to De La O (2013). Even in within-country analysis, targeted programs seem to deliver inconsistent electoral payoffs. In Argentina, a program that granted benefits to the unemployed improved the electoral performance of the peronismo, but not that of the radicalismo (Nazareno et al., 2006). Blattman et al. (2018) find that a Ugandan government program to provide start-up capital led to higher support for the opposition party. Rather than rewarding the government in elections, beneficiaries increased opposition party membership, campaigning, and voting. Higher incomes are associated with opposition support, and the authors hypothesize that financial independence frees the poor to express political preferences publicly, being less reliant on patronage and other political transfers.

Two major empirical concerns of the existing literature are omitted variables and reverse causality. In this sense, if incumbents intentionally allocate resources to areas where they are electorally weak (or strong), then estimates of electoral returns are biased downward (or upward). The idea that parties are making strategical decisions about exactly which groups will respond most to transfers has been analysed by several authors. Some pre-electoral competition models (Cox and McCubbins, 1986; Lindbeck and Weibull, 1987; Robinson and Verdier, 2013) predict that targeting political "core supporters" optimizes electoral prospects. There are also many empirical studies supporting the view that material benefits are strategically directed toward "swing voters", including Wright (1974), Bickers and Stein (1996), Denemark (2000), Dahlberg and Johansson (2002) and Stokes (2005). A typical belief underlying the swing voter logic is Stokes's (2005: 317): "voters who are predisposed in favor of [a party] on partisan or programmatic grounds [– that is, its core voters –] cannot credibly threaten to punish their favored party if it withholds [distributive] rewards. Therefore the party should not waste rewards on them." In any case, beyond the core versus swing debate, a positive association between resource allocation and political support might not imply causality. Further, another concern arises if specific groups, such as the poor, are more likely to benefit from government spending choices and also have political preferences, in particular for left-wing parties that promote redistribution.

To overcome these challenges, many studies explored sources of exogenous variation from random assignments or quasi-experimental environments. Manacorda et al. (2011) explore the quasi-random assignment of applicants to the Uruguayan CCT based on a sharp discontinuity in a predicted income score to identify the effect of receiving transfers on support for the incumbent government. De La O (2013) takes advantage of the fact that the Mexican CCT randomized impact evaluation offers exogenous variation in the duration of exposure to program benefits. The results show that assignment to early program enrolment led to a 7% increase in voter turnout and a 9% increase in incumbent vote share in the 2000 presidential election. Also, exposure to program benefits had no influence on support for opposition parties, providing evidence to Oportunidade's pro-incumbent mobilizing effects.

Far less is known about the electoral effects of healthcare provision. Recent works focus mainly on the effects of local health interventions. Fried and Venkataramani (2017) provide evidence suggesting that *Programa Agua Limpia* (PAL), a clean water program, produced substantial electoral returns. Using instrumental variables models, they find that a standard deviation shift in the lives saved by PAL was associated with a 2.4% increase in support for Mexico's long-ruling party (*Partido Revolucionario Institucional*, PRI) in subsequent local elections. Croke (2017) investigates this question in Tanzania, which has recently implemented health programs targeting malaria. Results show that bed net distribution results in large, statistically significant improvements in the approval levels of political leaders, especially in malaria endemic areas. Nevertheless, the author provides evidence suggesting a significant fading of the effect over time. Such dynamic effect may also help to explain variation in the results identified in the literature. If healthcare services are delivered far in advance of elections, their effects could wear off entirely and result in no particular return at election time.

By contrast, De Kadt and Lieberman (2017) show that improvements in key services with direct implications for public health (water provision, sanitation, refuse collection) actually reduced government support in South Africa between 2000-2011. The authors explore several mechanisms to clarify these surprising findings. First, expanding service delivery seems to increase electors' awareness of, and exposure to, corruption. In most developing democracies, there is a growing acceptance of corruption as a major political issue, which might offset the expected electoral returns. The authors also argue that increases in service delivery improve voter expectations. In this sense, shifts in voting behavior might occur once voters are provided with basic services. Citizens may revise their expectations of government provision upward, seeking out alternative parties. Therefore, voters might engage in what the authors call "nuanced accountability": despite taking service delivery into consideration, they can evaluate their experiences in more complex ways.

3

Institutional Background

Over the last 30 years, Brazil has seen impressive advances in health outcomes, far exceeding that required by the Millennium Development Goals. There has been a significant fall in mortality (particularly infant and child mortality, with infant mortality as low as 12,8 per 1,000) and a remarkable rise in life expectancy, which is now 76 years at birth. In 1991, infant mortality rate was 45,1 per 1000, and life expectancy 65 years (IBGE, 2018). There is a growing body of evidence demonstrating the critical role that massive expansion of primary health facilities played in this process (Macinko et al., 2006; Aquino et al., 2009; Gragnolati et al., 2013; Guanais, 2013).

The 1988 Federal Constitution was a landmark in Brazil's health system reform. For the first time in the country's history, the state was legally responsible for ensuring free and universal health care. In order to make it feasible, the Unified Health System (Sistema Único de Saúde, SUS) was implemented to provide universal care free at the point of delivery, decentralizing health provision to municipal governments.

Before the introduction of *SUS* in the 1990s, public health in Brazil relied on a corporative structure administered by the Ministry of Health and the social security system. There was reasonably good medical care for specific occupational categories through the retirement and pension institutes. The bulk of the population, however, had to continue to rely mainly on deficient public services and out-of-pocket payments for private healthcare services (Paim et al., 2011).

In 1994, the Family Health Program (FHP) was introduced as part of the government's policy for extending primary care access. Following pilot experiments in a few municipalities with community-based primary care, the health coverage was scaled up to cover more than 85 million people in 2006, being present in more than 90% of municipalities (Brazilian Ministry of Health, 2006a). At the same time, federal expenditure on the program increased over the years, from R$ 280 million in 1998 to R$ 2.7 billion in 2005 (Bhalotra et al., 2019). The expansion of the FHP is displayed in Figure A.1, and interrelated aggregate trends are depicted graphically in Figure A.2.

The program operates through family healthcare teams, each composed of one family doctor, one nurse, one assistant nurse, and four to six health community agents. Since 2004, some expanded teams also include one dentist, one assistant dentist, and one dental hygiene technician. Each team follows 600–1000 families from a given neighborhood or community, attending both in the primary health units [1] and in the households. FHP's teams operate as the first point of contact between families and the health system, running primary healthcare, health counseling, preventive and recovery services (Rocha and Soares, 2010; Paim et al., 2011; Bhalotra et al., 2019).

In line with the Brazilian Ministry of Health, we can summarize FHP's main characteristics as follows: i) to serve as an entry point into a hierarchical and regional system of health; ii) to have a definite territory and delimited population of responsibility of a specific health team, establishing liability (co-responsibility for the health care of a defined population; iii) to intervene in the critical risk factors at the community level; iv) to perform integral, permanent, and quality assistance; v) to promote education and health awareness activities; vi) to promote the organization of the community and to act as a link between different sectors of civil society, and vii) to use information systems to monitor decisions and health outcomes (DAB, 2000).

The program has shown to be a very effective model, improving medical conditions at low cost, primarily through prevention and early detection. As a result of recurrently monitoring the same families, FHP's professionals can promote better dietary and hygiene habits, detect early symptoms, and minimize the effect of endemic problems. Besides, with this community-level approach, most basic conditions can be treated within the context of the program itself, lessening the pressure on public hospitals. Bhalotra et al. (2019) document that the increase in outpatient care under the FHP reduced the caseload of hospitals, allowing hospitals to accommodate more of the procedures that require inpatient care.

In 2000, the yearly cost of maintaining one family health team was estimated to be of the order of R$215,000 to R$ 340,000, or between US$ 109,610 and US$ 173,400. Assuming that a health team covers approximately 3,500 individuals, these numbers would correspond to a yearly cost between US$ 31 and US$ 50 per person covered (FGV-EPOS, 2001).

[1] Operational basis of a FHP team in a specific geographical area

Regarding administrative and budgetary terms, the FHP is a federal program, which is implemented in a decentralized way by municipalities. Considering the institutional design of the program, implementation should demand coordination across municipality, state, and federal governments. Nevertheless, there seem to be instances of implementation without support or interference of state governments. In sum, FHP's implementation requires voluntary adhesion of local administrations, preferably with state support. Proper attributions of the different spheres of government are defined in the following way (Brazilian Ministry of Health (2006b), as translated by Rocha and Soares (2010)):

- Federal Government: elaborate the basic health goals of national policy; co-finance the system of "basic health attention;" organize the formation of human resources in the area; propose mechanisms to program, control, regulate and evaluate the system of "basic health attention;" maintain the national database;
- State Government: follow the implementation and execution of the Family Health Program; regulate the inter-municipal relations; coordinate policies of human resources qualification in the state; co-finance the program; help in the execution of the strategies of the system of basic health attention; and
- Municipality Government: define and implement the model of the Family Health Program; hire the labor for use in the program; maintain the management network of basic health units; co-finance the program; maintain the system of information; evaluate the performance of the basic health attention teams under its supervision.

In 2004, the government determined a new set of rules regarding FHP transfers to the municipal level. Municipalities with HDI below 0.70 and population under 30,000 started to receive an extra 50% funding per team. Until August 2004, FHP transfers were paid monthly as a fixed amount per team for all municipalities (around R$ 7,130 per team per month and 20000 in implementation incentives per team). After this new rule was set up, any qualifying municipality could elect to start receiving around R$ 10,695 per team per month. [2]

The list of municipalities eligible for the extra funding released in 2004 did not change even after the publication of new population estimates and a

[2] The population limit was set to 50,000 for states that form the legal Amazon. This region is therefore excluded from our sample.

new census in 2010. The HDI for eligibility was calculated based on the 2000 census, and the population was referenced using the 2003 estimates of the government's statistics department (IBGE). [3] By investigating frequency breaks around the cutoffs and applying the tests developed by McCrary (2008), we find no evidence of manipulation at eligibility cutoffs. Therefore, we have good theoretical and empirical reasons to believe that local political authorities could not have manipulated the eligibility for treatment.

There is a vast body of empirical evidence concerning the impact of the program on health outcomes. Macinko et al. (2006) document a statistically significant effect of the FHP on infant mortality, using state-level data (27 states). By surveying subjective perceptions, Macinko et al. (2007) report that the presence of the program in a given municipality is associated with better-perceived health on the part of the population. Rocha and Soares (2010) use municipality level data to conduct an extensive analysis of the effects of the FHP on mortality by age group, cause of death, region, and initial mortality level. The results show a robust correlation between the timing of program implementation and reductions in mortality throughout the age distribution, but particularly at very early ages (infant mortality). The response to the program is larger in municipalities with worse off initial conditions and in the poorest regions of Brazil (North and Northeast). In a similar empirical strategy, Bhalotra et al. (2019) further look specifically into the mechanisms through which the FHP impacted mortality outcomes, showing that the program improved access to both primary and hospital care (the latter, especially, for conditions less treatable with primary care).

Despite the number of existing studies on the health benefits associated with the implementation of the FHP, little is known about its electoral impacts. While it is conventional wisdom that the expansion of government welfare programs usually leaves room for incumbents to claim the credit for positive results and seek re-election, there is not empirical evidence on the magnitude of these effects. In this paper, we explore this discontinuous funding rule in order to estimate the electoral effects of FHP expansion. More specifically, we investigate if voters in municipalities that received more FHP investment tended to reward incumbents in mayoral elections in 2008. Under different assumptions that will be discussed detailed in Section 5, this funding discontinuity could allow us to identify the causal effects of the FHP as it generates a quasi-experimental assignment of FHP resources to municipalities.

