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Urban Planning and Local Development: Evidence from Brazil

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This paper studies the effects of mandated urban planning introduced by Brazil's 2001 City Statute, which required municipalities with at least 20,000 inhabitants to adopt a master plan. Exploiting this population threshold in a fuzzy regression discontinuity design and combining survey, fiscal, census, and satellite data, I show that having a master plan generated sustained improvements in housing and urban infrastructure by strengthening local state capacity. Municipalities expanded their set of urban planning and land management instruments beyond the master plan and increased investment in housing and urban infrastructure, financed through higher land-based revenues. State governments further supported these investments by conditioning earmarked transfers on plan adoption.

KEYWORDS
Urbanization, State capacity, Property tax, Housing.

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Planificación Urbana y Desarrollo Local: Evidencia para Brasil

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Este trabajo estudia los efectos de la planificación urbana obligatoria introducida por el Estatuto de la Ciudad de 2001 en Brasil, que exigió a los municipios con al menos 20.000 habitantes adoptar un plan director. Explotando este umbral poblacional mediante un diseño de regresión discontinua difusa y combinando datos de encuestas, fiscales, censales y satelitales, muestro que contar con un plan director generó mejoras sostenidas en vivienda e infraestructura urbana al fortalecer la capacidad estatal local. Los municipios ampliaron su conjunto de instrumentos de planificación y gestión del suelo más allá del plan director y aumentaron la inversión en vivienda e infraestructura urbana, financiada a través de mayores ingresos vinculados al suelo. Los gobiernos estaduales reforzaron estas inversiones al condicionar transferencias a la adopción del plan.

KEYWORDS

Urbanización. Vivienda. Impuesto predial. Capacidad estatal.

1 | INTRODUCTION

The high urbanization rates achieved by developing countries imply that their cities must confront congestion externalities with limited resources and state capacity (Glaeser, 2013; Glaeser and Henderson, 2017). Local governments must be able to align the provision of basic urban infrastructure with settlement patterns and to raise the resources required to finance large infrastructure needs. This urban dimension of state capacity affects the welfare of a large and expanding share of the developing-world population.

Having a master plan is one of the most basic components of urban state capacity. By defining the urban perimeter, the plan determines the supply of formal urban land—affecting housing informality and affordability—and delineates the area subject to the property tax, a key revenue source for financing the infrastructure and public goods needed to manage congestion. Yet such plans remain surprisingly uncommon: only 15 percent of Brazilian municipalities in 2005 and fewer than half of Mexican municipalities in 2024 had a master plan (Alves et al., 2025).

Studying the impacts of urban planning institutions in the developing world faces three main challenges. First, economic development and institutional quality are strongly correlated, complicating the identification of causal effects. A small number of studies have leveraged natural experiments to examine changes in land-use institutions within specific areas of cities (Galiani and Schargrodsky, 2010; Michaels et al., 2021; Harari and Wong, 2025), but no work examines the causal impacts of citywide interventions in urban planning capacity. Second, systematic data on the existence of master plans and other local urban regulations are scarce in developing countries. Third, many effects of urban planning are likely to materialize only in the long run, further increasing data requirements.

This paper addresses these challenges by examining a federal law that mandated Brazilian municipalities with 20,000 or more inhabitants to implement a master plan. The population threshold enables a regression discontinuity design that addresses the identification challenge. I leverage the high-quality and diverse public data available for Brazilian municipalities to evaluate the impacts of approving a master plan on urban laws and regulations, local public finances, the extent and shape of the urban footprint using satellite imagery, and measures of urban infrastructure and quality of life from population censuses. These impacts are measured from the very short run to nearly two decades after the mandate was introduced.

The mandate was introduced by the 2001 City Statute (Estatuto da Cidade), a federal law that required a set of municipalities to approve a master plan by 2006. In addition to the 20,000-population rule, the mandate also applied to municipalities located in officially designated metropolitan or tourist areas. I therefore focus on the 3,301 out of 5,564 municipalities that did not meet these additional criteria in 2005, representing roughly one-third of Brazil's population. The mandate increased the probability of having an approved master plan in 2008 by 39 percentage points. I study the effects of having a master plan using a fuzzy regression discontinuity design, with this estimate serving as the first stage.

The master plan mandate affected Brazilian municipalities along several dimensions that can be grouped into four sets of results, along with a set of informative null effects. First, the approval of the plan expanded the set of urban management laws and regulations, including participatory-democracy institutions central to the spirit of the City Statute. By 2012, treated municipalities exhibited a higher prevalence of urban councils, urban perimeter laws, and instruments for active land-use management and land value capture, such as regulations on joint urban operations (Operação Urbana Consorciada) and grants of real right of use (Concessão do Direito Real de Uso). This institutional upgrading continued over time. By 2018, it included a broad set of zoning laws and land-management instruments, notably the designation of zones of special social interest (ZEIS). This first set of results indicates that implementing a plan strengthened the formal institutional dimension of urban state capacity. The second and third sets of results show that these institutional changes were effective, rather than merely formal.

The second set of results describes how master plans made municipalities more active in implementing housing policies, including the construction of new units, the upgrading of existing ones, and sustained increases in expenditure on housing and urban infrastructure. The third set of results concerns municipal revenues, which financed the higher expenditures on housing and infrastructure. Revenues increased through two channels. First, master plans substantially raised collections from real estate–related taxes, including the property tax (IPTU), the tax on real estate transactions (ITBI), and revenues from land value capture mechanisms such as the onerous grant of the right to build (Outorga Onerosa do Direito de Construir), special assessments (Contribuição de Melhoria), and joint urban operations (Operações Urbanas Consorciadas). The effects on IPTU persisted through 2018, the last year for which data are available. Second, municipalities with master plans received higher transfers from state governments, primarily through convênios, which are earmarked for specific investments in housing and infrastructure. This pattern is consistent with the expenditure-side evidence, and anecdotal accounts suggest that several states required the existence of a master plan as a condition for receiving such transfers.

The improved urban state capacity achieved through mandated master plans translated into better quality of life for residents of treated municipalities, which constitutes the fourth set of results. In the 2010 Census, only a few years after the mandate deadline, treated municipalities exhibited nearly a 70 percent reduction in housing informality. They also experienced a 43 percent increase in the share of households with trash collection and an almost 90 percent reduction in the share of households with water connections located outside the dwelling. Improvements in housing quality persisted more than a decade after the mandate became effective, as shown by the 2022 Census. By that year, municipalities with master plans had almost doubled the share of households with septic tanks connected to the sewer network—a mid-tier sanitation solution between stand-alone septic systems and full sewer connections. A principal component index of housing quality in 2022, aggregating information on wall materials, water provision, trash collection, and sanitation, improved by roughly half a standard deviation.

Finally, I document a set of meaningful null effects that help characterize the scope of the policy's impacts. Having a master plan did not affect city size, whether measured by total population or by the spatial footprint of the urbanized area. There are also no detectable effects on measures of urban form such as sprawl (Burchfield et al., 2006) or cohesion (Harari, 2015). In the already highly urbanized context of Brazil, the plans thus did not affect the extensive margin of city growth but instead improved the quality of the existing urban territory. The policy likewise had no effects on local economic activity, including wages, household incomes, or the number of firms.

Taken together, the results indicate that master plans improved urban living conditions by strengthening multiple dimensions of municipal state capacity. Approving a plan induced municipalities to adopt a broader set of planning, participatory, and land-management regulations, expanding their ability to improve existing urban developments and mobilize revenues tied to urban land. The resulting increase in own-source revenues, complemented by higher earmarked transfers from state governments, financed sustained increases in housing and urban infrastructure investment. These investments translated into improvements in housing formality and access to basic services, without affecting city size, urban form, or aggregate economic activity. This pattern suggests that the effects of urban planning operated primarily through improvements in local public goods and service provision, rather than through changes in spatial structure or economic growth.

This paper contributes to three strands of literature. First, it provides causal evidence on the effects of citywide planning institutions. A large literature studies land-use regulations in developed countries (Saiz, 2010; Turner et al., 2014; Baum-Snow and Han, 2023), with a smaller but growing set of contributions for developing countries (Anagol et al., 2021; Chen et al., 2024; Nagpal and Gandhi, 2024). Henderson et al. (2025) document positive effects of greenfield urban planning on land values in Dar es Salaam, driven by improved property rights and road access, while Michaels et al. (2021) show long-run gains from planned greenfield development in Dar es Salaam and secondary Tanzanian cities. The present paper complements this work by focusing on citywide planning institutions and on contexts in which rapid urban growth has already occurred and the central challenge lies in improving existing urban areas—as it is the case in much of Latin America.

Second, the findings relate to work on the causes and consequences of slum formation (Brueckner and Selod, 2009; Cavalcanti et al., 2018; Alves, 2021; Henderson et al., 2020). Master plans reduced multiple forms of housing deprivation in Brazilian municipalities, including informality and inadequate sanitation and water provision. A substantial body of research shows that improvements along these dimensions have large positive effects on residents' welfare (Field, 2005, 2007; Galiani and Schargrodsky, 2010; Galiani et al., 2017). In particular, extensive evidence documents the severe health consequences of inadequate water and sanitation (Kesztenbaum and Rosenthal, 2017; Alsan and Goldin, 2019), dimensions improved following the implementation of master plans in Brazil.

Finally, the results contribute to the literature on state fiscal capacity in developing countries by identifying an institutional mechanism through which local governments expand their ability to tax immobile bases. A large body of work emphasizes that fiscal capacity depends on administrative and informational investments rather than statutory tax rates alone (Besley and Persson, 2009, 2011). Taxes on land and real property are widely regarded as among the most efficient and least distortionary sources of local revenue (Oates, 1972; Gordon and Li, 2009), yet they have historically underperformed in developing economies. The findings here suggest that improvements in urban planning capacity can translate into sustained gains in property tax revenue.

2 | CONTEXT

In July 2001, the Brazilian parliament approved the City Statute (*Estatuto da Cidade*). The law introduced a set of new urban management instruments and imposed the obligation of having a master plan for a set of municipalities. The mandate applied to municipalities with more than 20,000 inhabitants and to those located within officially designated metropolitan regions or areas of special tourist interest. Municipalities were given five years—until 2006—to comply.

