Financially Constrained Procurement

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Abstract

We investigate how the financial constraints of local governments interact with those of their corporate suppliers to affect outcomes in public procurement. Using auction-level data on Brazilian municipal procurement and population-based discontinuities in federal transfers, we show that higher transfers relieve local municipalities constraints, allowing for larger tenders and faster payments to suppliers. This draws new suppliers into competition, especially small, young, and distant firms which face participation costs and are themselves constrained. Higher supplier competition is associated with lower procurement prices especially for essential public goods and services, suggesting pass-through effects to local populations.

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1 Introduction

Local governments heavily rely on corporate suppliers to buy drugs, build roads, and provide basic services for their residents.[1] However, financial constraints often hamper the effectiveness of the procurement process, especially in developing economies where local governments struggle to finance their purchases and pay their suppliers on time (World Bank, 2025). Anecdotal evidence suggests that these constraints act as entry barriers (OECD, 2018) that may lead to inefficiencies (e.g., Bandiera et al., 2009), but systematic evidence on this topic remains scarce. How does the relaxation of government financial constraints affect firms' incentives to participate in public procurement? Which firms benefit from an improvement in their buyers' financial condition, and what are the associated effects on local economic outcomes?

In this paper, we study these questions by exploiting a laboratory in Brazil that provides quasiexperimental relief in local governments' financial constraints. We leverage discontinuous changes in federal funding allocations based on the population of Brazilian municipalities and item-level procurement auction data to study how changes in municipalities' available funding affect procurement competition and outcomes. Because municipalities just above and below a funding cutoff serve similar populations, they are likely to face a similar demand for public goods. We find that, when local municipalities' constraints are relaxed, their ability to meet such demand increases: higher funding is associated with higher amounts tendered by local municipalities and with faster payments to suppliers. In turn, this appears to foster participation—especially by small and young suppliers, that are themselves constrained—decreases incumbents' market shares, and ultimately results in price declines for the procurement of the same item. These competitive effects are particularly pronounced for essential goods and services such as healthcare, suggesting pass-through benefits to local populations in developing

[1] Public procurement accounts for around 13% of GDP in the average OECD country. Nearly two-thirds of this spending occurs at the local level (OECD, 2024, 2025).

economies.

Our empirical strategy relies on the *Fundo de Participação dos Municípios* (FPM) program, through which the Brazilian federal government determines and transfers funds to local municipalities every year. FPM transfers are economically large—they constitute around 31% of municipal revenues on average—, and they are an essential source of financial flexibility since Brazilian municipalities' taxation and borrowing opportunities are restricted by federal law.[2] As part of the FPM program, federal transfers increase by around 20% on average when municipalities cross predetermined population thresholds. The assignment of municipalities to different population groups is performed annually at the federal level, leaving little room for municipalities to manipulate their population size to secure more funds.

We implement a fuzzy regression discontinuity design (RDD) that instruments actual transfers with their law-implied values to capture quasi-exogenous variation in transfers around the FPM thresholds (and thus remove variation in transfers potentially arising from endogenous economic conditions and political economy considerations; e.g., Brollo et al., 2013; Corbi et al., 2019). We combine this identification strategy with granular procurement auction data at the item level, covering over 4 million procurement observations from 853 municipalities in *Minas Gerais*, the largest Brazilian state, between 2014 and 2020. This dataset includes information on auction participants, winning suppliers, procurement prices, quantities purchased, and payment timing, allowing us to study buyers and suppliers' actions both before and after contracts are assigned.

Our identification strategy mainly leverages cross-sectional variation by comparing outcomes for the procurement of the same item between municipalities just above and below the FPM population thresholds. In robustness tests, we also leverage time-series variation as some municipalities cross these thresholds over time. When studying pro-

[2]In Brazil, the Federal Constitution limits municipal taxation powers, while Senate resolutions effectively prohibit municipalities from issuing bonds and place restrictions on bank borrowing.

curement prices, we are also able to include supplier-item-FPM cutoff fixed effects, which allow us to determine whether the same supplier charges different prices for the same item to municipalities on either side of the threshold.

Our main result shows that discontinuous increases in federal transfers are associated with higher supplier participation in the municipal procurement market: a 10% higher federal transfer for municipalities just above the average FPM threshold leads to 3.9-6.7% greater participation (measured by number of bidders in auctions of the same product), suggesting that local governments' constraints directly affect suppliers' willingness to participate in public procurement. Given that FPM transfers jump by around 20% around the average threshold in our sample, our estimates imply 8-13% more bidders for auctions held by municipalities just-above an FPM cutoff, relative to those held by municipalities just-below the same cutoff.

Our baseline findings are robust to alternative specifications and validation tests. For example, McCrary density tests show no evidence of bunching around the FPM thresholds, and other sources of municipal revenue and financing appear to be balanced around them. We also document quantitatively similar effects when we study the evolution of procurement outcomes as the same municipality crosses an FPM threshold (thus reducing potential concerns about comparability of different municipalities), and as we experiment with different RDD polynomial orders, kernels, and bandwidths. In the cross-section, we find economically larger effects for smaller municipalities and for municipalities with higher levels of debt around the same cutoff —that is, for municipalities whose financial constraints are more likely to bind—, validating our interpretation that the relaxation of municipal financial constraints (rather than potential sources of confounding variation around an FPM threshold) is the main reason for higher bidder participation.