[3] The original list is constant of the following decree: Portaria 1.434/GM, July 14, 2004.

4

Data

We use data from several different sources in order to estimate the electoral impact of the Family Health Program. The following sections describe our datasets and present some descriptive statistics.

4.1

Family Health Program Data

We obtain data related to the implementation of the FHP at the municipality level from the Brazilian Ministry of Health (Department of Basic Attention, MS/DAB). Updated monthly, it provides the number of FHP teams and the proportion of the population covered in each municipality, starting from 1996.

4.2

Health Data

Brazilian Ministry of Health (MS/Datasus) also provides data on health outcomes and access to health care. Data on infant and maternal mortality are available from the Brazilian National System of Mortality Records (Datasus/SIM). It provides information on every death officially registered in Brazil, including cause of death, date of birth, and municipality of residence. We also use in our analysis the National System of Information on Birth Records (Datasus/SINASC), which covers every registered birth in Brazil, containing information on number of births and relevant birth outcomes. The National System of Information on Ambulatory Care (Datasus/SIA) includes administrative information on ambulatory visits funded by SUS. All medical care provided on an outpatient basis, including diagnosis, observation, consultation, treatment, intervention, and rehabilitation services are included. We are also able to identify the type of health professional that delivered the service (physicians by specialization, nurses, or community health agents). The National System of Information on Hospitalizations (Datasus/SIH) contains administrative information at the hospitalization level, comprehending all hospital admissions funded by the Brazilian Unified Health System. Information on hospital infrastructure (number of hospital beds and the presence of a hospital in the municipality) is also obtained from the Ministry of Health (MS/Datasus).

4.3 Election Data

We employ electoral data from the Superior Electoral Court (TSE). These data contain vote totals for each candidate by municipality, their party affiliation, as well as various individual characteristics, such as the candidate's gender, education, and occupation. We use this information to construct measures of electoral performance, such as incumbent's vote share (as a percentage of valid votes).

We restrict the sample to the set of municipalities with fewer than 200,000 voters and whose first-term mayors were eligible for reelection in 2008. Municipalities with more than 200,000 voters are required by law to have run-off elections whenever there is no absolute majority winner in the first round election. As the possibility of mayoral run-off elections changes the political competition at the municipal level, affecting incumbents' behavior (Chamon et al., 2019), we restrict the analysis to the municipalities where the decision was made through a simple majority rule. Besides, of all 5565 municipalities, there are around only 50 municipalities with 200,000 or more voters in 2008. Under these criteria, the final sample comprises 1726 municipalities.

4.4 Other Sources

Finally, we employ other municipality data that are auxiliary to our analysis. The National Treasury database (FINBRA) provides data on basic health transfers to municipalities. Annual data on the municipality population, by age and gender, are obtained from the Brazilian Census Bureau (IBGE, after Instituto Brasileiro de Geografia e Estatística). All variables are collapsed at the municipality-by-year level, and merged with the other data containing FHP variables as well as electoral outcomes.

Table A.1 presents some descriptive statistics at the municipal level in 2004. Since then, there were improvements along many dimensions, though at different paces. Figure A.2 presents some aggregated trends for health indicators.

5

Empirical Strategy

Consider the following cross-sectional relationship between FHP transfers and electoral performance:

$$y_i = \beta_0 + \beta_1 log(T_i) + x_i'\lambda + \varepsilon_i$$

$$log(T_i) = \alpha + x_i'\delta + \nu_i$$

where y_i measures of the average incumbents' performance in municipality i (e.g. incumbent's vote share), T_i is the transfer of federal resources from the FHP, x_i is a vector of observed municipal characteristics, and ε_i and ν_i are unobserved determinants of electoral performance and FHP funds, respectively. Under the assumption that $E[\varepsilon_i \nu_i] = 0$, the least squares estimator of β_1 will be a consistent estimate of the causal effect of FHP transfers on incumbent's performance in local elections.

However, there are several potential omitted variables that covary with both FHP transfers and electoral performance. For instance, if FHP resources are intentionally allocated to electorally weak (or strong) areas, then estimates of electoral returns are biased downward (or upward). Another concern arises if specific areas, such as poor areas, are more likely to benefit from public spending choices and also have political preferences, in particular for left-wing parties that promote redistribution.

To overcome these empirical concerns, we exploit an exogenous variation in federal transfers to municipal governments from the Family Health Program in Brazil to identify how additional investment in primary healthcare impacts on electoral outcomes. As described in Section 3, funding changed discontinuously according to population and HDI thresholds. Here, a municipality m with population p_m, and HDI denoted by h_m, has the ATE defined over the frontier:

$$F = (p_m, h_m) : (p_m <= 30, h_m = 0.7) \cup (p_m = 30, h_m <= 0.7)$$

with respective treatment cutoffs for population and HDI at 30,000 and 0.7

We employ a fuzzy regression discontinuity design (RDD) in an effort to generate an assignment of FHP investment that is as good as random near the cutoffs, allowing causal inference of its effects. Intuitively, municipalities just below the threshold should be, on average, similar in all observed and unobserved characteristics to those just above it, so that any difference in outcomes between these two groups must be caused by variations in FHP transfers. We take advantage of this discontinuity to evaluate the effects of higher FHP transfers on political outcomes. In our setting, we examine whether voters in municipalities that were just above and just below the thresholds exhibit different electoral behaviours in mayoral elections in 2008.

In our RD setting, given that FHP funding across municipalities is a discontinuous function of both municipal population and HDI, quasi-random assignment of this variable could be achieved by employing MRDD. In the two-score case, the average treatment effect is identified for a frontier of points, in contrast to a single point in the one-score case. This changes the estimation and interpretation of the treatment effects within the RD framework, mainly due to potential heterogeneity of these effects along the frontier

Exploring the population-threshold is more appealing because the subsamples have a much higher number of observations (see Figure 5.1). Therefore, we employ a fuzzy RDD with one running variable in an effort to generate an assignment of FHP investment that is as good as random near the cutoffs, allowing causal inference of its effects

We estimate variations of the following instrumental variables regression:

$$y_i = \beta_0 + \beta_1 \hat{T}_i + f(P) + \theta_i + \varepsilon_i$$

$$T_i = \alpha_0 + \alpha_1 1\{P_i < \overline{P}_k\} + g(P) + \theta_i + \nu_i$$

where P_i is the population of municipality i in 2003, $1\{.\}$ is an indicator function that equals one if the municipality's population is below the population cutoff $\overline{P}_k$, θ is a vector of municipal controls. The functions $f(.)$ and $g(.)$ are flexible functions of population.

One potential pitfall of using discontinuity-based assignment is that local officials might strategically manipulate indicators to obtain desirable policies. Manipulative sorting could then introduce selection bias into estimates of causal effects and invalidate the comparability of municipalities near the threshold.

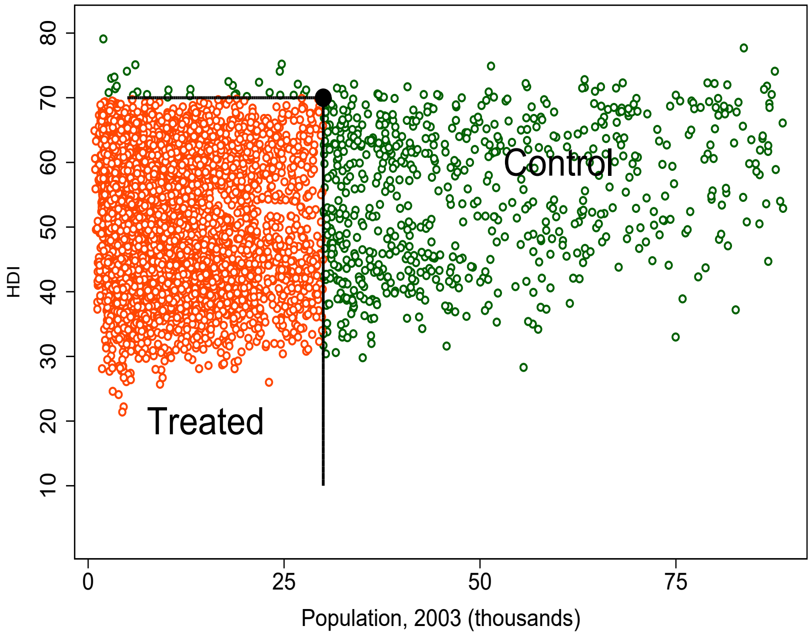
In section A.2, we present some robustness checks we used to validate our empirical strategy. There is no evidence of manipulation in the running variables or discontinuities in observable characteristics around the thresholds. By investigating frequency breaks around the cutoffs and applying the tests developed by McCrary (2008), we find no evidence of manipulation at eligibility cutoffs. As an initial assessment of how serious the issue of manipulative sorting might be, we plot the population histogram (Figure A.3), supporting that there is no significant jump in the distribution just below the threshold. Not surprisingly, the McCrary test does not indicate a frequency breaks around the cutoffs (Figure A.4).

All this is consistent with the fact that the list of municipalities eligible for the extra funding released in 2004 did not change even after the publication of new population estimates and a new census in 2010. The HDI for eligibility was calculated based on the 2000 census, and the population was referenced using the 2003 estimates of the government's statistics department (IBGE). [1] Therefore, we have good theoretical and empirical reasons to believe that local political authorities could not have manipulated the eligibility for treatment.

The potential sample includes all municipalities within the central 95% percentile in population and HDI. The treatment frontier is the black line. Orange dots represent municipalities eligible to treatment.

[1] The original list is constant of the following decree: Portaria 1.434/GM, July 14, 2004.

Figure 5.1: Potential Sample and Treatment Frontier



Source: Brazilian Ministry of Health, SAS/Dept de Atenção Básica – DAB.

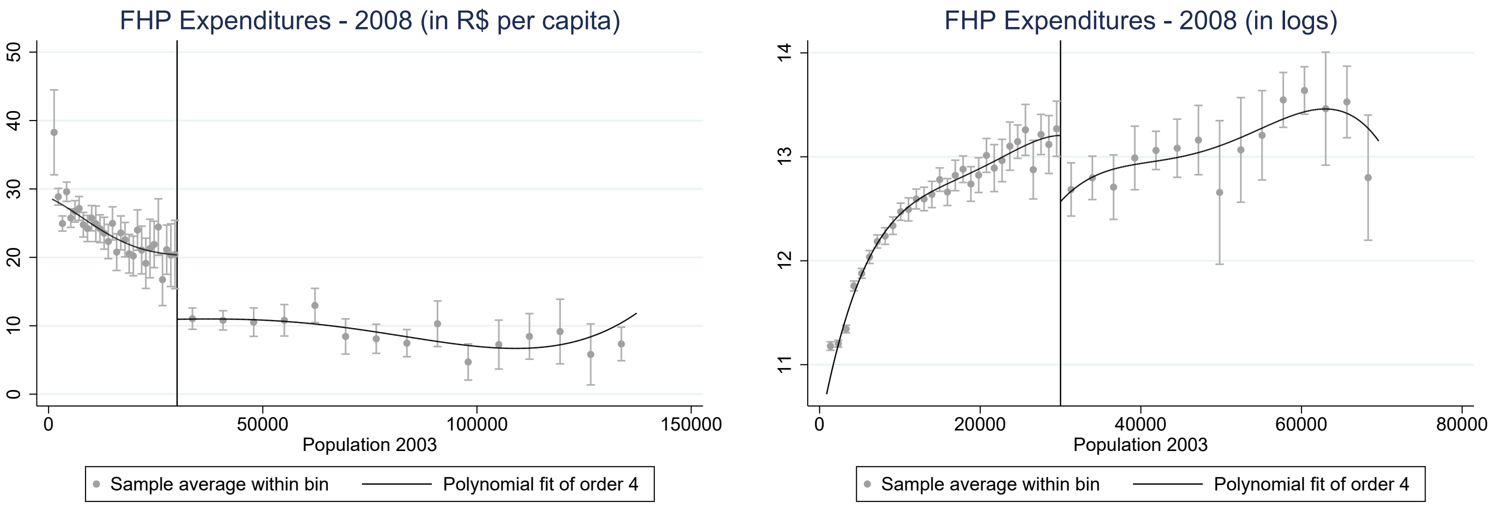
Note: The original source of data used to compute each variable is listed on Table A.1.