The City Statute was shaped by principles such as the "right to the city," the "social function of urban property," and expanded participatory governance, which were introduced by the 1988 federal constitution. In line with these ideas, the law created several new urban management instruments, including the progressive property tax and zones of special social interest (ZEIS) aimed at upgrading and formalizing informal settlements. It also established requirements for social participation both in the formulation of the master plan and in the governance of the associated instruments.

The three panels in Figure 1 show how the obligation established by the Statute generated a huge increase in the number of municipalities with a master plan. Using retrospective data from 2021, panel a) shows a spike in 2006 in the year of approval of the plan, with more than 700 municipalities having their plan approved that year. The effects of the Statute also show up in the two following years, with around 300 municipalities having their plans approved each year. Panel b) shows the share of municipalities with a master plan. This share was very low before 2006, with less than 10% of municipalities having a master plan. This low incidence illustrates a general deficit of urban planning capabilities, a key local dimension of state capacity that is missing in many developing world cities. In Mexico, in 2023, less than half of the municipalities had a plan (Alves et al., 2025). In Brazil, the share of municipalities with a plan had a discontinuous jump in 2006 and kept growing at a decreasing speed, reaching around 55% by 2021.

Panel (c) of Figure 1 provides further evidence of the Statute's impact: a sharp reduction in the average age of existing master plans in 2006. The figure also reveals a pattern of concern: the average age of master plans increased steadily, exceeding 12 years by 2021—one of the highest levels in the series. Although the Statute required municipalities to update their plans at least every ten years, this requirement is not reflected in the data.

3 | DATA AND SAMPLE

The paper employs five main data sources. First, the Brazilian national statistical agency (IBGE) provides annual municipal population estimates. These figures are used to calculate major federal transfers which depend on population brackets (Corbi et al., 2019), and also determine whether a municipality is legally required to prepare a master plan.

Second, I use IBGE's MUNIC survey on local public policies, which covers all municipalities. I employ the 2008, 2009, 2012, 2018, 2020, and 2021 editions, which contain the most detailed information on urban policies. The MUNIC reports whether each municipality has a master plan and also documents a range of related policies, including housing construction, titling of informal settlements, and the adoption of urban management instruments created by the Estatuto da Cidade, such as progressive property taxation.

Third, I use the 2010 and 2022 population censuses to measure socioeconomic outcomes aggregated at the level of the municipality, with particular attention to housing quality and access to basic urban services. I also use the 2000 census to construct pre-treatment measures of several key outcomes. Table 1 presents descriptive statistics for three censuses aggregated at the municipality level.

The fourth datasource consists of municipal finance data from the federal Finance Ministry's SICONFI information system. These data provide detailed annual accounts of revenues and expenditures, including transfers received from state and federal governments. The dataset covers 2000–2024, although some expenditure categories are available only for a subset of years.

Finally, I incorporate the MapBiomas land-use classification, which identifies urban land use at 30-meter resolution from 1985 to 2023. I compute a few measures of the evolution of municipalities' urban footprint. I focus on the urban polygon of the capital of each municipality. To delineate the urban area of this capital, I start with the dot representing the capital in official maps, and then recursively add urban pixels located less than 2km away. I then calculate Burchfield et al. (2006)'s measure of sprawl of the urban growth for that area. Figure A.1 in the Appendix illustrates this procedure with the two municipalities with the lowest and highest urban growth sprawl measures. Additionally, I compute the total area, perimeter, and disconnection (Harari, 2020) and cohesion (Angel et al., 2010) measures for that polygon.

The main sample includes all municipalities that existed in 2006 and for which the requirement to prepare a master plan depended solely on their population, rather than on the additional criteria established by the Estatuto da Cidade. I therefore exclude municipalities located in metropolitan regions, urban agglomerations, or special tourist areas. This leaves 3,301 municipalities out of the 5,564 that existed in 2006. These municipalities included in the sample represent approximately 70 million people, a third of Brazil's population

4 | RESULTS

4.1 | Validity of the design

I begin by assessing standard validity conditions for the regression discontinuity design. The first check examines the continuity of the population distribution around the 20,000 threshold, which would be violated in the presence of sorting or manipulation. The histogram in Figure A.2 in the Appendix shows no visible discontinuity. A formal density manipulation test yields a p-value of 0.17, failing to reject continuity.

The second check verifies the absence of discontinuities in relevant covariates and outcomes before treatment. Table A.1 in the Appendix reports estimates using pre-treatment data. In the 2000 population census, there are no discontinuities in the share of households with proper sanitation, water access, trash collection, or squatting, all outcomes that are affected by the policy in later censuses. The table also shows no discontinuities in municipal per capita expenditure, total revenue, or property tax revenue. This last outcome is also affected by the policy in the post-treatment period.

The third check is specific to the institutional context of Brazilian municipal finance. Municipalities rely heavily on transfers from the federal government, particularly through the Municipal Participation Fund (FPM), whose allocation is largely determined by population thresholds (Corbi et al., 2019). If any of these thresholds coincided with the 20,000 cutoff used in the master plan mandate, they could confound the estimated effects. This is not the case. The two closest FPM thresholds are 16,980 and 23,772 inhabitants. Figure A.3 in the Appendix plots local averages of FPM transfers as a function of population and shows clear jumps at the FPM thresholds, indicated by dashed vertical lines, but no discontinuity at 20,000. This pattern holds not only in 2006, the year in which the running variable is measured, but also in 2010 and 2014.

4.2 | First stage

I now turn to the first stage of the regression discontinuity design. Table 4 and Figure 2 quantify the increase in master plan adoption at the 20,000-inhabitant threshold across different years. I use plan adoption in 2008 as the benchmark for the first stage, as it is the earliest year for which implementation data are available after the mandate came into effect. Table 4 shows that the policy increased the probability of having a master plan by 39 percentage points in that year. The corresponding graphical evidence in Figure 2 displays a clear discontinuity at the threshold, indicating that the mandate roughly doubled the share of municipalities with a plan.

Although the municipal population and the relevance of the other criteria in the mandate (e.g. metropolitan or tourist area) may change, the 2006 population cutoff continues to discontinuously affect plan adoption in later years. Both the table and the figure show clear and large, though declining in magnitude, discontinuities in the share of municipalities with a master plan in 2012, 2015, and 2021.

4.3 | Main results

The mandate affected municipalities along several relevant dimensions, which I group into five sets of results. I discuss each in turn. Throughout, I present graphical evidence based on binned outcomes together with regression estimates from a fuzzy regression discontinuity design, which capture the effect of having a master plan. The benchmark graphs and regressions follow the defaults set in Cattaneo et al. (2022)'s rdplot and rdrobust STATA commands. For the regression estimates, I present five alternative combinations of kernels, polynomial degrees, and specifications with and without controls.

The first set of results documents how the mandate generated a substantially richer set of urban regulations and management instruments, many of which incorporate participatory governance. These results are based on the MUNIC surveys, particularly the 2012 and 2018 editions, which provide detailed information on municipal urban regulations. The mandate increased the adoption of a wide range of laws. Figure 3 illustrates the discontinuities for three representative regulations in different years: the regulation of joint urban operations in 2008, the establishment of an urban perimeter in 2012, and the regulation of zones of special social interest (ZEIS) in 2018.

Table A.2 in the Appendix reports regression estimates for the effect of having a master plan on the adoption of 18 different municipal laws, most of them measured in 2018. Many of these instruments were explicitly introduced by the City Statute. The results can be grouped into four categories. First, the mandate increased the use of core planning tools, including laws defining the urban perimeter (Column 2), regular zoning (Column 9), environmental zoning (Column 15), building codes (Column 14), and requirements for impact studies (Columns 4 and 13). Second, it raised the prevalence of participatory institutions, such as urban councils (Column 1). Third, it expanded the use of instruments aimed at the upgrading and formalization of informal settlements, including ZEIS (Column 5), the concession of the real right of use (Column 3), and urban usucapion (Column 19). Fourth, it increased the adoption of land value capture instruments, such as the onerous grant of the right to build (Outorga Onerosa do Direito de Construir, Column 10), special assessments (Contribuição de Melhoria, Column 11), and joint urban operations (Operação Urbana Consorciada, Column 12). The latter instruments are explicitly designed to recover land value gains or finance public works. Importantly, the City Statute mandates that revenues obtained through these instruments be allocated to social housing, urban infrastructure, or land titling programs.

The second set of results shows that master plans led to higher investment in housing policy and urban infrastructure. Figure 4 documents positive effects on the share of municipalities reporting, in the MUNIC surveys, the construction of new housing units in 2007 and 2008, the existence of a municipal housing fund in 2009, and the implementation of housing improvement programs in 2018 and 2020. The effects on these self-reported measures are corroborated by fiscal data. Figure 5 presents regression discontinuity estimates of the impact of the master plan on per capita expenditure in housing (Panel a) and urban infrastructure (Panel b) for each year between 2004 and 2024. The effect on housing began in 2009 and persisted until 2015. The impact on urban infrastructure is evident as early as 2006, peaks between 2008 and 2013, and persists until 2020. Tables A.3 and A.4 in the Appendix report multiple regression specifications focusing on average per capita expenditure over 2010–2012, the period in which effects are strongest for both categories. Figure A.4 in the Appendix presents the corresponding graphical evidence showing clear discontinuities in the housing and urban infrastructure expenditure during those years.

The third set of results examines how municipalities financed these higher expenditures. I find that having a master plan increased revenues through two main channels: own-source revenues and transfers from state governments. On the own-revenue side, the plan raised collections from taxes linked to urban land and housing. Panel (a) of Figure 6 reports regression discontinuity estimates for per capita revenue from real estate–related taxes for each year between 2004 and 2017. Revenue in this category increased beginning in 2009 and remained higher until 2015. Panel (b) presents the corresponding discontinuity graph for average revenue over 2010–2012, when the effect is largest. Table A.5 reports the associated regression estimates under alternative specifications.