6
Results

Our empirical strategy explores the population eligibility criteria as a source of exogenous variation in FHP transfers to study its effects in an instrumental variables framework. The causal estimation of the political effects depends on the existence of a strong first-stage relationship. In Figure 6.1, we start with visual inspection to check if 2008's FHP transfers to municipalities were sensitive to the population threshold. Crossing the population threshold set up by these rules is highly and significantly predictive of federal FHP transfers to municipalities, as shown by the regression discontinuity estimates and standard errors depicted in each graph.

We confirm the latter fact by estimating the results of the first stage of our instrumental variable regressions in Table 6.1. On average, crossing the 2003-population threshold from right to left increases the amount of resources received by municipalities by roughly 70% in 2008. Considering that the average for control municipalities (the ones within a 7000-population interval above the 30000 population-threshold) would have annual FHP transfers of R$432,494.8, the treatment would trigger an increase of R$ 302,745.

Figure 6.1: Instrument Relevance: First Stage Results for FHP Funds



The vertical line represents the treatment frontier (additional FHP funding). The y-axis shows expenditures in health in 2008, per capita and in logs, respectively. The x-axis shows population threshold. The lines are fitted by local linear regression and the grey shades are the 95% confidence level.

Table 6.1: First Stage: Population in 2003 and FHP annual transfers in 2008

	(1)	(2)	(3)
FHP transfers in 2008	.68715	.73425	.70982
(s.e)	(.15233)***	(.19101)***	(.19683)***
Mean in the control group in 2008 (in R$): 432,494.8			
Bandwidth	[7217, 7217]	[11103, 7036]	[6507, 6507]
Bandwidth type	MSE-optimal (1)	MSE-optimal (2)	MSE-optimal (3)
Kernel	Epanechnikov	Epanechnikov	Epanechnikov
Obs	1594	1594	1594

Notes: (i) The table reports the first stage estimates. FHP Funds estimated are estimated in log(Variable) (ii) Vector of municipal controls includes PBF coverage, GDP per capita (log), % urban population, % households with sanitation, piped water and sewer (iii) Main specification, MSE-optimal bandwidth selector for the RD treatment effect estimator calculated by the method proposed by Calonico, Cattaneo, and Titiunik (2014) ; (iv); MSE-optimal (1): one common MSE-optimal bandwidth selector for the RD treatment effect estimator; MSE-optimal (2): two different MSE-optimal bandwidth selectors (below and above the cutoff) for the RD treatment effect estimator; MSE-optimal (3): one common MSE-optimal bandwidth selector for the sum of regression estimates (as opposed to difference thereof). (v) To help evaluate the magnitude of the effects, the dependent variable mean — the average for municipalities within a 7000-population interval above the 30000 population-threshold — is presented.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$; Robust Standard errors in parentheses

6.1

Political Outcomes

Table 6.2 presents the TSLS and reduced-form estimates for political outcomes. All estimations include municipal controls, such as PBF coverage, GDP per capita (log), urban population, and percentage of households with basic sanitation services, piped water, and sewer. We rely on the Calonico et al. (2014) algorithm for choosing optimal bandwidths, but also explore alternative choices of the bandwidth. To help evaluate the magnitude of the effects, we present the dependent variable mean (average for municipalities within a 7000-population interval above the 30000 population- threshold). From the IV regression in Table 6.2, for a 50% (70%) increase in FHP annual transfers, the incumbent's vote share increases by roughly 9 pp (13.5 pp).

The magnitude and significance of the coefficients remain stable across specifications, only increasing as the bandwidth becomes narrower. Therefore, the CCT's algorithm for choosing the MSE optimal bandwidth is likely more conservative, i.e., any potential bias coming from widening the bandwidth, although seemingly small, would work in favor of the results. These results are robust to the choice of kernel, bandwidth, and order of the polynomial function.

To place these estimates in perspective, it is useful to compare its magnitudes considering similar analyses for other strands of public service delivery. Dias and Ferraz (2019) estimate that the proportion of votes of the incumbent increases between 0.4 and 1.9 pp. (1-4%) with the release of information about school quality. A reason that might explain why voters respond more strongly to the health care investment than information about the quality of schools is that gains in primary care services are much more perceptible. Although the IDEB grade is an objective measure of school quality, it is not obvious that voters should understand it. In this sense, it is easier for voters to become aware of improvements in basic care delivery than school performance, harder to detect and less straightforward to interpret.

6.2

Mechanisms

In this section, we explore reasons that might explain why voters reward the incumbent mayor running for reelection in response to an increase in primary health funds. We investigate indicators of access to primary care and health outcomes, focusing most of the analysis on maternal and infant health, the priorities of the program. Unless otherwise noted, all estimations include municipal controls, such as PBF coverage, GDP per capita (log), urban population, and percentage of households with basic sanitation services, piped water, and sewer. We rely on the Calonico et al. (2014) algorithm for choosing optimal bandwidths, but also explore alternative choices of the bandwidth.

6.2.1

Access to health services

In this section, we explore reasons that might explain why voters reward the incumbent mayor running for reelection in response to an increase in primary health funds. We investigate indicators of access to primary care and health outcomes, focusing most of the analysis on maternal and infant health, the priorities of the program. Unless otherwise noted, all estimations include municipal controls, such as PBF coverage, GDP per capita (log), urban population, and percentage of households with basic sanitation services, piped water, and sewer. We rely on the Calonico et al. (2014) algorithm for choosing optimal bandwidths, but also explore alternative choices of the bandwidth.

6.2.2

Access to health services

One potential explanation for FHP electoral effects would be that the additional resources improved access to primary care by increasing the number of facilities offering outpatient services and procedures per capita. We start by considering program's coverage. Table 6.3 reports the TSLS and reduced-form estimates for the effects of additional transfers on the proportion of FHP estimated covered population. Not surprisingly, for a 50% increase in FHP annual transfers, FHP covered population increases by roughly 13 percentage points (pp). Considering that the average for the control group is approximately 55% in our sample, the magnitude of the increase is substantial, suggesting that the FHP teams had sufficient capillarity and penetration in eligible municipalities.

Alongside with coverage expansion, Table 6.4 reports the TSLS and reduced-form estimates for the effects of additional FHP funds on the number of outpatient procedures delivered by different professional categories per capita. From the TSLS regression, for a 50% increase in FHP annual transfers, the number of outpatient procedures per FHP team per capita increases by approximately 1.3. The remainder of the table shows the robustness of results to the choice of bandwidth. Following, we explore different professional categories within the program's scope, such as FHP physician and community general practitioner, reflecting the same pattern. We also use the logarithm of the total number of outpatient procedures to test robustness and overcome noisy data (Table A.8). In any case, both specifications exhibit a similar rising pattern in the number of outpatient procedures delivered by different professional categories.

To better comprehend these effects, we construct productivity measures of healthcare production. Results, shown in Table 6.5, suggest that the additional funds increased the number of outpatient procedures per FHP team per year: for a 50% increase in FHP annual transfers, the number of outpatient procedures increases by approximately 1100 per FHP team. Following, we look at the effects of federal transfers on the number of outpatient facilities with FHP Teams per capita. Table 6.6 presents the main results. There is a large and statistically significant increase in the number of outpatient facilities with FHP Teams. In summary, these patterns suggest that both increasing program's coverage and improving productivity in healthcare delivery could explain the positive effects on the mayor's political support in 2008.

6.2.3

Health Outcomes

We then analyze health outcomes to investigate whether improving primary care had perceived impacts on public health. We focus most of the analysis on maternal and infant health, the priorities of the program. Results are shown in Table 6.7. We start by looking at outcome variables related to the quality of births. From the IV regression, there is a small, but significant improvement in birth weight: for a 50% (70%) in FHP annual transfers, birth weight increases by approximately 48 g (67 g). The magnitude of the coefficients remains stable across specifications. We also extend the analysis for low birth weight indicator. [1] Results shown in Table A.11 suggest that low birth weight decreases by roughly 1pp. Considering that the average for the control group is approximately 8% in our sample, the magnitude of the decline is substantial.

Following to infant and maternal mortality rates, results do not indicate any significant change. As Bhalotra et al. (2019), we explore infant mortality by cause and timing of death and also extend the maternal mortality analysis (Tables A.10 and A.9). The authors look at maternal mortality rate (MMR) [2] and mortality for women of reproductive age. Since MMR is rare (0.03 per 1000 women and 0.40 per 1000 births), these data are noisy. Therefore, as these authors, we also report estimates for the total female mortality rate in the reproductive ages (age 10 to 49), a large share of which is determined by MMR. Even though MMR is usually reported per birth, since fertility is potentially endogenous, we follow Bhalotra et al. (2019) and also present MMR per woman, accounting for any effects on fertility.

The same pattern is observed when we explore infant mortality by cause and timing of death and alternative definitions for maternal mortality rate. There is no evidence that this additional FHP investment led to declines in infant and maternal mortality in 2008. One potential explanation of this result is the heterogeneous effect of the program on mortality according to the time of exposure, as documented by previous research (Rocha and Soares, 2010; Bhalotra et al., 2019). Bhalotra et al. (2019) track the period of major expansion of the program, between 1996 and 2004. The authors identify significant program impacts on mortality and show that most outcomes increase in the duration of exposure to the program. In this sense, we might

[1] Defined by the World Health Organization as a birth weight of an infant of 2,499 g or less, regardless of gestational age.

[2] MMR is identified by ICD-10 code under the chapter O, and in line with global conventions, these refer to the mortality of women within 42 days of childbirth (Bhalotra et al., 2019).

be working with a relatively limited time window to detect any program's contribution to the observed change. In any case, considering a comparatively short period of time, results already suggest a significant improvement in the quality of births, as reported by the significant improvements in birth weight.

In order to get a better understanding of our results, we investigate how FHP investment affected common causes of low-birth weight in newborns. The primary cause is premature birth, commonly defined as any birth that occurs before 37 weeks gestation. In addition to the fact that a baby born early has less time in the mother's uterus to grow and gain weight, much of a fetus's weight is gained during the latter part of the mother's pregnancy. As expected, there was a significant increase in indicators for gestation of at least 37 weeks. Results shown in Table A.12 suggest that it increases by roughly 2pp.

Another cause of low birth-weight is intrauterine growth restriction (IUGR). This occurs when a baby does not grow adequately in utero due to the placenta's problems, the mother's health or congenital disabilities. Babies with intrauterine growth restriction (IUGR) may be born early or full-term. Because maternal nutrition and weight gain are linked with fetal weight gain, eating a healthy diet, avoiding alcohol, cigarettes and illicit drugs in pregnancy are essential. In this sense, prenatal care is a key factor in preventing preterm births and low birth-weight babies. In Table A.13, we investigated how additional FHP investment affected access to prenatal care. We find no evidence of such mechanisms at the margin of 7 or more visits. One possible explanation for this result is that FHP additional investments could have led to qualitative gains rather than an increase in the average number of prenatal care visits. There is emerging evidence that the overall quality of prenatal care may be even more important than the timing of initiation and the number of visits (Sword et al., 2012). Nevertheless, as discussed previously, additional resources improved access to general primary care by increasing the number of facilities offering outpatient services and procedures per capita, which could suffice to explain the significant improvement in the quality of births.

6.2.4

Robustness

Finally, we propose falsification tests to address potential violations of our identification strategy. First, we present the estimation results for the pre-treatment period. Our main empirical specification estimates the effects in the 2008 elections. Considering that the discontinuous funding rule was introduced in August 2004, we would not expect to observe any effects for the electoral cycle of 2000. We confirm the latter fact by estimating the pre-treatment results as a placebo test in Tables A.4. As expected, the model's first stage estimates find no significant change in the expected health expenditures and we found no significant effects on electoral support.

Then, we also consider the possibility of alternative policy discontinuities around the same thresholds of population and/or HDI that could confound the results. To the best of our knowledge, there is no policy discontinuity at either HDI of 0.7 or population of 30,000 during the period under analysis. Therefore, we investigate alternative discontinuities at neighbour thresholds. The most relevant budgetary component of Brazilian municipalities is the Fundo de Participação dos Municipios (FPM), distributed discontinuously across population brackets. [3] One of the population thresholds, at 30,564, is near to the FHP population cutoff. Nevertheless, Table A.6 shows strong evidence that the FPM is unlikely to drive our results. The absence of a significant effect on health expenditures on the first stage is evidence that the FPM is not generating a funding gap at this threshold.

[3] The thresholds are defined with an associated coefficient that varies nonlinearly between 0.6 and 4, with smaller population brackets corresponding to lower coefficients. Then, each municipality is annually assigned to a population threshold based on its number of inhabitants, with larger municipalities receiving greater transfers.

Table 6.2: Incumbent's Vote Share in 2008

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: IV estimates						
FHP transfers	0.195	0.191	0.190	0.195	0.183	0.172
(s.e)	(0.096)**	(0.080)**	(0.097)**	(0.070)***	(0.066)***	(0.062)***
Panel B: Reduced-form estimates						
Population in 2003	0.136	0.162	0.121	0.126	0.122	0.123
(s.e)	(0.051)***	(0.048)***	(0.053)**	(0.043)***	(0.042)***	(0.039)***
Mean of dependent variable: 0.514						
Bandwidth	[7217, 7217]	[11103, 7036]	[6507, 6507]	[9000, 9000]	[10000, 10000]	[12000, 12000]
Bandwidth type	MSE-optimal (1)	MSE-optimal (2)	MSE-optimal (3)	9000	10000	12000
Kernel	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov
Obs	1594	1594	1594	1594	1594	1594

Notes: (i) The table reports the TSLS and reduced-form estimates for the effects of additional PSF funds on the incumbent's vote share, 2008. PSF Funds estimated are estimated in log(Variable) (ii) Vector of municipal controls includes PBF coverage, GDP per capita (log), % urban population, % households with sanitation, piped water and sewer (iii) Main specification, MSE-optimal bandwidth selector for the RD treatment effect estimator calculated by the method proposed by Calonico, Cattaneo, and Titiunik (2014) ; (iv); MSE-optimal (1): one common MSE-optimal bandwidth selector for the RD treatment effect estimator; MSE-optimal (2): two different MSE-optimal bandwidth selectors (below and above the cutoff) for the RD treatment effect estimator; MSE-optimal (3): one common MSE-optimal bandwidth selector for the sum of regression estimates (as opposed to difference thereof). (v) To help evaluate the magnitude of the effects, the dependent variable mean — the average for municipalities within a 7000-population interval above the 30000 population-threshold — is presented.

*** p<0.01, ** p<0.05, * p<0.1; Robust Standard errors in parentheses

Table 6.3: Proportion of FHP estimated covered population

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: IV estimates						
FHP transfers	21.639	25.303	21.684	23.499	23.692	24.644
(s.e)	(13.021)*	(6.627)***	(13.014)*	(7.903)***	(7.179)***	(7.416)***
Panel B: Reduced-form estimates						
Population in 2003	26.579	26.162	26.547	23.474	24.774	24.168
(s.e)	(11.978)**	(8.329)***	(11.751)**	(13.662)*	(12.867)*	(11.817)**
Mean of dependent variable: 54.83						
Bandwidth	[6426, 6426]	[26912, 6898]	[6403, 6403]	[9000, 9000]	[10000, 10000]	[12000, 12000]
Bandwidth type	MSE-optimal (1)	MSE-optimal (2)	MSE-optimal (3)	9000	10000	12000
Kernel	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov
Obs	1606	1606	1606	1606	1606	1606

Notes: (i) The table reports the TSLS and reduced-form estimates for the effects of additional PSF funds on the proportion of FHP estimated covered population. PSF Funds estimated are estimated in log(Variable) (ii) Vector of municipal controls includes PBF coverage, GDP per capita (log), % urban population, % households with sanitation, piped water and sewer (iii) Main specification, MSE-optimal bandwidth selector for the RD treatment effect estimator calculated by the method proposed by Calonico, Cattaneo, and Titiunik (2014) ; (iv); MSE-optimal (1): one common MSE-optimal bandwidth selector for the RD treatment effect estimator; MSE-optimal (2): two different MSE-optimal bandwidth selectors (below and above the cut-off) for the RD treatment effect estimator; MSE-optimal (3): one common MSE-optimal bandwidth selector for the sum of regression estimates (as opposed to difference thereof). (v) To help evaluate the magnitude of the effects, the dependent variable mean — the average for municipalities within a 7000-population interval above the 30000 population-threshold — is presented.
*** p<0.01, ** p<0.05, * p<0.1; Robust Standard errors in parentheses

Table 6.4: Number of Outpatient Procedures Per Capita

	Delivered by PSF Team					
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: IV estimates						
FHP transfers	2.688	1.994	2.757	2.491	2.479	2.375
(s.e)	(1.452)*	(1.251)	(1.557)*	(1.315)*	(1.231)**	(1.214)*
Panel B: Reduced-form estimates						
Population in 2003	1.816	1.168	1.820	1.170	1.356	1.556
(s.e)	(1.206)	(0.810)	(1.193)	(1.179)	(1.123)	(1.035)
Mean of dependent variable:			**2.555**			
Bandwidth	[7993, 7993]	[17332, 7939]	[7487, 7487]	[9000, 9000]	[10000, 10000]	[12000, 12000]
Bandwidth type	MSE-optimal (1)	MSE-optimal (2)	MSE-optimal (3)	9000	10000	12000
Kernel	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov
Obs	1530	1530	1530	12,754	7,112	1,494

	Delivered by Community General Practitioner					
	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: IV estimates						
FHP transfers	0.976	0.768	0.983	0.938	0.916	0.861
(s.e)	(0.206)***	(0.192)***	(0.206)***	(0.160)***	(0.147)***	(0.143)***
Panel B: Reduced-form estimates						
Population in 2003	0.586	0.494	0.611	0.472	0.526	0.570
(s.e)	(0.239)**	(0.210)**	(0.252)**	(0.211)**	(0.194)***	(0.171)***
Mean of dependent variable:			**0.738**			
Bandwidth	[7155, 7155]	[21132, 6947]	[7007, 7007]	[9000, 9000]	[10000, 10000]	[12000, 12000]
Bandwidth type	MSE-optimal (1)	MSE-optimal (2)	MSE-optimal (3)	9000	10000	12000
Kernel	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov
Obs	1,509	1,509	1,509	1,509	1,509	1,494

	Delivered by PSF General Practitioner					
	(13)	(14)	(15)	(16)	(17)	(18)
Panel A: IV estimates						
FHP transfers	0.905	0.704	0.919	0.889	0.877	0.835
(s.e)	(0.210)***	(0.201)***	(0.217)***	(0.166)***	(0.151)***	(0.150)***
Panel B: Reduced-form estimates						
Population in 2003	0.569	0.444	0.554	0.440	0.492	0.553
(s.e)	(0.239)**	(0.207)**	(0.254)**	(0.217)**	(0.199)**	(0.178)***
Mean of dependent variable:			**0.770**			
Bandwidth	[7456, 7456]	[20706, 7305]	[7300, 7300]	[9000, 9000]	[10000, 10000]	[12000, 12000]
Bandwidth type	MSE-optimal (1)	MSE-optimal (2)	MSE-optimal (3)	9000	10000	12000
Kernel	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov
Obs	1,510	1,510	1,510	1,510	1,510	1,494

Notes: (i) The table reports the TSLS and reduced-form estimates for the effects of additional PSF funds on the number of outpatient procedures delivered by different professional categories per capita. PSF Funds estimated are estimated in log(Variable) (ii) Vector of municipal controls includes PBF coverage, GDP per capita (log), % urban population, % households with sanitation, piped water and sewer (iii) Main specification, MSE-optimal bandwidth selector for the RD treatment effect estimator calculated by the method proposed by Calonico, Cattaneo, and Titiunik (2014) ; (iv); MSE-optimal (1): one common MSE-optimal bandwidth selector for the RD treatment effect estimator; MSE-optimal (2): two different MSE-optimal bandwidth selectors (below and above the cutoff) for the RD treatment effect estimator; MSE-optimal (3): one common MSE-optimal bandwidth selector for the sum of regression estimates (as opposed to difference thereof). (v) To help evaluate the magnitude of the effects, the dependent variable mean — the average for municipalities within a 7000-population interval above the 30000 population-threshold — is presented.
*** p<0.01, ** p<0.05, * p<0.1; Robust Standard errors in parentheses

Table 6.5: Number of Outpatient Procedures per PSF Team/Year

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: IV estimates						
FHP transfers	2,273.971	1,341.073	2,283.374	2,131.911	2,274.271	2,143.274
(s.e)	(770.391)***	(737.710)*	(774.322)***	(672.287)***	(624.609)***	(606.246)***
Panel B: Reduced-form estimates						
Population in 2003	1,685.872	1,058.561	1,684.173	1,249.641	1,526.692	1,602.798
(s.e)	(738.480)**	(610.067)*	(737.133)**	(658.012)*	(612.885)**	(548.148)***
Mean of dependent variable: 11741						
Bandwidth	[7907, 7907]	[18261, 7763]	[7870, 7870]	[9000, 9000]	[10000, 10000]	[12000, 12000]
Bandwidth type	MSE-optimal (1)	MSE-optimal (2)	MSE-optimal (3)	9000	10000	12000
Kernel	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov
Obs	1,494	1,494	1,494	1,494	1,494	1,494