The two main components of real estate taxation in Brazilian municipalities are the property tax (IPTU) and the tax on housing transactions (ITBI). Figure A.5 in the Appendix shows the effect of the policy on per capita revenue from each tax between 2000 and 2018. The increase in IPTU revenue begins in 2009 and persists through 2018, while the effect on ITBI is more transitory, emerging in 2008 and disappearing by 2016. Figure A.6 and Table A.6 in the Appendix provide graphical and regression evidence of the IPTU discontinuity for selected years between 2009 and 2021.

Beyond IPTU and ITBI, the plan also increased revenues from land value capture mechanisms, including the onerous grant of the right to build, solo criado, transfers of development rights, and joint urban operations.[1] Collecting revenue from these instruments often requires updating assessed property values (Planta de Valores), since tax bases are typically well below market values. The City Statute requires that all such instruments be authorized by municipal law and grounded in the master plan, consistent with the institutional changes documented in the first set of results.

In 2009, 94 percent of municipalities already collected IPTU revenue according to the MUNIC, limiting the scope for extensive-margin effects. Consistent with this, I find no impact on the probability of collecting IPTU in either the 2009 or 2015 MUNIC. I also find no effects on city expansion, measured either by urban area or by the number of households, indicating that the revenue gains operate through an intensive margin, with existing properties paying more. This pattern is consistent with the adoption of land value capture instruments and with the absence of effects on other taxes and revenue sources unrelated to land use, such as the ISS, FPM, or ICMS. Together, these results indicate that the master plan did not generate a generalized increase in municipal revenues, but instead affected specific fiscal instruments tied to urban land.

A second financing channel operates through increased transfers from state governments. Together with federal transfers, these constitute the main source of municipal revenue in Brazil, particularly for smaller municipalities. The effects are concentrated in transfers earmarked for investment, consistent with the observed increases in housing and infrastructure expenditure. Panel (a) of Figure 7 shows positive effects on per capita state transfers in 2009, 2010, and 2012, while Panel (b) presents the discontinuity for the 2010–2012 average. Table A.7 in the Appendix reports regression estimates for alternative specifications. Anecdotal evidence suggests that states frequently conditioned access to these transfers on municipalities having approved a master plan.

The fourth set of results documents substantial improvements in urban quality of life. I find positive discontinuities in both the 2010 and 2022 population censuses for key housing and infrastructure indicators. Figure 8 shows that the plan reduced the share of households that neither rent nor own their dwelling, a measure of housing informality, as well as the share of households with water connections outside the home and without trash collection. Figure 9 shows improvements in sanitation outcomes and in a summary index of housing deprivation in the 2022 census. Tables A.8 through A.12 report the corresponding regression estimates.

[1] Results available upon request.

Finally, I group a set of relevant null results. Having a master plan did not increase city size, measured either by total population or by the urban footprint identified in the MapBiomas data. The policy also had no detectable effects on average income or wages in the census, nor did it alter several measures of urban form constructed from satellite imagery.

Taken together, the results point to a coherent mechanism linking the master plan mandate to improvements in urban living conditions. The mandate first altered local institutions by inducing municipalities to adopt a broader set of planning, participatory, and land-management regulations. These institutional changes expanded municipalities' ability to guide urban development and to mobilize revenues tied to urban land, particularly through property taxation and land value capture instruments. The resulting increase in own-source revenues, complemented by higher earmarked transfers from state governments, financed sustained increases in housing and urban infrastructure investment. These investments, in turn, translated into improvements in housing formality and access to basic services, without affecting city size, urban form, or aggregate economic activity. This pattern is consistent with urban planning operating primarily through improvements in local public goods and service provision, rather than through changes in spatial structure or economic growth.

5 | CONCLUDING REMARKS

Approving a master plan in Brazilian municipalities following the City Statute mandate led to meaningful short- and medium-run improvements in urban quality of life. These gains were driven by sustained increases in public spending on housing and urban infrastructure, financed primarily through higher revenues from property taxation and other land-based fiscal instruments. The results highlight how mandating urban planning, when paired with a comprehensive set of land management and value capture tools, can strengthen local state capacity and translate institutional reforms into tangible welfare improvements. More broadly, the findings suggest that urban planning institutions can play a central role in improving living conditions in rapidly urbanizing cities in the developing world.

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REFERENCES

Alsan, M. and Goldin, C. (2019) Watersheds in Child Mortality: The Role of Effective Water and Sewerage Infrastructure, 1880–1920. *Journal of Political Economy*, **127**, 586–638. URL: https://www.journals.uchicago.edu/doi/abs/10.1086/700766.

Alves, G. (2021) Slum growth in Brazilian cities. *Journal of Urban Economics*, **122**. URL: https://www.sciencedirect.com/science/article/pii/S0094119021000097.

Alves, G., Brassiolo, P., Buccari, F., Camacho, C., Cifuentes, R., Estrada, R. and Fajardo, G. (2025) *Nearby solutions: The role of regional and local governments in Latin America and the Caribbean*. Caf development bank of latin america and the caribbean edn. URL: https://scioteca.caf.com/handle/123456789/2432.

Anagol, S., Ferreira, F. and Rexer, J. (2021) Estimating the Economic Value of Zoning Reform. URL: https://www.nber.org/papers/w29440.

Angel, S., Parent, J. and Civco, D. L. (2010) Ten compactness properties of circles: measuring shape in geography. *Canadian Geographies / Géographies canadiennes*, **54**, 441–461. URL: https://onlinelibrary.wiley.com/doi/10.1111/j.1541-0064.2009.00304.x.

Baum-Snow, N. and Han, L. (2023) The microgeography of housing supply. *Journal of Political Economy*.

Besley, T. and Persson, T. (2009) The Origins of State Capacity: Property Rights, Taxation, and Politics. *American Economic Review*, **99**, 1218–1244. URL: https://www.aeaweb.org/articles?id=10.1257/aer.99.4.1218.

— (2011) *Pillars of Prosperity: The Political Economics of Development Clusters*. Princeton University Press. URL: https://www.jstor.org/stable/j.ctt1d2dmcd.

Brueckner, J. K. and Selod, H. (2009) A Theory of Urban Squatting and Land-Tenure Formalization in Developing Countries. *American Economic Journal: Economic Policy*, **1**, 28–51. URL: http://ideas.repec.org/a/aea/aejpol/v1y2009i1p28-51.html.

Burchfield, M., Overman, H. G., Puga, D. and Turner, M. A. (2006) Causes of Sprawl: A Portrait from Space*. *The Quarterly Journal of Economics*, **121**, 587–633. URL: https://doi.org/10.1162/qjec.2006.121.2.587.

Calonico, S., Cattaneo, M. D., Farrell, M. H. and Titiunik, R. (2017) rdrobust: Software for regression-discontinuity designs. *Stata Journal*, **17**, 372–404.

Calonico, S., Cattaneo, M. D. and Titiunik, R. (2014) Robust data-driven inference in the regression-discontinuity design. *Stata Journal*, **14**, 909–946.

Cattaneo, M. D., Jansson, M. and Ma, X. (2022) RDDENSITY: Stata module to perform Manipulation Testing Using Local Polynomial Density Estimation. *Statistical Software Components*. URL: https://ideas.repec.org//c/boc/bocode/s459094.html. Publisher: Boston College Department of Economics.

Cavalcanti, T., da Mata, D. and dos Santos, M. (2018) On the causes of slum formation. *Economic Journal*.

Chen, L., Hasan, R., Jiang, Y. and Parkhomenko, A. (2024) Faster, taller, better: Transit improvements and land use policies. *Journal of Development Economics*, **171**, 103322. URL: https://www.sciencedirect.com/science/article/pii/S0304387824000713.

Corbi, R., Papaioannou, E. and Surico, P. (2019) Regional Transfer Multipliers. *The Review of Economic Studies*, **86**, 1901–1934. URL: https://ideas.repec.org//a/oup/restud/v86y2019i5p1901-1934..html.

Field, E. (2005) Property Rights and Investment in Urban Slums. *Journal of the European Economic Association*, **3**, 279–290. URL: http://ideas.repec.org/a/tpr/jeurec/v3y2005i2-3p279-290.html.

— (2007) Entitled to Work: Urban Property Rights and Labor Supply in Peru. *The Quarterly Journal of Economics*, **122**, 1561–1602. URL: http://ideas.repec.org/a/tpr/qjecon/v122y2007i4p1561-1602.html.

Galiani, S., Gertler, P. J., Undurraga, R., Cooper, R., Martínez, S. and Ross, A. (2017) Shelter from the storm: Upgrading housing infrastructure in Latin American slums. *Journal of Urban Economics*, **98**, 187–213. URL: https://www.sciencedirect.com/science/article/pii/S0094119016300572.

Galiani, S. and Schargrodsky, E. (2010) Property rights for the poor: Effects of land titling. *Journal of Public Economics*, **94**, 700–729. URL: http://ideas.repec.org/a/eee/pubeco/v94y2010i9-10p700-729.html.

Glaeser, E. and Henderson, J. V. (2017) Urban economics for the developing World: An introduction. *Journal of Urban Economics*, **98**, 1–5. URL: https://ideas.repec.org/a/eee/juecon/v98y2017icp1-5.html.

Glaeser, E. L. (2013) A World of Cities: The Causes and Consequences of Urbanization in Poorer Countries. *NBER Working Paper 19745*, National Bureau of Economic Research, Inc. URL: http://ideas.repec.org/p/nbr/nberwo/19745.html.

Gordon, R. and Li, W. (2009) Tax structures in developing countries: Many puzzles and a possible explanation. *Journal of Public Economics*, **93**, 855–866. URL: https://www.sciencedirect.com/science/article/pii/S004727270900036X.

Harari, M. (2015) Cities in bad shape: Urban geometry in india. *Job market paper, Massachusetts Institute of Technology*. URL: http://www.theigc.org/wp-content/uploads/2015/05/5MariaflaviaHarari.pdf.

— (2020) Cities in Bad Shape: Urban Geometry in India. *American Economic Review*, **110**, 2377–2421.

Harari, M. and Wong, M. (2025) Slum Upgrading and Long-Run Urban Development: Evidence from Indonesia. *The Review of Economic Studies*, rdaf090. URL: https://doi.org/10.1093/restud/rdaf090.

Henderson, J. V., Líbano Monteiro, F., Manara, M. and Michaels, G. (2025) Economics of Greenfield Urban Planning. URL: https://papers.ssrn.com/abstract=5250998.

Henderson, J. V., Regan, T. and Venables, A. J. (2020) Building the city: from slums to a modern metropolis. *Review of Economic Studies*. URL: http://www.lse.ac.uk/geography-and-environment/research/discussion-paper-series.

Kesztenbaum, L. and Rosenthal, J.-L. (2017) Sewers' diffusion and the decline of mortality: The case of Paris, 1880–1914. *Journal of Urban Economics*, **98**, 174–186. URL: http://www.sciencedirect.com/science/article/pii/S0094119016000139.

Michaels, G., Nigmatulina, D., Rauch, F., Regan, T., Baruah, N. and Dahlstrand, A. (2021) Planning Ahead for Better Neighborhoods: Long-Run Evidence from Tanzania. *Journal of Political Economy*. URL: https://www.journals.uchicago.edu/doi/10.1086/714119.

Nagpal, G. and Gandhi, S. (2024) Scaling heights: affordability implications of zoning deregulation in India. *Job Market Paper, Brown University*. URL: https://scholar.google.com/scholar?cluster=5737556254609392136&hl=en&oi=scholarr.

Oates, W. E. (1972) Fiscal federalism. *New York*, **1**.

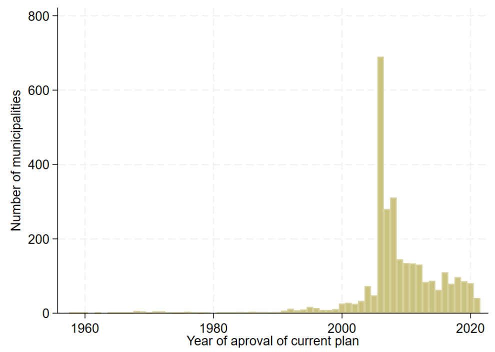
Saiz, A. (2010) The Geographic Determinants of Housing Supply. *The Quarterly Journal of Economics*, **125**, 1253–1296. URL: http://qje.oxfordjournals.org/content/125/3/1253.

Turner, M. A., Haughwout, A. and van der Klaauw, W. (2014) Land Use Regulation and Welfare. *Econometrica*, **82**, 1341–1403. URL: http://onlinelibrary.wiley.com/doi/10.3982/ECTA9823/abstract.

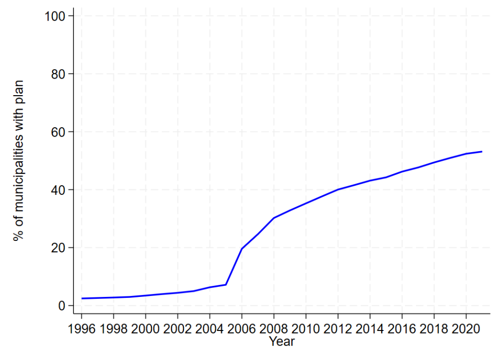
TABLES AND FIGURES

FIGURE 1 Master plans in Brazilian municipalities

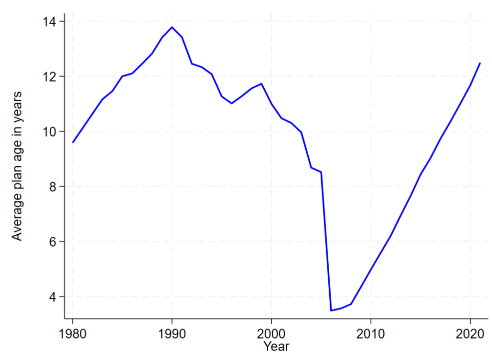
(a) Master plan year of approval.



(b) Share of municipalities with a master plan.

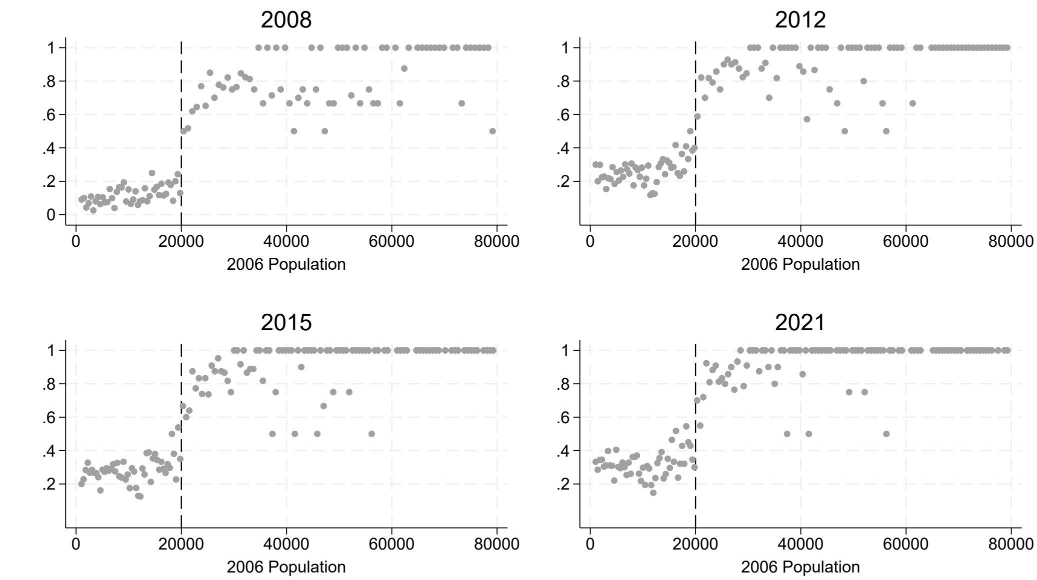


(c) Average age of the master plan.



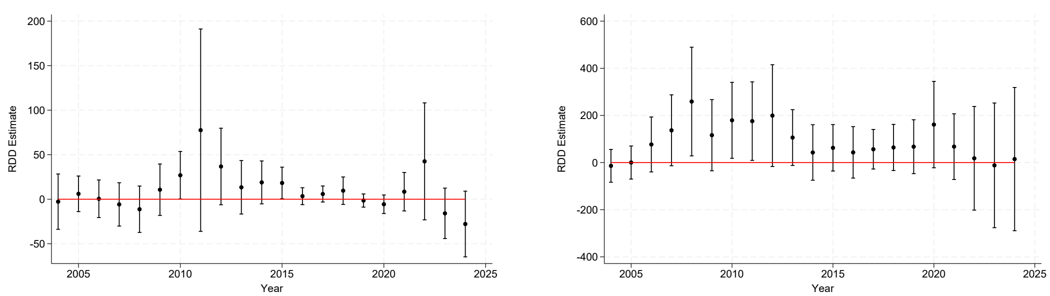
Notes: All panels are constructed with data from the 2021 edition of the MUNIC survey. Thus, in panel a), the approval year refers to the municipality's current plan at the time of that survey. Panel (b) plots the cumulative share of municipalities with an adopted master plan by year. Panel (c) reports the average age (in years) of the current master plan, as measured from 2021.

FIGURE 2 Impact on the probability of having a master plan.



Notes: The variables in the y-axis are binary and capture if the municipality declared to have a master plan in different editions of the MUNIC survey. The dots are local averages in bins of the same size. This size corresponds to the mimicking variance evenly-spaced method using spacing estimators provided by the `rdplot` Stata command by Calonico et al. (2014). I restrict the sample to municipalities with a population of less than 80,000 in 2006.

FIGURE 5 Impact on per capita public expenditure in housing and urban infrastructure.



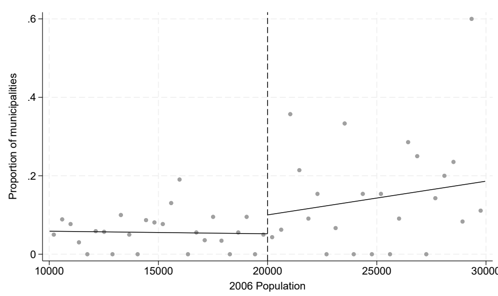
(a) Housing

(b) Urban infrastructure

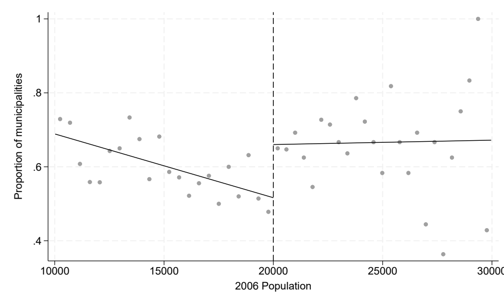
Notes: Each point estimate corresponds to a different fuzzy regression discontinuity in which the 2006 population is the running variable, 20,000 is the cutoff, having a master plan in 2008 is the treatment, and the dependent variable is the per capita expenditure in the corresponding year. Point estimates are obtained with a local polynomial regression with a triangular kernel and a polynomial of degree 1 in a symmetric, Mean Squared Error-optimal window using the `rdrobust` Stata command by Calonico et al. (2017).

FIGURE 3 Impact on the probability of having certain urban laws.

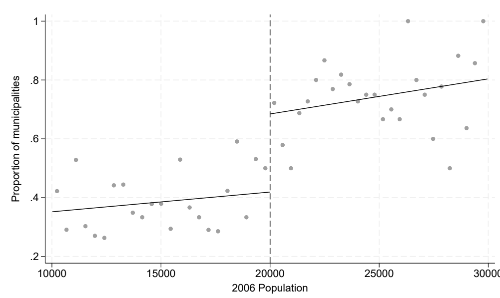
(a) Joint development. 2008.



(b) Urban perimeter. 2012.



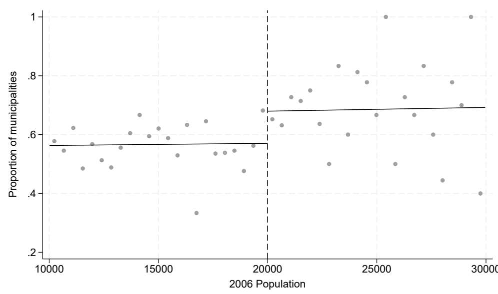
(c) Special zones of social interest. 2018.