Notes: (i) The table reports the TSLS and reduced-form estimates for the effects of additional PSF funds on the number of outpatient procedures per PSF team. PSF Funds estimated are estimated in log(Variable) (ii) Vector of municipal controls includes PBF coverage, GDP per capita (log), % urban population, % households with sanitation, piped water and sewer (iii) Main specification, MSE-optimal bandwidth selector for the RD treatment effect estimator calculated by the method proposed by Calonico, Cattaneo, and Titiunik (2014) ; (iv); MSE-optimal (1): one common MSE-optimal bandwidth selector for the RD treatment effect estimator; MSE-optimal (2): two different MSE-optimal bandwidth selectors (below and above the cut-off) for the RD treatment effect estimator; MSE-optimal (3): one common MSE-optimal bandwidth selector for the sum of regression estimates (as opposed to difference thereof). (v) To help evaluate the magnitude of the effects, the dependent variable mean — the average for municipalities within a 7000-population interval above the 30000 population-threshold — is presented.
*** p<0.01, ** p<0.05, * p<0.1; Robust Standard errors in parentheses

Table 6.6: Number of Ambulatory Facilities with PSF Teams Per Capita

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: IV estimates						
FHP transfers	0.089	0.074	0.089	0.078	0.078	0.086
(s.e)	(0.033)***	(0.024)***	(0.034)***	(0.026)***	(0.023)***	(0.023)***
Panel B: Reduced-form estimates						
Population in 2003	0.074	0.068	0.074	0.069	0.068	0.077
(s.e)	(0.035)**	(0.027)**	(0.035)**	(0.031)**	(0.029)**	(0.028)***
Mean of dependent variable: 0.154						
Bandwidth	[5130, 5130]	[21700, 4792]	[5069, 5069]	[9000, 9000]	[10000, 10000]	[12000, 12000]
Bandwidth type	MSE-optimal (1)	MSE-optimal (2)	MSE-optimal (2)	9000	10000	12000
Kernel	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov
Obs	1,577	1,577	1,577	12,754	7,112	1,494

Notes: (i) The table reports the TSLS and reduced-form estimates for the effects of additional PSF funds on the number of outpatient facilities with PSF Teams per capita. PSF Funds estimated are estimated in log(Variable) (ii) Vector of municipal controls includes PBF coverage, GDP per capita (log), % urban population, % households with sanitation, piped water and sewer (iii) Main specification, MSE-optimal bandwidth selector for the RD treatment effect estimator calculated by the method proposed by Calonico, Cattaneo, and Titiunik (2014) ; (iv); MSE-optimal (1): one common MSE-optimal bandwidth selector for the RD treatment effect estimator; MSE-optimal (2): two different MSE-optimal bandwidth selectors (below and above the cutoff) for the RD treatment effect estimator; MSE-optimal (3): one common MSE-optimal bandwidth selector for the sum of regression estimates (as opposed to difference thereof). (v) To help evaluate the magnitude of the effects, the dependent variable mean — the average for municipalities within a 7000-population interval above the 30000 population-threshold — is presented.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$; Robust Standard errors in parentheses

Table 6.7: Main Health Outcomes

	Birth Weight					
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: IV estimates						
FHP transfers	90.293	55.482	91.058	86.661	90.150	95.315
(s.e)	(38.223)**	(27.357)**	(38.807)**	(28.115)***	(26.570)***	(26.102)***
Panel B: Reduced-form estimates						
Population in 2003	63.310	39.183	69.415	57.747	63.471	71.393
(s.e)	(28.871)**	(18.668)**	(26.639)***	(20.690)***	(19.666)***	(18.332)***
Mean of dependent variable:	**3.198**					
Bandwidth	[6977, 6977]	[16535, 8550]	[6826, 6826]	[9000, 9000]	[10000, 10000]	[12000, 12000]
Bandwidth type	MSE-optimal (1)	MSE-optimal (2)	MSE-optimal (3)	9000	10000	12000
Kernel	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov
Obs	1,594	1594	1594	1594	1594	1594

	Infant Mortality Rate (before 1 year old, per 1000 babies 0-1 year old)					
	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: IV estimates						
FHP transfers	-1.684	-0.319	-1.816	-0.865	-1.421	-1.879
(s.e)	(2.802)	(2.130)	(2.832)	(2.467)	(2.324)	(2.325)
Panel B: Reduced-form estimates						
Population in 2003	-1.701	-0.529	-2.070	-0.993	-1.360	-1.688
(s.e)	(1.879)	(1.236)	(1.810)	(1.680)	(1.629)	(1.566)
Mean of dependent variable:	**13.51**					
Bandwidth	[6565, 6565]	[26734, 7425]	[6664, 6664]	[9000, 9000]	[10000, 10000]	[12000, 12000]
Bandwidth type	MSE-optimal (1)	MSE-optimal (2)	MSE-optimal (3)	9000	10000	12000
Kernel	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov
Obs	1,594	1594	1594	1594	1594	1594

	Maternal Mortality Rate (only ICD10="O", per 1000 babies 0-1 year old)					
	(13)	(14)	(15)	(16)	(17)	(18)
Panel A: IV estimates						
FHP transfers	-0.495	-0.296	-0.488	-0.525	-0.419	-0.308
(s.e)	(0.743)	(0.457)	(0.742)	(0.548)	(0.510)	(0.503)
Panel B: Reduced-form estimates						
Population in 2003	-0.129	-0.056	-0.121	-0.104	-0.049	-0.015
(s.e)	(0.387)	(0.270)	(0.393)	(0.382)	(0.361)	(0.337)
Mean of dependent variable:	**0.682**					
Bandwidth	[6491, 6491]	[15143, 8073]	[6525, 6525]	[9000, 9000]	[10000, 10000]	[12000, 12000]
Bandwidth type	MSE-optimal (1)	MSE-optimal (2)	MSE-optimal (3)	9000	10000	12000
Kernel	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov
Obs	1,594	1594	1594	1594	1594	1594

Notes: (i) The table reports the TSLS and reduced-form estimates for the effects of additional PSF funds on infant mortality rate (all deaths of individuals up to one year of age), maternal mortality rate (identified by ICD-10 code under the chapter O, mortality of women within 42 days of childbirth) and birth weight, 2008. PSF Funds estimated are estimated in log(Variable) (ii) Vector of municipal controls includes PBF coverage, GDP per capita (log), % urban population, % households with sanitation, piped water and sewer (iii) Main specification, MSE-optimal bandwidth selector for the RD treatment effect estimator calculated by the method proposed by Calonico, Cattaneo, and Titiunik (2014) ; (iv); MSE-optimal (1): one common MSE-optimal bandwidth selector for the RD treatment effect estimator; MSE-optimal (2): two different MSE-optimal bandwidth selectors (below and above the cutoff) for the RD treatment effect estimator; MSE-optimal (3): one common MSE-optimal bandwidth selector for the sum of regression estimates (as opposed to difference thereof). (v) To help evaluate the magnitude of the effects, the dependent variable mean — the average for municipalities within a 7000-population interval above the 30000 population-threshold — is presented.
*** p<0.01, ** p<0.05, * p<0.1; Robust Standard errors in parentheses

7

Conclusions

This paper examines whether voters reward politicians for additional spending on primary health care. We address this question in the context of the Family Health Program (FHP) in Brazil, exploring discontinuities in funding that created a quasi-experimental assignment of FHP resources to municipalities. More specifically, we investigate if voters in municipalities that received more FHP investment tended to reward incumbents in mayoral elections in 2008. To achieve this objective, we use administrative records from the Brazilian Ministry of Health's System of Information (DataSUS) and several sources to obtain information on program implementation, local-level health facilities, and indicators of access.

We employ a regression discontinuity design and a novel identification strategy to estimate the effects of healthcare transfers on the local politics of Brazilian municipalities. We provide evidence that FHP investments had significant effects on electoral support. Results show that for a 50% increment in FHP annual transfers, the incumbent's vote share increases by roughly 9 pp. We also show that possible mechanisms for these electoral effects were better access to primary care and consequent improved outcomes at birth.

The theory reconciles these empirical findings by showing that primary health investments increase incumbents' ability to raise support. Naturally, the magnitude of effects has to be treated carefully when applied to a more general context, as it may well depend on institutional features specific to the Brazilian case. Nonetheless, these results have significant policy implications and shed light on the incentives for national politicians to implement similar healthcare programs. Overall, this paper contributes to a better understanding of the substantial changes the Brazilian health system has undergone and its potential electoral effects. Despite its limitations, this first attempt to measure the electoral effects of public health investments may provide fruitful lines for further research.

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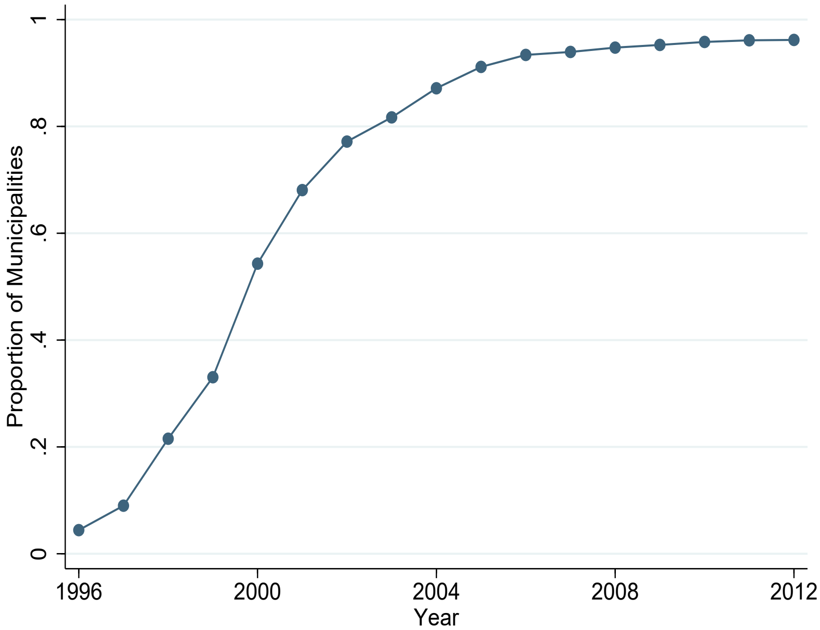
A

Appendix

A.1

Descriptive Statistics

Figure A.1: FHP Expansion



Source: Brazilian Ministry of Health, SAS/Dept de Atenção Básica – DAB.
Note: The original source of data used to compute each variable is listed on Table A.1.