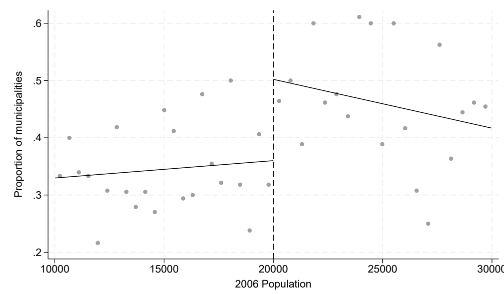
Notes: The variables in the y-axis are binary and capture if the municipality declared to have each law in different editions of the MUNIC survey. The dots are local averages in bins of the same size. This size corresponds to the mimicking variance evenly-spaced method using spacing estimators provided by the `rdplot` Stata command by Calonico et al. (2014). I restrict the sample to municipalities with a population of more than 10,000 and less than 30,000 in 2006.

FIGURE 4 Impact on housing interventions.

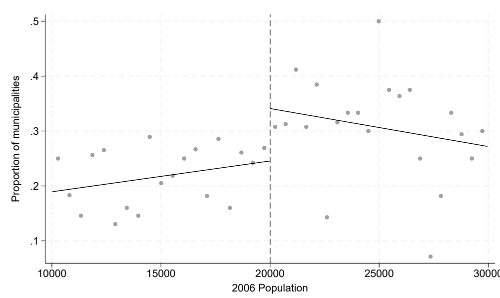
(a) Public construction of new housing units by the municipality. 2007 and 2008.



(b) Existence of municipal public housing fund. 2009.

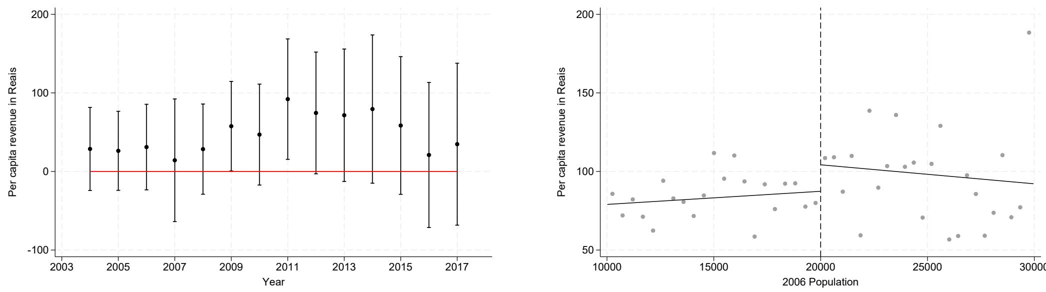


(c) Improvement of existing housing units. 2018 and 2020.



Notes: The dots are local averages in bins of the same size. This size corresponds to the mimicking variance evenly-spaced method using spacing estimators provided by the `rdplot` Stata command by Calonico et al. (2014). The lines are polynomials of degree one estimated separately on each side of the threshold. Variables represented on the y-axis are binary outcomes obtained from different editions of the MUNIC survey. The existence of public construction of new housing units is obtained from the 2008 edition, the existence of a municipal housing fund from the 2009 edition, and the existence of actions improving existing housing units is measured at the 2020 MUNIC. The year of reference of each outcome may differ from the year of the survey, as indicated in each graph's title. For instance, the 2020 MUNIC edition asked for improvement actions between 2018 and 2020. I restrict the sample to municipalities with a population of more than 10,000 and less than 30,000 in 2006.

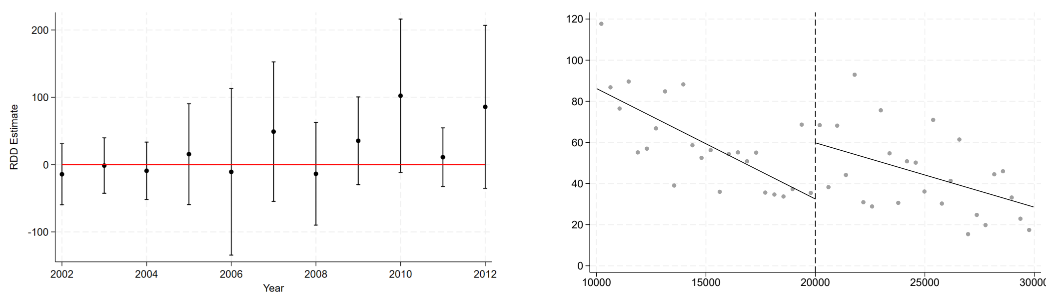
FIGURE 6 Impact on per capita revenue from real estate taxes.



(a) Effects by year. (b) Average effects: 2010–2012.

Notes: In panel (a), each point estimate corresponds to a different fuzzy regression discontinuity in which the 2006 population is the running variable, 20,000 is the cutoff, having a master plan in 2008 is the treatment, and the dependent variable is the per capita revenue from real estate-related taxes in the corresponding year. Point estimates are obtained with a local polynomial regression with a triangular kernel and a polynomial of degree 1 in a symmetric, mean-squared-error-optimal window using the `rdrobust` Stata command by Calonico et al. (2017). In panel (b), the dots are local averages in evenly spaced bins. The bin size corresponds to the mimicking-variance method using spacing estimators from the `rdplot` Stata command by Calonico et al. (2014). The lines are first-degree polynomials estimated separately on each side of the threshold. I restrict the sample to municipalities with a population of more than 10,000 and less than 30,000 in 2006.

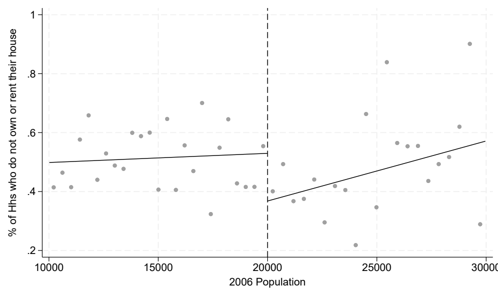
FIGURE 7 Impact on per capita revenue from capital transfers received from the state.



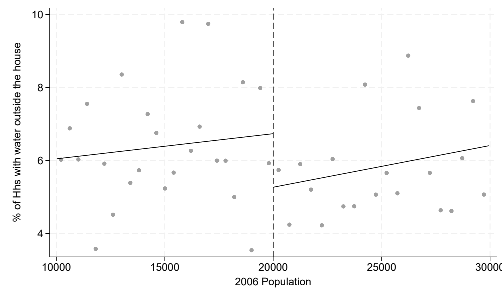
(a) Effects by year. (b) Average effects: 2010–2012.

Notes: In panel (a), each point estimate corresponds to a different fuzzy regression discontinuity in which the 2006 population is the running variable, 20,000 is the cutoff, having a master plan in 2008 is the treatment, and the dependent variable is the per capita revenue from capital transfers received from the municipality's state in the corresponding year. Point estimates are obtained with a local polynomial regression with a triangular kernel and a polynomial of degree 1 in a symmetric, mean-squared-error-optimal window using the `rdrobust` Stata command by Calonico et al. (2017). In panel (b), the dots are local averages in evenly spaced bins. The bin size corresponds to the mimicking-variance method using spacing estimators from the `rdplot` Stata command by Calonico et al. (2014). The lines are first-degree polynomials estimated separately on each side of the threshold. I restrict the sample to municipalities with a population of more than 10,000 and less than 30,000 in 2006.

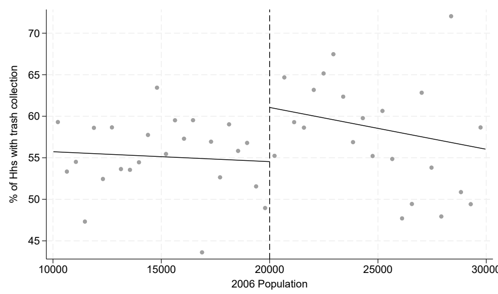
FIGURE 8 Impact on variables in the 2010 census.



(a) Share of households that do not own or rent their house.



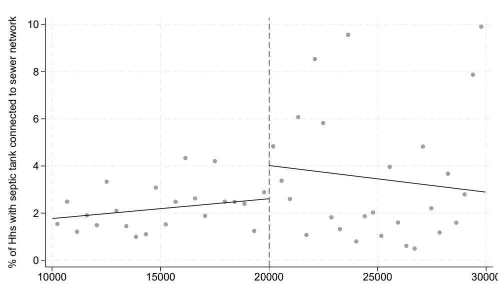
(b) Share of households with water outside their house.



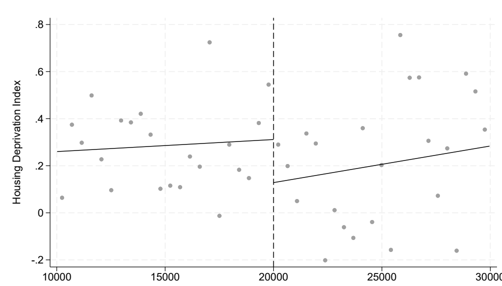
(c) Share of households with trash collection.

Notes: The dots are local averages in bins of the same size. This size corresponds to the mimicking-variance evenly-spaced method using spacing estimators provided by the `rdplot` Stata command by Calonico et al. (2014). The lines are polynomials of degree one estimated separately on each side of the threshold. Variables represented on the y-axis are obtained from the 2010 Brazilian Census. I restrict the sample to municipalities with a population of more than 10,000 and less than 30,000 in 2006.

FIGURE 9 Impact on variables in the 2022 census.



(a) Share of households with septic tank connected to the sewer network.



(b) Index of housing deprivation.

Notes: The dots are local averages in bins of the same size. This size corresponds to the mimicking-variance evenly-spaced method using spacing estimators provided by the `rdplot` Stata command by Calonico et al. (2014). The lines are polynomials of degree one estimated separately on each side of the threshold. Variables represented on the y-axis are obtained from the 2022 Brazilian Census. The housing deprivation index is the first factor in a principal factor analysis performed with municipality-level data over the following variables: deprivation in sanitation, deprivation in water, deprivation in trash collection, and deprivation in wall materials. I restrict the sample to municipalities with a population of more than 10,000 and less than 30,000 in 2006.

TABLE 1 Descriptive statistics from the population censuses.

	2000		2010		2022	
	Mean	sd	Mean	sd	Mean	sd
Population	16,364	48,491	17,794	58,828	20,226	46,786
Owner	78.9	7.8	76.8	9.2	76.8	8.9
Renter	12.4	6.1	11.3	6.6	14.9	7.5
Informal occupant	0.52	1.02	0.52	0.85	0.62	1.13
Other tenure status	8.2	3.5	11.4	4.3	7.7	3.9
Trash collection	50.5	26.2	67.6	21.8	78.4	17.6
Water outside the house	11.6	15.2	4.8	7.0	3.8	6.0
Sanitation: network	21.2	29.0	28.0	31.7	32.8	33.2
Sanitation: septic tank	9.5	15.4	11.9	15.8	19.1	21.6
Other	69.3	5.3	60.1	5.1	48.1	4.2
N	3,241		3,299		3,299	

Notes: The sample is those municipalities not belonging to metropolitan or tourist areas in 2005.

TABLE 2 Descriptive statistics: per capita municipal expenditure and income variables in 2024 Brazilian reais (BRL).

	2004		2012		2017	
	Mean	sd	Mean	sd	Mean	sd
Panel A: Municipal Expenditure						
Total	2,568	1,364	4,732	2,183	4,464	1,962
Housing	22.0	78.2	25.4	135.6	7.8	57.1
Urban infrastructure	72.7	131.6	174.4	281.1	101.3	168.6
Panel B: Municipal Revenue						
Total	2,757	1,457	4,958	2,365	4,937	2,351
Transfers received	2,487	1,316	4,416	2,109	4,352	2,122
Real-state taxes	69.0	80.3	119.6	117.7	143.9	148.1
IPTU	25.3	59.4	38.7	76.4	46.9	85.5
ITBI	17.1	30.5	32.4	47.1	34.6	65.2
N	3,055		3,056		3,288	

Notes: Revenues are current or effective. In some years, they differ slightly from budgetary revenue. The sample is those municipalities not belonging to metropolitan or tourist areas in 2005.

TABLE 3 Descriptive statistics: urban plans and urban legislation

	Mean (%)	Obs.
Panel A: Urban master plan		
2005	9.6	3,299
2008	24.6	3,298
2009	31.8	3,299
2012	38.1	3,299
2015	40.3	3,299
2018	42.2	3,298
2021	43.9	3,296
Panel B: Laws and regulations		
Urban Council (2012)	16.7	3,299
Urban Perimeter (2012)	69.1	3,299
Real Right Concession (2012)	7.7	3,299
Impact Study (2012)	7.5	3,299
ZEIS (2018)	47.5	3,298
Special Areas (2018)	36.4	3,298
Urban Perimeter (2018)	89.0	3,298
Land Subdivision (2018)	58.9	3,298
Zoning (2018)	54.1	3,298
Solo criado (2018)	32.2	3,298
Special assessment (2018)	55.0	3,298
Joint development (2018)	22.5	3,298
Impact Study (2018)	30.3	3,298
Building Code (2018)	62.2	3,297
Environmental Zoning (2018)	29.6	3,298
Predial servitude (2018)	16.0	3,298
Historic Preservation (2018)	27.7	3,298
Housing Policy (2018)	26.7	3,297
Usucapion (2018)	13.4	3,298
Surface Rights (2018)	17.6	3,298

Notes: Data obtained from different editions of the MUNIC surveys. The sample is those municipalities not belonging to metropolitan or tourist areas in 2005.

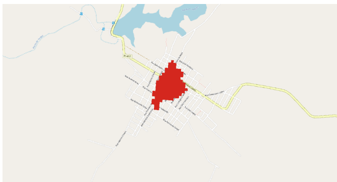
TABLE 4 First Stage. Effect on the probability of having a master plan.

	(1) 2008	(2) 2012	(3) 2015	(4) 2021
RD Effect	0.39***	0.35***	0.30***	0.31***
	(0.04)	(0.05)	(0.05)	(0.05)
Bandw.	20,316	16,197	15,484	14,908
Observations	3,300	3,301	3,301	3,301
Effective Obs.	3,047	2,359	2,110	1,944

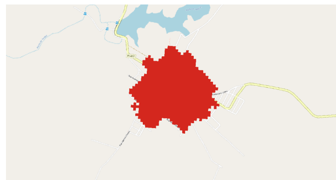
Notes: Estimates correspond to a regression discontinuity design with the 2006 population as the running variable and 20,000 as the cutoff. The dependent variables are indicators of having a master plan in the MUNIC survey of each year. Point estimates are obtained with a local polynomial regression with a triangular kernel and a polynomial of degree 1 in a symmetric, MSE-optimal window using the `rdrobust` Stata command by Calonico et al. (2017).

A | ONLINE APPENDIX

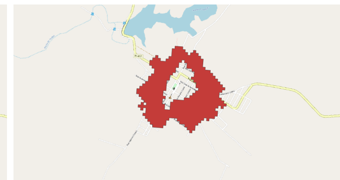
FIGURE A.1 Lowest and highest urban sprawl in the MapBiomas database



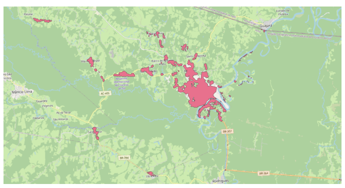
Curral novo do Piauí. 2000.



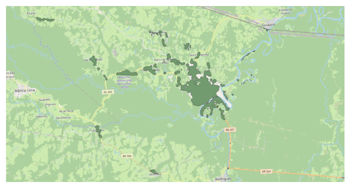
Curral novo do Piauí. 2023.



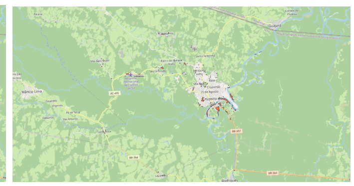
2000-2023 Change



Cruzeiro do Sul. 2000.



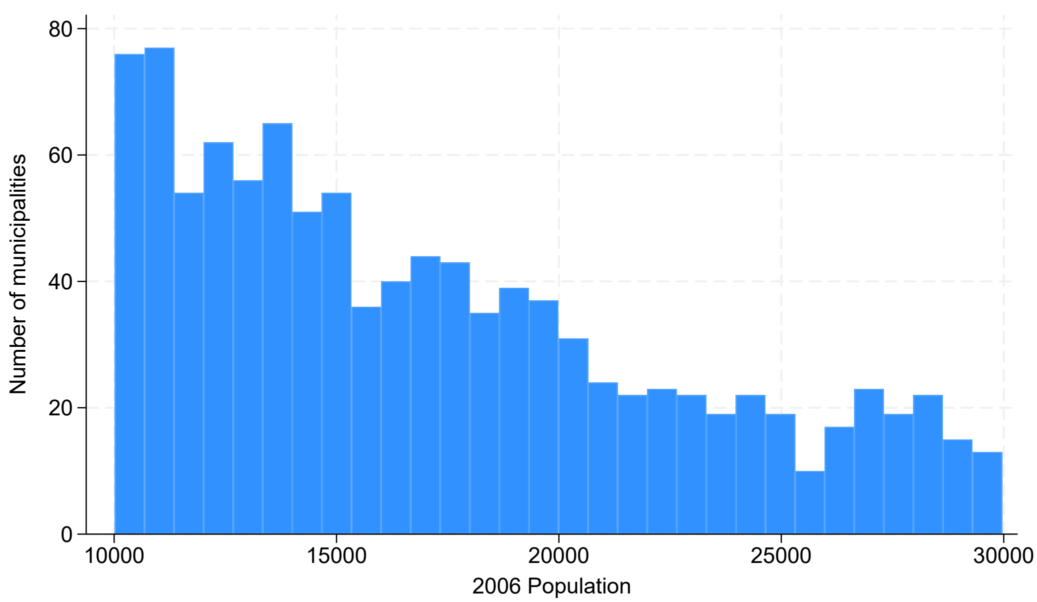
Cruzeiro do Sul. 2023.



2000-2023 Change

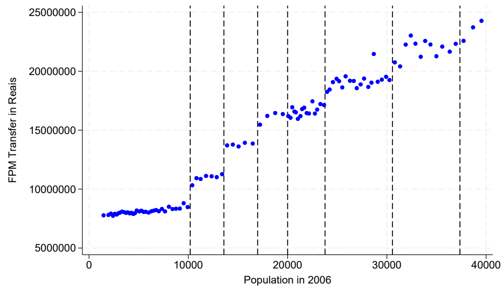
Notes: The two municipalities are the ones with the lowest (up) and highest (bottom) measures of sprawl of urban growth using Burchfield et al. (2006)'s measure.

FIGURE A.2 Number of municipalities near the 20,000 population threshold.

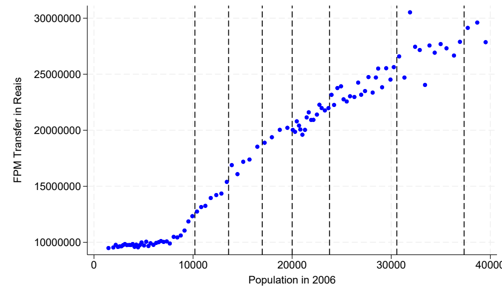


Notes: Population estimated by IBGE. Municipalities are those not mandated by reasons other than population size. The sample thus excludes municipalities that were part of urban agglomerations or areas of touristic interest according to the 2005 MUNIC survey and that were not part of metropolitan regions or urban agglomerations in 2005 according to IBGE.

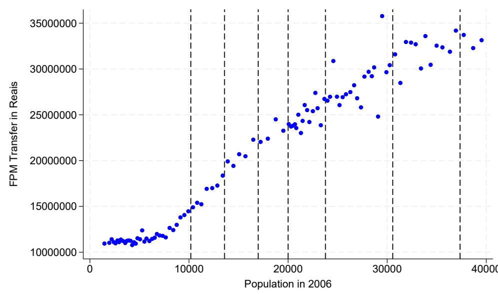
FIGURE A.3 2006 population and FPM transfers across different years.