Figure A.2: Aggregate Trends

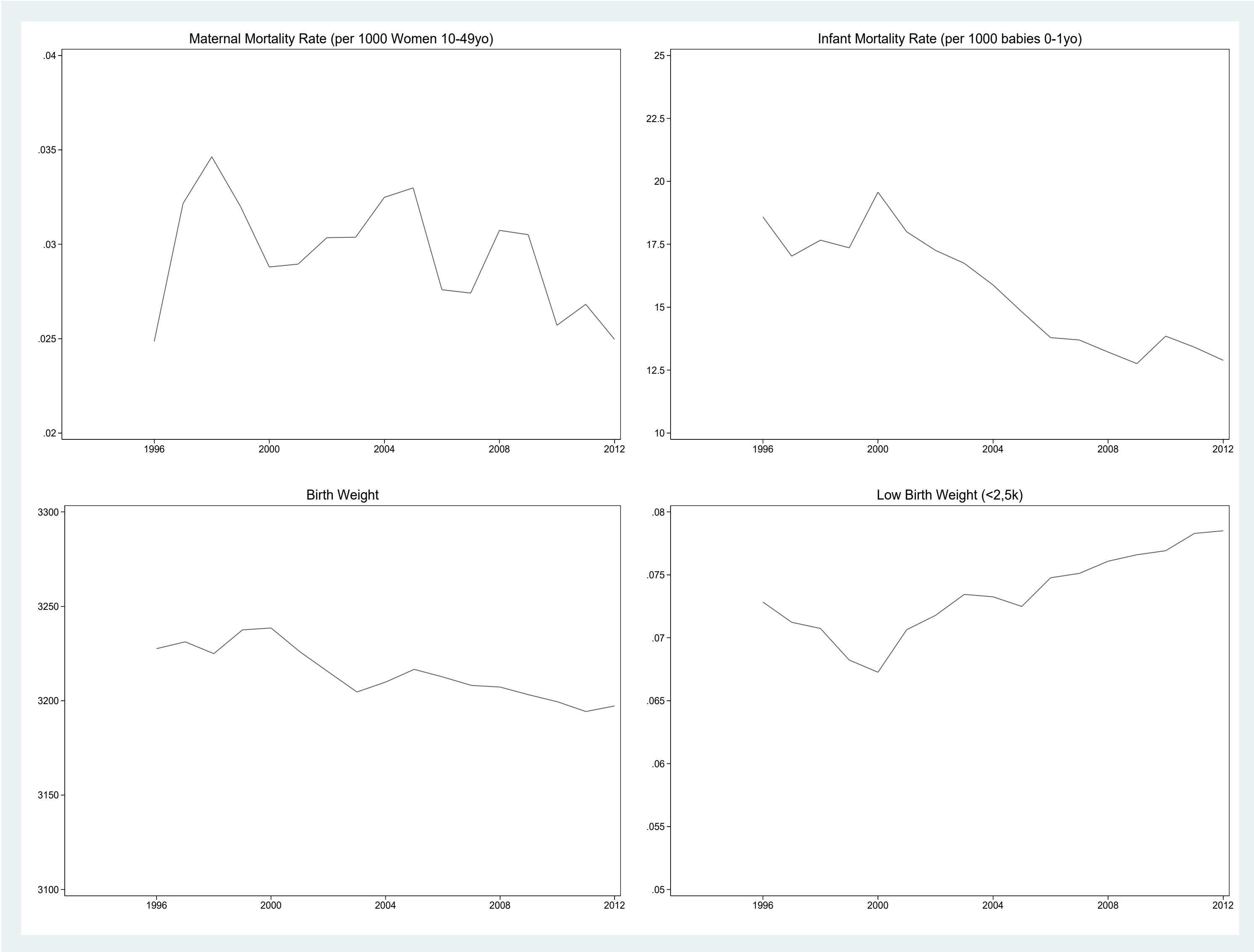


Table A.1: Main Descriptive Statistics

	Obs.	Mean	Stand Dev	Min	Max	Source of Data	Year
Municipality Public Expenditures and Health Infrastructure							
Dummy for FHP	1,726	0.85	0.35	0	1.00	Datasus/DAB	2004
Number of FHP teams implemented	1,726	2.86	6.71	0	201.00	Datasus/DAB	2004
Proportion of FHP estimated covered population	1,726	65.93	38.72	0	100.00	Datasus/DAB	2004
Total Expenditures, Except in Health (in R$ per capita)	1,638	960.84	518.50	198.12	7,564.74	Finbra	2004
Expenditures in Health (in R$ per capita)	1,638	308.43	179.33	0	2,985.83	Finbra	2004
FHP Expenditures (in R$ per capita)	1,726	16.32	11.41	0	57.26	FNS	2004
Dummy for Hospital	1,726	0.59	0.49	0	1.00	Datasus	2004
Hospital Beds (per capita*1000)	1,726	2.01	2.66	0	33.97	Datasus	2004
Number of Health Facilities with Ambulatory Service							
Total (per capita)	1,726	0.54	0.32	0	2.49	Datasus/SIA	2004
With Obstetrical / Gyneco. Services (per 1000 women 10-49yo)	1,726	0.37	0.45	0	3.93	Datasus/SIA	2004
With Pediatric Services (per children 0-1yo)	1,726	0.29	0.44	0	3.78	Datasus/SIA	2004
Number of Outpatient Procedures							
Total (per capita*1000)	1,715	6.96	5.15	0.01	83.34	Datasus/SIA	2004
Number of Pediatric Appointments (per children*1000 0-1yo)	1,715	19.42	23.73	0.01	297.15	Datasus/SIA	2004
Number of Gyneco-Obstetrical Appointments (per women*1000 10-49yo)	1,715	144,56	300,19	0	4329	Datasus/SIA	2004
Access to Health Services (Mean, Conditional on Birth)							
Birth at Hospital	1,726	0.97	0.10	0.00	1.00	Datasus/SINASC	2004
Share C-Sections	1,726	0.43	0.18	0.02	1.00	Datasus/SINASC	2004
Prenatal Visits None	1,726	0.02	0.03	0.00	0.56	Datasus/SINASC	2004
Prenatal Visits 1-6	1,726	0.43	0.23	0.00	0.96	Datasus/SINASC	2004
Prenatal Visits 7+	1,726	0.55	0.24	0.03	1.00	Datasus/SINASC	2004
Hospitalization Rates by Chronic Conditions (all individuals age 50+, *1000)							
All	1724	178,90	168,06	0	6175	Datasus/SIH	2004
ICSAP	1724	67,91	52,94	0	1355	Datasus/SIH	2004
Non-ICSAP	1724	110,99	124,73	0	4820	Datasus/SIH	2004
Neoplasms	1724	6,80	21,72	0	882	Datasus/SIH	2004
Diabetes Mellitus	1724	4,36	5,57	0	143	Datasus/SIH	2004
CVD	1724	48,16	47,83	0	1565	Datasus/SIH	2004

Table A.2: Main Descriptive Statistics (cont.)

	Obs.	Mean	Stand Dev	Min	Max	Source of Data	Year
Maternal Mortality (per 1000 women 10-49yo)							
Female Mortality Rate (Irrespective of Cause)	1,726	0.96	0.72	0.00	5.36	Datasus/SIM	2004
Maternal Mortality Rate (MMR, only if ICD10="O")	1,726	0.03	0.13	0.00	1.56	Datasus/SIM	2004
Female Mortality Rate (Irrespective of Cause, per 1000 Babies 0-1yo)	1,726	18.34	14.88	0.00	111.11	Datasus/SIM	2004
Maternal Mortality Rate (MMR, only if ICD10="O", per 1000 Babies 0-1yo)	1,726	0.54	2.56	0.00	45.45	Datasus/SIM	2004
Infant Mortality Rate (IMR, per 1000 babies 0-1yo)							
Total	1,726	15.23	13.31	0.00	105.26	Datasus/SIM	2004
Infectious	1,726	1.00	3.03	0.00	40.00	Datasus/SIM	2004
Perinatal	1,726	8.64	9.80	0.00	90.91	Datasus/SIM	2004
Respiratory	1,726	0.91	3.59	0.00	66.67	Datasus/SIM	2004
Congenital	1,726	2.19	4.70	0.00	50.00	Datasus/SIM	2004
External	1,726	0.30	1.67	0.00	32.26	Datasus/SIM	2004
Others	1,726	0.65	2.37	0.00	27.78	Datasus/SIM	2004
Fetal	1,726	4.72	7.04	0.00	51.72	Datasus/SIM	2004
Neonatal	1,726	10,37	10,59	0	91	Datasus/SIM	2004
Within 24hs	1,726	4.01	6.58	0.00	62.50	Datasus/SIM	2004
Within 24hs-27 days	1,726	6.11	7.74	0.00	76.92	Datasus/SIM	2004
Within 27 days - 1 year	1,726	5.11	7.64	0.00	66.67	Datasus/SIM	2004
Birth Outcomes (Mean, Conditional on Birth)							
Apgar 1	1,726	8.17	0.48	4.88	10.00	Datasus/SINASC	2004
Apgar 5	1,726	9.32	0.36	7.96	10.00	Datasus/SINASC	2004
Birth Weight	1,726	3,202.84	99.62	2,846.72	3,614.12	Datasus/SINASC	2004
Low Birth Weight (<2,5k)	1,726	0.08	0.04	0.00	0.33	Datasus/SINASC	2004
Gestation Weeks 37+	1,726	0.94	0.05	0.38	1.00	Datasus/SINASC	2004

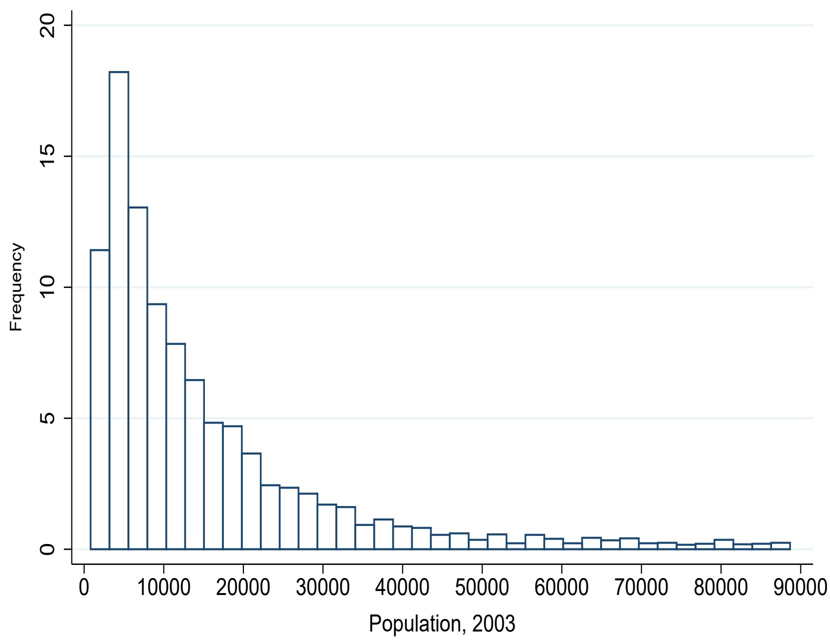
A.2

Design Validity and Robustness

Table A.3: Balancedness Around Cutoffs for the Main Sample

	RD Effect	**Robust p-value**
Dep Var:		
Area	-194636,000	.433
Log (Density)	-.021	.976
Log (per capita GDP)	-.293	.269
Total Expenditures, Except in Health (in R$ per capita)	-30224,000	.849
Expenditures in Health (in R$ per capita)	-19876	.721
Households covered by PBF	23129	.240
Hospital Beds per capita	.155	.636
Hospital Indicator	.041	.494
Households with sewage treatment system	-4149,000	.663
Households with garbage collection system	-10926,000	.028

Figure A.3: Population Histogram



As an initial assessment of how serious the issue of manipulative sorting might be, we plot a population histogram