(a) 2006



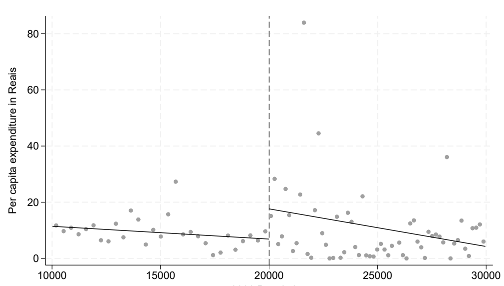
(b) 2010



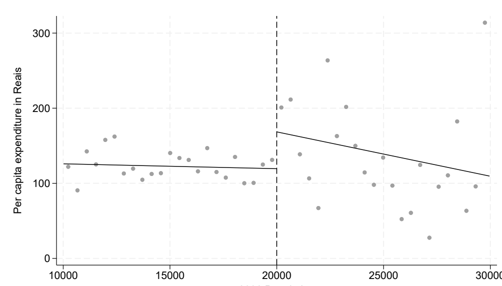
(c) 2014

Notes: The graphs show local averages of the 2006 population and the respective year of FPM transfers. There are 50 bins on each side of the 20,000 population threshold. Bins on the same side of the discontinuity have the same number of observations. The vertical lines correspond to the FPM thresholds except for the 20,000.

FIGURE A.4 Effect on per capita public expenditure on housing and urban infrastructure: 2010–2012 average.



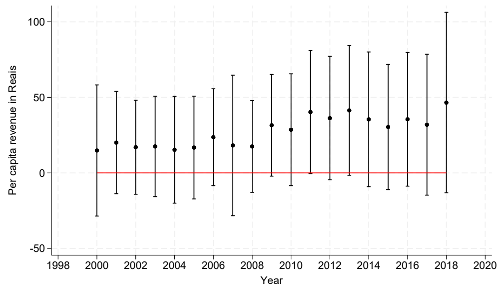
(a) Expenditure on housing



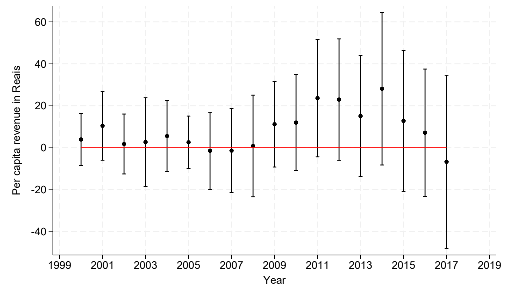
(b) Expenditure on urban infrastructure

Notes: The dots are local averages in bins of the same size. This size corresponds to the mimicking-variance evenly-spaced method using spacing estimators provided by the `rdplot` Stata command by Calonico et al. (2014). The lines are first-degree polynomials estimated separately on each side of the threshold.

FIGURE A.5 Effect on per capita revenue from IPTU and ITBI taxes.



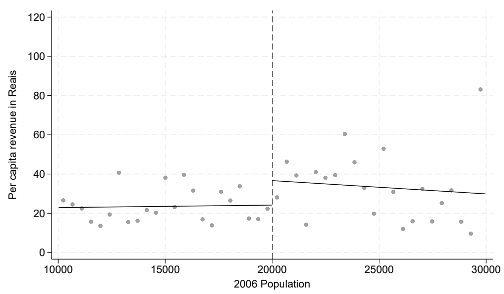
(a) IPTU



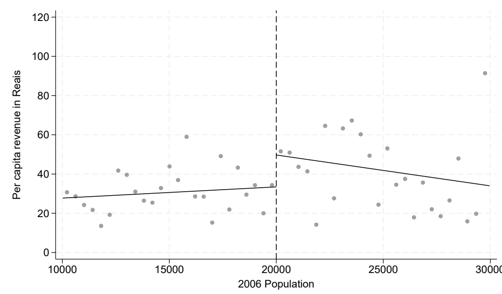
(b) ITBI

Notes: Each point estimate corresponds to a different fuzzy regression discontinuity in which the 2006 population is the running variable, 20,000 is the cutoff, having a master plan in 2008 is the treatment, and the dependent variable is the per capita revenue from property taxes in the corresponding year. Point estimates are obtained with a local polynomial regression with a triangular kernel and a polynomial of degree 1 in a symmetric, mean-squared-error-optimal window using the `rdrobust` Stata command by Calonico et al. (2017).

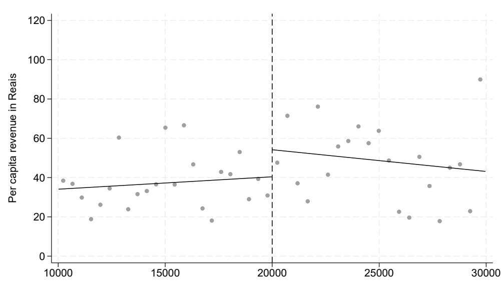
FIGURE A.6 Effect on per capita revenue from IPTU.



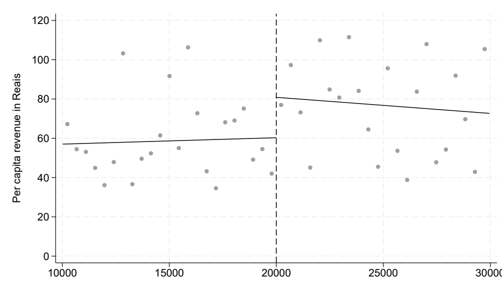
(a) 2009



(b) 2013



(c) 2017



(d) 2021

Notes: Each point estimate corresponds to a different fuzzy regression discontinuity in which the 2006 population is the running variable, 20,000 is the cutoff, having a master plan in 2008 is the treatment, and the dependent variable is the per capita revenue from property taxes in the corresponding year. Point estimates are obtained with a local polynomial regression with a triangular kernel and a polynomial of degree 1 in a symmetric, mean-squared-error-optimal window using the `rdrobust` Stata command by Calonico et al. (2017).

TABLE A.1 Validity of the Regression Discontinuity Design. Effects on variables measured in 2000.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	2000 census							
	Sanitation	Water	People/bed	Mean. Income	Trash	Squatting	Owners	Renters
RD Effect	0.01	0.01	-0.08	117.82	-0.06	0.00	-0.01	0.02
	(0.11)	(0.06)	(0.10)	(87.55)	(0.08)	(0.00)	(0.02)	(0.02)
Obs	3,241	3,242	3,242	3,242	3,242	3,242	3,242	3,242

	(9)	(10)	(11)	(12)
	Urban footprint	Fiscal variables per cap		
		Expenditure	Revenue	Property tax
RD Effect	0.10	333.29	329.07	14.84
	(0.74)	(300.61)	(291.51)	(22.14)
Obs	3,300	3,142	3,142	3,142

Notes: Estimates correspond to a fuzzy regression discontinuity design with the 2006 population as the running variable, 20,000 as the cutoff, and having a master plan in 2008 as the treatment. Point estimates are obtained with a local polynomial regression with a triangular kernel and a polynomial of degree 1 in a symmetric, Mean Squared Error-optimal window using the rdrobust stata command by Calonico et al. (2017).

TABLE A.2 Effects on laws and regulations in 2012 and 2018.

	(1)	(2)	(3)	(4)	(5)
	Urban Council	Urban Perimeter	Real Right Concession	Impact Study	ZEIS
RD Effect	0.46^{***}	0.29^{**}	0.22^{**}	0.22^{**}	0.74^{***}
	(0.13)	(0.15)	(0.10)	(0.10)	(0.13)
Bandw.	16,978	17,003	14,462	14,373	16,290
Effective Obs.	2,593	2,603	1,836	1,809	2,397
Observations	3,300	3,300	3,300	3,300	3,299
	(6)	(7)	(8)	(9)	(10)
	Special Areas	Urban Perimeter	Land Subdivision	Zoning	Solo criado
RD Effect	0.56^{***}	0.24^{**}	0.36^{***}	0.38^{***}	0.31^{**}
	(0.14)	(0.10)	(0.13)	(0.13)	(0.14)
Bandw.	15,800	16,859	16,184	15,913	15,788
Effective Obs.	2,223	2,550	2,354	2,263	2,217
Observations	3,299	3,299	3,299	3,299	3,299
	(11)	(12)	(13)	(14)	(15)
	Special assesment	Joint development	Impact Study	Building Code	Environmental Zoning
RD Effect	0.36^{***}	0.38^{***}	0.56^{***}	0.07	0.33^{**}
	(0.14)	(0.13)	(0.14)	(0.14)	(0.13)
Bandw.	15,940	16,642	16,869	16,533	15,788
Effective Obs.	2,272	2,489	2,553	2,468	2,217
Observations	3,299	3,299	3,299	3,298	3,299
	(16)	(17)	(18)	(19)	(20)
	Predial servitude	Historic Preservation	Housing Policy	Usucapion	Surface Rights
RD Effect	0.23^{*}	0.50^{***}	0.29^{**}	0.47^{***}	0.52^{***}
	(0.12)	(0.16)	(0.14)	(0.13)	(0.14)
Bandw.	16,639	14,397	17,180	16,365	16,505
Effective Obs.	2,489	1,812	2,670	2,415	2,462
Observations	3,299	3,299	3,298	3,299	3,299

Notes: All dependent variables are binary and capture if the municipality has a certain law at the time of the MUNIC survey. The dependent variables of the first four columns are from the 2012 edition of the survey and the rest are from the 2018 edition. Estimates correspond to a fuzzy regression discontinuity design with the 2006 population as the running variable, 20,000 as the cutoff, and having a master plan in 2008 as the treatment. Point estimates are obtained with a local polynomial regression with a triangular kernel and a polynomial of degree 1 in a symmetric, Mean Squared Error-optimal window using the rdrobust stata command by Calonico et al. (2017).

TABLE A.3 Effects on Per Capita Expenditure in Housing. 2010-2012 average.

	(1)	(2)	(3)	(4)	(5)
RD Effect	51.4**	31.3**	58.3**	24.8**	45.3**
	(23.8)	(15.5)	(27.9)	(11.5)	(22.5)
Pol Order	1	0	1	0	1
Kernel	Triang	Triang	Unif	Unif	Triang
Bandw.	6840	2275	5576	1569	7018
Controls	No	No	No	No	Yes
Effective Obs.	664	214	528	152	686
Obs	3268	3268	3268	3268	3268

Notes: Estimates correspond to a fuzzy regression discontinuity design with the 2006 population as the running variable, 20,000 as the cutoff, and having a master plan in 2008 as the treatment. Point estimates are obtained with a local polynomial regression with a triangular or uniform kernel, a polynomial of degree 0 or 1, and symmetric or asymmetric (only column 6) Mean Squared Error-optimal windows using the rdrobust stata command by Calonico et al. (2017). FPM controls are a set of binary variables indicating the FPM bracket according to the 2010 population.

TABLE A.4 Effects on Per Capita Expenditure in Urban Infrastructure. 2010-2012 average.

	(1)	(2)	(3)	(4)	(5)
RD Effect	195.0**	170.4*	207.3**	128.6	211.2**
	(86.9)	(87.9)	(86.4)	(85.1)	(93.7)
Pol Order	1	0	1	0	1
Kernel	Triang	Triang	Unif	Unif	Triang
Bandw.	11673	2879	9151	1963	10470
Controls	No	No	No	No	Yes
Effective Obs.	1294	270	947	183	1125
Obs	3268	3268	3268	3268	3268

Notes: Estimates correspond to a fuzzy regression discontinuity design with the 2006 population as the running variable, 20,000 as the cutoff, and having a master plan in 2008 as the treatment. Point estimates are obtained with a local polynomial regression with a triangular or uniform kernel, a polynomial of degree 0 or 1, and symmetric or asymmetric (only column 6) Mean Squared Error-optimal windows using the rdrobust stata command by Calonico et al. (2017). FPM controls are a set of binary variables indicating the FPM bracket according to the 2010 population.

TABLE A.5 Effects on per capita revenue from property tax. 2010-2012 average.

	(1)	(2)	(3)	(4)	(5)
RD Effect	64.3*	59.2*	67.4*	39.5	32.1*
	(36.4)	(34.0)	(37.2)	(37.5)	(18.6)
Pol Order	1	0	1	0	1
Kernel	Triang	Triang	Unif	Unif	Triang
Bandw.	11255	3044	8894	1991	11854
Controls	No	No	No	No	Yes
Effective Obs.	1235	292	902	184	1257
Obs	3268	3268	3268	3268	3132

Notes: Estimates correspond to a fuzzy regression discontinuity design with the 2006 population as the running variable, 20,000 as the cutoff, and having a master plan in 2008 as the treatment. Point estimates are obtained with a local polynomial regression with a triangular or uniform kernel, a polynomial of degree 0 or 1, and symmetric mean-squared error-optimal windows using the rdrobust stata command by Calonico et al. (2017). Column 5 controls for the value of the dependent variable in 2004, the earliest available.

TABLE A.6 Effects on IPTU per capita revenue.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	2009	2011	2013	2015	2017	2019	2021
RD Effect	31.5*	40.2*	41.4*	30.4	31.9	88.3*	48.7
	(17.2)	(20.8)	(21.9)	(21.1)	(23.8)	(51.8)	(32.2)
Bandw.	14371	15804	15386	15791	15188	15439	16307
Effective Obs.	1789	2134	2037	2156	1997	2093	2396
Obs	3258	3186	3243	3221	3288	3289	3294

Notes: Estimates correspond to a fuzzy regression discontinuity design with the 2006 population as the running variable, 20,000 as the cutoff, and having a master plan in 2008 as the treatment. Point estimates are obtained with a local polynomial regression with a triangular kernel, a polynomial of degree 1, and symmetric mean-squared error-optimal windows using the rdrobust stata command by Calonico et al. (2017).

TABLE A.7 Effects on Capital Transfers per capita received from the state. 2010-2012 average

	(1)	(2)	(3)	(4)	(5)
RD Effect	58.5	36.5	61.5	45.5	63.1*
	(38.5)	(34.3)	(39.0)	(43.1)	(37.0)
Pol Order	1	0	1	0	1
Kernel	Triang	Triang	Unif	Unif	Triang
Bandw.	9614	2831	7450	2012	9694
Controls	No	No	No	No	Yes
Effective Obs.	920	237	676	164	888
Obs	3033	3033	3033	3033	2927

Notes: Estimates correspond to a fuzzy regression discontinuity design with the 2006 population as the running variable, 20,000 as the cutoff, 2010-2012 average capital transfers received from the municipality's state as the dependent variable, and having a master plan in 2008 as the treatment. Point estimates are obtained with a local polynomial regression with a triangular or uniform kernel, a polynomial of degree 0 or 1, and symmetric mean-squared error-optimal windows using the rdrobust stata command by Calonico et al. (2017). Column 5 controls for the value of the dependent variable in 2004, the earliest available.

TABLE A.8 Effects on % of households that do not own or rent the house they live in. 2010 census.

	(1)	(2)	(3)	(4)	(5)
RD Effect	-0.38**	-0.24*	-0.33**	-0.24*	-0.35**
	(0.17)	(0.13)	(0.16)	(0.13)	(0.17)
Pol Order	1	0	1	0	1
Kernel	Triang	Triang	Unif	Unif	Triang
Bandw.	16316	5341	12715	3544	15233
Controls	No	No	No	No	Yes
Effective Obs.	2400	511	1481	336	2004
Obs	3298	3298	3298	3298	3239

Notes: Estimates correspond to a fuzzy regression discontinuity design with the 2006 population as the running variable, 20,000 as the cutoff, % of households that do not own or rent the house they live in in the 2010 census as the dependent variable, and having a master plan in 2008 as the treatment. Point estimates are obtained with a local polynomial regression with a triangular or uniform kernel, a polynomial of degree 0 or 1, and symmetric mean-squared error-optimal windows using the rdrobust stata command by Calonico et al. (2017). Column 5 controls for the value of the dependent variable in the 2000 census.

TABLE A.9 Effects on % of households with water outside their house. 2010 census.

	(1)	(2)	(3)	(4)	(5)
RD Effect	-4.5**	-3.2*	-4.5**	-3.2*	-4.3**
	(2.2)	(1.8)	(2.3)	(1.9)	(2.0)
Pol Order	1	0	1	0	1
Kernel	Triang	Triang	Unif	Unif	Triang
Bandw.	13948	4749	10888	3054	14243
Controls	No	No	No	No	Yes
Effective Obs.	1722	446	1198	295	1771
Obs	3298	3298	3298	3298	3239

Notes: Estimates correspond to a fuzzy regression discontinuity design with the 2006 population as the running variable, 20,000 as the cutoff, % of households with water outside their house in the 2010 census as the dependent variable, and having a master plan in 2008 as the treatment. Point estimates are obtained with a local polynomial regression with a triangular or uniform kernel, a polynomial of degree 0 or 1, and symmetric mean-squared error-optimal windows using the rdrobust stata command by Calonico et al. (2017). Column 5 controls for the value of the dependent variable in 2004, the earliest available.

TABLE A.10 Effects on % of households with trash collection. 2010 Census.

	(1)	(2)	(3)	(4)	(5)
RD Effect	14.6*	17.0**	12.7	17.9**	13.9**
	(7.9)	(7.7)	(7.9)	(7.8)	(7.0)
Pol Order	1	0	1	0	1
Kernel	Triangular	Triangular	Uniform	Uniform	Triangular
Bandw.	16861	4541	13231	3082	16681
Effective Obs.	2552	429	1573	297	2476
Obs	3,300	3,300	3,300	3,300	3,241

Notes: Estimates correspond to a fuzzy regression discontinuity design with the 2006 population as the running variable, 20,000 as the cutoff, % of households with trash collection in the 2010 census as the dependent variable, and having a master plan in 2008 as the treatment. Point estimates are obtained with a local polynomial regression with a triangular or uniform kernel, a polynomial of degree 0 or 1, and symmetric mean-squared error-optimal windows using the rdrobust stata command by Calonico et al. (2017). Column 5 controls for the value of the dependent variable in the 2000 census.

TABLE A.11 Effects on % of households with septic tank connected to the sewer network. 2022 Census.

	(1)	(2)	(3)	(4)	(5)
RD Effect	5.0**	4.5*	4.1*	4.6*	5.0**
	(2.5)	(2.3)	(2.3)	(2.6)	(2.5)
Pol Order	1	0	1	0	1
Kernel	Triang	Triang	Unif	Unif	Triang
Bandw.	17743	4968	13937	3111	18002
Controls	No	No	No	No	Yes
Effective Obs.	2846	466	1723	300	2871
Obs	3300	3300	3300	3300	3241

Notes: Estimates correspond to a fuzzy regression discontinuity design with the 2006 population as the running variable, 20,000 as the cutoff, % of households with septic tank connected to the sewer network in the 2022 census as the dependent variable, and having a master plan in 2008 as the treatment. Point estimates are obtained with a local polynomial regression with a triangular or uniform kernel, a polynomial of degree 0 or 1, and symmetric mean-squared error-optimal windows using the rdrobust stata command by Calonico et al. (2017). Column 5 controls for the value of the dependent variable in the 2000 census.

TABLE A.12 Effects on Housing Deprivation Index. 2022 Census.

	(1)	(2)	(3)	(4)	(5)
RD Effect	-0.48	-0.32	-0.50*	-0.50**	-0.45*
	(0.29)	(0.20)	(0.29)	(0.23)	(0.25)
Pol Order	1	0	1	0	1
Kernel	Triang	Triang	Unif	Unif	Triang
Bandw.	15853	7004	12348	3913	15337
Controls	No	No	No	No	Yes
Effective Obs.	2245	692	1410	374	2043
Obs	3300	3300	3300	3300	3241

Notes: Estimates correspond to a fuzzy regression discontinuity design with the 2006 population as the running variable, 20,000 as the cutoff, a housing deprivation index in the 2022census as the dependent variable, and having a master plan in 2008 as the treatment. The housing deprivation index is the first factor in a principal factor analysis performed with municipality-level data over the following variables: deprivation in sanitation, deprivation in water, deprivation in trash collection, and deprivation in wall materials. Point estimates are obtained with a local polynomial regression with a triangular or uniform kernel, a polynomial of degree 0 or 1, and symmetric mean-squared error-optimal windows using the rdrobust stata command by Calonico et al. (2017). Column 5 controls for the value of the dependent variable in the 2000 census.