Figure A.4: McCrary test for population threshold

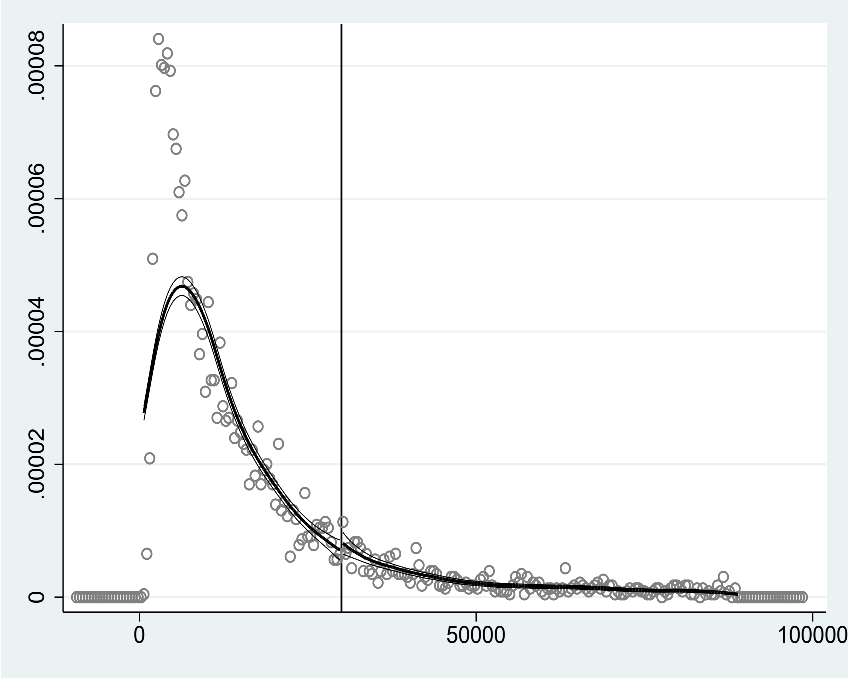


Figure shows the distribution of the population of each municipality in our sample for the 30000 cutoff point (denoted by vertical line). Not surprisingly (given the histograms in figure A.3), the McCrary test does not indicate a significant jump in the population threshold

Table A.4: First Stage: Population in 2003 and Expenditures in Health in 2000 (in log)

	(1)	(2)	(3)
Expenditures in Health in 2000	.08551	-.01138	.09022
(s.e)	(.17850)	(.12472)	(.17642)
p-value	0.632	0.927	0.609
Bandwidth	[6075, 6075]	[25371, 8583]	[6171, 6171]
Bandwidth type	MSE-optimal (1)	MSE-optimal (2)	MSE-optimal (3)
Kernel	Epanechnikov	Epanechnikov	Epanechnikov
Obs	2046	2046	2046

Notes: (i) The table reports the first stage estimates. Health Funds estimated are estimated in log(Variable) (ii) Vector of municipal controls includes PBF coverage, GDP per capita (log), % urban population, % households with sanitation, piped water and sewer (iii) Main specification, MSE-optimal bandwidth selector for the RD treatment effect estimator calculated by the method proposed by Calonico, Cattaneo, and Titiunik (2014) ; (iv); MSE-optimal (1): one common MSE-optimal bandwidth selector for the RD treatment effect estimator; MSE-optimal (2): two different MSE-optimal bandwidth selectors (below and above the cutoff) for the RD treatment effect estimator; MSE-optimal (3): one common MSE-optimal bandwidth selector for the sum of regression estimates (as opposed to difference thereof). (v) To help evaluate the magnitude of the effects, the dependent variable mean — the average for municipalities within a 7000-population interval above the 30000 population-threshold — is presented.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$; Robust Standard errors in parentheses

Table A.5: Incumbent's Vote Share in 2000

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: IV estimates						
Expenditures in Health	-0.587	-0.487	-0.583	-0.463	-0.502	-0.249
(s.e)	(0.691)	(0.360)	(0.667)	(0.367)	(0.315)	(0.233)
Panel B: Reduced-form estimates						
Population in 2003	-0.058	-0.025	-0.048	-0.047	-0.062	-0.050
(s.e)	(0.052)	(0.038)	(0.042)	(0.041)	(0.039)	(0.035)
Mean of dependent variable: .4106993						
Bandwidth	[6075, 6075]	[25371, 8583]	[6171, 6171]	[9000, 9000]	[10000, 10000]	[12000, 12000]
Bandwidth type	MSE-optimal (1)	MSE-optimal (2)	MSE-optimal (3)	9000	10000	12000
Kernel	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov
Obs	2046	2046	2046	2046	2046	2046

Notes: The table reports the TSLS and reduced-form estimates for the effects of additional PSF funds on the incumbent's vote share, 2000. Expenditures in health (Finbra) estimated are estimated in log(Variable) (ii) Vector of municipal controls includes PBF coverage, GDP per capita (log), % urban population, % households with sanitation, piped water and sewer (iii) Main specification, MSE-optimal bandwidth selector for the RD treatment effect estimator calculated by the method proposed by Calonico, Cattaneo, and Titiunik (2014) ; (iv); MSE-optimal (1): one common MSE-optimal bandwidth selector for the RD treatment effect estimator; MSE-optimal (2): two different MSE-optimal bandwidth selectors (below and above the cut-off) for the RD treatment effect estimator; MSE-optimal (3): one common MSE-optimal bandwidth selector for the sum of regression estimates (as opposed to difference thereof). (v) To help evaluate the magnitude of the effects, the dependent variable mean — the average for municipalities within a 7000-population interval above the 30000 population-threshold — is presented.
*** p<0.01, ** p<0.05, * p<0.1; Robust Standard errors in parentheses

Table A.6: First Stage: FPM Population Threshold and Health annual transfers in 2008 (log)

	(1)	(2)	(3)
Health transfers in 2008	-.08614	.04699	-.08964
(s.e)	(.14601)	(.10691)	(.1498)
p-value	0.555	0.660	0.550
Bandwidth	[7765, 7765]	[18662, 9029]	[7456, 7456]
Bandwidth type	MSE-optimal (1)	MSE-optimal (2)	MSE-optimal (3)
Kernel	Epanechnikov	Epanechnikov	Epanechnikov
Obs	1907	1907	1907

Notes: (i) The table reports the first stage estimates. Health Funds estimated are estimated in log(Variable) (ii) Vector of municipal controls includes PBF coverage, GDP per capita (log), % urban population, % households with sanitation, piped water and sewer (iii) Main specification, MSE-optimal bandwidth selector for the RD treatment effect estimator calculated by the method proposed by Calonico, Cattaneo, and Titiunik (2014) ; (iv); MSE-optimal (1): one common MSE-optimal bandwidth selector for the RD treatment effect estimator; MSE-optimal (2): two different MSE-optimal bandwidth selectors (below and above the cutoff) for the RD treatment effect estimator; MSE-optimal (3): one common MSE-optimal bandwidth selector for the sum of regression estimates (as opposed to difference thereof). (v) To help evaluate the magnitude of the effects, the dependent variable mean — the average for municipalities within a 7000-population interval above the 30000 population-threshold — is presented.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$; Robust Standard errors in parentheses

Table A.7: Incumbent's Vote Share in 2008 (FPM Population Threshold)

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: IV estimates						
Health transfers	-0.175	0.111	-0.196	0.109	0.132	0.108
(s.e)	(1.979)	(1.291)	(1.470)	(1.028)	(1.758)	(1.187)
Panel B: Reduced-form estimates						
Population in 2003	0.070	0.052	0.071	0.035	0.033	0.069
(s.e)	(0.046)	(0.038)	(0.048)	(0.044)	(0.043)	(0.055)
Mean of dependent variable: 0.498						
Bandwidth	[7765, 7765]	[18662, 9029]	[7456, 7456]	[9000, 9000]	[10000, 10000]	[12000, 12000]
Bandwidth type	MSE-optimal (1)	MSE-optimal (2)	MSE-optimal (3)	9000	10000	12000
Kernel	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov
Obs	1907	1907	1907	1907	1907	1907

Notes: The table reports the TSLS and reduced-form estimates for the effects of additional PSF funds on the incumbent's vote share, 2008. Expenditures in health (Finbra) estimated are estimated in log(Variable) (ii) Vector of municipal controls includes PBF coverage, GDP per capita (log), % urban population, % households with sanitation, piped water and sewer (iii) Main specification, MSE-optimal bandwidth selector for the RD treatment effect estimator calculated by the method proposed by Calonico, Cattaneo, and Titiunik (2014) ; (iv); MSE-optimal (1): one common MSE-optimal bandwidth selector for the RD treatment effect estimator; MSE-optimal (2): two different MSE-optimal bandwidth selectors (below and above the cut-off) for the RD treatment effect estimator; MSE-optimal (3): one common MSE-optimal bandwidth selector for the sum of regression estimates (as opposed to difference thereof). (v) To help evaluate the magnitude of the effects, the dependent variable mean — the average for municipalities within a 7000-population interval above the 30000 population-threshold — is presented.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$; Robust Standard errors in parentheses

Table A.8: Number of Outpatient Procedures (in log(Variable))

	Delivered by PSF Team					
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: IV estimates						
FHP transfers	1.362	0.919	1.295	1.363	1.294	1.232
(s.e)	(0.518)***	(0.329)***	(0.426)***	(0.365)***	(0.319)***	(0.302)***
Panel B: Reduced-form estimates						
Population in 2003	0.688	0.422	0.645	0.344	0.375	0.482
(s.e)	(0.371)*	(0.282)	(0.340)*	(0.383)	(0.360)	(0.328)
Mean of dependent variable:			**11,06**			
Bandwidth	[7590, 7590]	[19396, 7732]	[8300, 8300]	[9000, 9000]	[10000, 10000]	[12000, 12000]
Bandwidth type	MSE-optimal (1)	MSE-optimal (2)	MSE-optimal (3)	9000	10000	12000
Kernel	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov
Obs	1540	1540	1540	1540	1540	1540

	Delivered by Community General Practitioner					
	(7)	(8)	(9)	(10)	(11)	(12)
Panel A: IV estimates						
FHP transfers	1.305	0.894	1.245	1.177	1.183	1.187
(s.e)	(0.417)***	(0.313)***	(0.345)***	(0.304)***	(0.271)***	(0.267)***
Panel B: Reduced-form estimates						
Population in 2003	0.574	0.308	0.539	-0.019	0.157	0.425
(s.e)	(0.353)	(0.276)	(0.345)	(0.421)	(0.393)	(0.354)
Mean of dependent variable:			**9.897**			
Bandwidth	[7579, 7579]	[25458, 7988]	[8363, 8363]	[9000, 9000]	[10000, 10000]	[12000, 12000]
Bandwidth type	MSE-optimal (1)	MSE-optimal (2)	MSE-optimal (3)	9000	10000	12000
Kernel	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov
Obs	1519	1519	1519	1519	1519	1519

	Delivered by PSF General Practitioner					
	(13)	(14)	(15)	(16)	(17)	(18)
Panel A: IV estimates						
FHP transfers	1.342	0.942	1.260	1.219	1.245	1.199
(s.e)	(0.427)***	(0.325)***	(0.338)***	(0.304)***	(0.274)***	(0.272)***
Panel B: Reduced-form estimates						
Population in 2003	0.492	0.278	0.485	0.007	0.220	0.439
(s.e)	(0.342)	(0.277)	(0.348)	(0.421)	(0.392)	(0.352)
Mean of dependent variable:			**9.895**			
Bandwidth	[7526, 7526]	[20247, 7897]	[8460, 8460]	[9000, 9000]	[10000, 10000]	[12000, 12000]
Bandwidth type	MSE-optimal (1)	MSE-optimal (2)	MSE-optimal (3)	9000	10000	12000
Kernel	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov
Obs	1518	1518	1518	1518	1518	1518

Notes: (i) The table reports the TSLS and reduced-form estimates for the effects of additional PSF funds on the number of outpatient procedures delivered by different professional categories, in log(Variable). PSF Funds estimated are estimated in log(Variable) (ii) Vector of municipal controls includes PBF coverage, GDP per capita (log), % urban population, % households with sanitation, piped water and sewer (iii) Main specification, MSE-optimal bandwidth selector for the RD treatment effect estimator calculated by the method proposed by Calonico, Cattaneo, and Titiunik (2014) ; (iv); MSE-optimal (1): one common MSE-optimal bandwidth selector for the RD treatment effect estimator; MSE-optimal (2): two different MSE-optimal bandwidth selectors (below and above the cutoff) for the RD treatment effect estimator; MSE-optimal (3): one common MSE-optimal bandwidth selector for the sum of regression estimates (as opposed to difference thereof). (v) To help evaluate the magnitude of the effects, the dependent variable mean — the average for municipalities within a 7000-population interval above the 30000 population-threshold — is presented.
*** p<0.01, ** p<0.05, * p<0.1; Robust Standard errors in parentheses

Table A.9: MMR - Alternative Definitions

Dependent variable:	Female Mortality Rate	MMR (only ICD10="O")	Female Mortality Rate	MMR (only ICD10="O")
	per 1000 women 10-49 years old		per 1000 babies 0-1 year old	
	(1)	(2)	(3)	(4)
Panel A: IV estimates				
				-0.495
FHP transfers	0.162	-0.008	-1.425	(0.743)
(s.e)	(0.123)	(0.037)	(3.435)	
Panel B: Reduced-form estimates				
				-0.129
Population in 2003	0.078	0.004	-1.095	(0.387)
(s.e)	(0.090)	(0.022)	(2.702)	
Mean of dependent variable:	1.045	0.0308	23.23	0.682
Bandwidth	[8492, 8492]	[6194, 6194]	[7505, 7505]	[6491, 6491]
Bandwidth type	MSE-optimal (1)	MSE-optimal (1)	MSE-optimal (1)	MSE-optimal (1)
Kernel	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov
Obs	1,594	1,594	1,594	1,594

Notes: (i) The table reports the TSLS and reduced-form estimates for the effects of additional PSF funds on maternal mortality rates (MMR) identified by ICD-10 code under the chapter O (mortality of women within 42 days of childbirth), 2008. Alongside estimates for MMR, we also report estimates for the total female mortality rate in the reproductive ages (age 10 to 49), a large share of which is determined by MMR. PSF Funds estimated are estimated in log(Variable) (ii) Vector of municipal controls includes PBF coverage, GDP per capita (log), % urban population, % households with sanitation, piped water and sewer (iii) Main specification, MSE-optimal bandwidth selector for the RD treatment effect estimator calculated by the method proposed by Calonico, Cattaneo, and Titiunik (2014) ; (iv); MSE-optimal (1): one common MSE-optimal bandwidth selector for the RD treatment effect estimator; MSE-optimal (2): two different MSE-optimal bandwidth selectors (below and above the cutoff) for the RD treatment effect estimator; MSE-optimal (3): one common MSE-optimal bandwidth selector for the sum of regression estimates (as opposed to difference thereof). (v) To help evaluate the magnitude of the effects, the dependent variable mean — the average for municipalities within a 7000-population interval above the 30000 population-threshold — is presented.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$; Robust Standard errors in parentheses

Table A.10: Infant Mortality Rate, Total and By Cause and Timing of Death (before 1 year old, per 1000 babies 0-1 year old)

Dependent variable:	IMR (Total)	Infectious	Respiratory	Congenital	Others	Neonatal	Within 24hs	Within 24hs-27 days	Within 27 days - 1 year
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Panel A: IV estimates									
FHP transfers	-1.684	-0.105	-1.203	-2.265	0.282	-2.091	0.243	-2.508	-0.286
(s.e)	(2.802)	(0.510)	(1.376)	(1.322)*	(0.539)	(3.013)	(1.590)	(1.933)	(1.587)
Panel B: Reduced-form estimates									
Population in 2003	-1.701	-0.252	-0.691	-0.673	0.150	-1.435	-1.309	-1.329	-0.924
(s.e)	(1.879)	(0.397)	(0.615)	(0.677)	(0.336)	(1.749)	(0.893)	(1.519)	(1.154)
Mean of dependent variable:	13.51	0.709	0.826	2.590	0.478	8.835	3.074	5.655	4715
Bandwidth	[6565, 6565]	[8267, 8267]	[7391, 7391]	[7141, 7141]	[7417, 7417]	[7093, 7093]	[8294, 8294]	[5755, 5755]	[7728, 7728]
Bandwidth type	MSE-optimal (1)	MSE-optimal (1)	MSE-optimal (1)	MSE-optimal (1)	MSE-optimal (1)	MSE-optimal (1)	MSE-optimal (1)	MSE-optimal (1)	MSE-optimal (1)
Kernel	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov
Obs	1,594	1,594	1,594	1,594	1,594	1,594	1,594	1,594	1,594

Notes: (i) The table reports the TSLS and reduced-form estimates for the effects of additional PSF funds on infant mortality rate (total, by cause and timing of death), 2008. PSF Funds estimated are estimated in log(Variable) (ii) Vector of municipal controls includes PBF coverage, GDP per capita (log), % urban population, % households with sanitation, piped water and sewer (iii) Main specification, MSE-optimal bandwidth selector for the RD treatment effect estimator calculated by the method proposed by Calonico, Cattaneo, and Titiunik (2014) ; (iv); MSE-optimal (1): one common MSE-optimal bandwidth selector for the RD treatment effect estimator; MSE-optimal (2): two different MSE-optimal bandwidth selectors (below and above the cutoff) for the RD treatment effect estimator; MSE-optimal (3): one common MSE-optimal bandwidth selector for the sum of regression estimates (as opposed to difference thereof). (v) To help evaluate the magnitude of the effects, the dependent variable mean — the average for municipalities within a 7000-population interval above the 30000 population-threshold — is presented.
*** $p<0.01$, ** $p<0.05$, * $p<0.1$; Robust Standard errors in parentheses

Table A.11: Low Birth Weight

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: IV estimates						
FHP transfers	-0.014	-0.013	-0.013	-0.017	-0.018	-0.019
(s.e)	(0.010)	(0.007)*	(0.008)	(0.009)*	(0.008)**	(0.008)**
Panel B: Reduced-form estimates						
Population in 2003	-0.017	-0.009	-0.015	-0.013	-0.014	-0.016
(s.e)	(0.008)**	(0.005)**	(0.008)**	(0.006)**	(0.006)**	(0.006)***
Mean of dependent variable: 0.0810						
Bandwidth	[8256, 8256]	[24351, 8360]	[10090, 10090]	[9000, 9000]	[10000, 10000]	[12000, 12000]
Bandwidth type	MSE-optimal (1)	MSE-optimal (2)	MSE-optimal (3)	9000	10000	12000
Kernel	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov
Obs	1,594	1,594	1,594	1,594	1,594	1,594

Notes: (i) The table reports the TSLS and reduced-form estimates for the effects of additional PSF funds on low birth weight indicator (>2,5k), 2008. PSF Funds estimated are estimated in log(Variable) (ii) Vector of municipal controls includes PBF coverage, GDP per capita (log), % urban population, % households with sanitation, piped water and sewer (iii) Main specification, MSE-optimal bandwidth selector for the RD treatment effect estimator calculated by the method proposed by Calonico, Cattaneo, and Titiunik (2014) ; (iv); MSE-optimal (1): one common MSE-optimal bandwidth selector for the RD treatment effect estimator; MSE-optimal (2): two different MSE-optimal bandwidth selectors (below and above the cutoff) for the RD treatment effect estimator; MSE-optimal (3): one common MSE-optimal bandwidth selector for the sum of regression estimates (as opposed to difference thereof). (v) To help evaluate the magnitude of the effects, the dependent variable mean — the average for municipalities within a 7000-population interval above the 30000 population-threshold — is presented.
*** p<0.01, ** p<0.05, * p<0.1; Robust Standard errors in parentheses

Table A.12: Gestation Weeks 37+

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: IV estimates						
FHP transfers	0.026	0.009	0.027	0.028	0.023	0.023
(s.e)	(0.014)*	(0.010)	(0.015)*	(0.011)**	(0.010)**	(0.010)**
Panel B: Reduced-form estimates						
Population in 2003	0.015	0.006	0.015	0.016	0.014	0.017
(s.e)	(0.009)*	(0.007)	(0.009)*	(0.009)*	(0.008)*	(0.008)**
Mean of dependent variable: 0.937						
Bandwidth	[7663, 7663]	[28031, 8115]	[7476, 7476]	[9000, 9000]	[10000, 10000]	[12000, 12000]
Bandwidth type	MSE-optimal (1)	MSE-optimal (2)	MSE-optimal (3)	9000	10000	12000
Kernel	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov
Obs	1,606	1,606	1,606	1,606	1,606	1,606

Notes: (i) The table reports the TSLS and reduced-form estimates for the effects of additional PSF funds on gestation of at least 37 weeks, 2008. PSF Funds estimated are estimated in log(Variable) (ii) Vector of municipal controls includes PBF coverage, GDP per capita (log), % urban population, % households with sanitation, piped water and sewer (iii) Main specification, MSE-optimal bandwidth selector for the RD treatment effect estimator calculated by the method proposed by Calonico, Cattaneo, and Titiunik (2014) ; (iv); MSE-optimal (1): one common MSE-optimal bandwidth selector for the RD treatment effect estimator; MSE-optimal (2): two different MSE-optimal bandwidth selectors (below and above the cutoff) for the RD treatment effect estimator; MSE-optimal (3): one common MSE-optimal bandwidth selector for the sum of regression estimates (as opposed to difference thereof). (v) To help evaluate the magnitude of the effects, the dependent variable mean — the average for municipalities within a 7000-population interval above the 30000 population-threshold — is presented.
*** p<0.01, ** p<0.05, * p<0.1; Robust Standard errors in parentheses

Table A.13: Prenatal Visits 7+

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: IV estimates						
FHP transfers	-0.100	-0.082	-0.100	-0.055	-0.085	-0.095
(s.e)	(0.101)	(0.082)	(0.101)	(0.099)	(0.091)	(0.086)
Panel B: Reduced-form estimates						
Population in 2003	-0.075	-0.086	-0.074	-0.026	-0.051	-0.069
(s.e)	(0.068)	(0.046)*	(0.067)	(0.073)	(0.069)	(0.063)
Mean of dependent variable: 0.644						
Bandwidth	[8785, 8785]	[28448, 8867]	[8790, 8790]	[9000, 9000]	[10000, 10000]	[12000, 12000]
Bandwidth type	MSE-optimal (1)	MSE-optimal (2)	MSE-optimal (3)	9000	10000	12000
Kernel	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov	Epanechnikov
Obs	1606	1606	1606	1606	1606	1606

Notes: (i) The table reports the TSLS and reduced-form estimates for the effects of additional PSF funds on prenatal care visits (to 7 or more), 2008. PSF Funds estimated are estimated in log(Variable) (ii) Vector of municipal controls includes PBF coverage, GDP per capita (log), % urban population, % households with sanitation, piped water and sewer (iii) Main specification, MSE-optimal bandwidth selector for the RD treatment effect estimator calculated by the method proposed by Calonico, Cattaneo, and Titiunik (2014) ; (iv); MSE-optimal (1): one common MSE-optimal bandwidth selector for the RD treatment effect estimator; MSE-optimal (2): two different MSE-optimal bandwidth selectors (below and above the cutoff) for the RD treatment effect estimator; MSE-optimal (3): one common MSE-optimal bandwidth selector for the sum of regression estimates (as opposed to difference thereof). (v) To help evaluate the magnitude of the effects, the dependent variable mean — the average for municipalities within a 7000-population interval above the 30000 population-threshold — is presented.
*** p<0.01, ** p<0.05, * p<0.1; Robust Standard errors in parentheses