How does a relaxation of local governments' financial constraints affects procurement participants' incentives and supplier pool composition? On the one hand, assortative

matching between buyers and suppliers (e.g., Melitz, 2003; Sugita et al., 2023) predicts that improvements in buyers' financial conditions attract larger, more productive suppliers who can meet higher quality or larger scale demand. Similarly, incumbent suppliers with established relationships may be best positioned to capture additional government spending, reinforcing existing market concentration. On the other hand, small and young firms, which are themselves financially constrained (Hadlock and Pierce, 2010), may face higher participation and delivery costs and be particularly sensitive to improvements in buyers' purchase volumes. Lacking access to trade credit and bank financing to bridge payment delays, they may also be more sensitive to buyers' payment reliability. Under this view, a relaxation of municipal constraints could disproportionately encourage entry by the most constrained suppliers.

Our tests provide evidence consistent with the second view. First, we find that jumps in federal transfers around the FPM thresholds allow local governments to increase the size and the frequency of their procurement tenders: a 10% increase in transfers is associated with a 0.4% increase in the number of auctions, and with a 5.7% higher average quantity purchased per item. Consistent with the interpretation that higher purchase quantities allow suppliers to cover their fixed costs, we find economically larger effects when suppliers are located farther from the tendering municipality.[3]

Second, municipalities receiving higher transfers also demonstrate higher payment reliability: using data on municipalities' payments to suppliers, we find that a 10% increase in FPM transfers decreases payment times by approximately 15.3% (5.5 days on average). The likelihoods of exceedingly slow payments (e.g., payments made six or more months after delivery) and default (i.e., municipalities not paying their suppli-

[3]Most of the procurement auctions require suppliers to attend a public bidding session for accreditation and to participate in the live, sequential bidding stage where firms make verbal offers. Even conditional on winning a contract, many Brazilian municipalities are geographically isolated and difficult to reach. In sum, suppliers face participation and delivery costs that increase with distance, suggesting that remote suppliers may be willing to bid only if the contract size justifies their (fixed) travel and delivery costs.

ers altogether) also decrease. Consistent with the interpretation that higher payment speed and reliability allow suppliers to cover *their own* liquidity needs, we find evidence of higher participation and higher likelihood of winning by small and young suppliers, who are more likely to be financially constrained (e.g., Hadlock and Pierce, 2010).[4] These findings suggest a first potential benefit of relieving local municipalities' financial constraints: encouraging small, young, and otherwise constrained firms to bid for government procurement contracts.

We also show that higher supplier participation decreases the concentration of input markets, the market shares of incumbent suppliers, and ultimately the prices that local governments pay in procurement: a 10% increase in transfers leads to up to a 4.6% reduction in the average price that *the same supplier* charges for *the same item* to municipalities just above and just below the FPM thresholds in our sample. These estimated price effects are most pronounced for larger suppliers (who are more likely to earn rents when municipalities are constrained), and for goods and services that exhibit high participation sensitivity to FPM transfers. Therefore, they are more likely to reflect differences in competition than payment delay premia and quantity discounts that suppliers could directly factor into their pricing.

Several pieces of evidence suggest that our findings are unlikely to be the result of higher corruption as local municipalities receive more funding (Brollo et al., 2013). For example, we find stronger participation by nonlocal suppliers who are outside the scope of direct transfers and arguably less likely to be connected to local municipal governments. Additionally, equilibrium procurement prices *decrease* in funding allocations even when the same firm supplies the same item to municipalities with different funding levels, suggesting that our participation findings are unlikely due to bid-rigging by means of phantom suppliers (e.g., Fazio and Zaldokas, 2024) or collusion Pesendorfer, 2000;

[4] As in many developing countries, small and young firms in Brazil have little or no access to trade credit (Rohner, 2019; Lisboa, 2020; Lanna, 2021) and bank credit more in general, making their cash flows entirely reliant on buyers' payments.

Kaway and Nakabayashi, 2022 Finally, we find weaker effects for the procurement of goods and services that may directly benefit bureaucrats and politicians (e.g., administrative material and equipment), suggesting that higher funding allocations are more likely to be directed to the consumption of local populations as opposed to that of local governments.

Overall, our findings highlight three economic benefits from the relaxation of municipal financial constraints. First, increasing municipalities' budgets and payment speed encourages entry into procurement by small, young, and otherwise constrained suppliers, with potential consequences for employment and growth at these firms. Second, our estimates suggest that even if small suppliers do not win a procurement auction, their participation can be beneficial in reducing large firms' rents. Third, we show that the estimated competitive and pricing effects are particularly pronounced for essential public goods and services such as infrastructure and healthcare, suggesting pass-through effects to local communities. More broadly, our findings suggest that fiscal transfers can operate not only through direct spending channels but also indirectly by decreasing procurement prices and thus increasing local governments' effective purchasing power.

Our study contributes to three strands of the literature. First, we contribute to a vast literature on the economics of public procurement (see, e.g., Bosio et al., 2022; Decarolis and Srhoj, 2025 for reviews and cross-country analyses), and more specifically to the strand of this literature showing that procurement participation varies with institutional features (e.g., Athey et al., 2011), information frictions and administrative costs (e.g., Bajari and Hortaçsu, 2003; Li and Zheng, 2009; Coviello and Mariniello, 2014) and rent extraction by buyers and suppliers (e.g., Clark et al., 2018; Kang and Miller, 2021). We complement this literature by showing that financial constraints of governments and prospective suppliers are an important yet understudied source of concentration in procurement markets.

Second, our work also contributes to an extensive literature that studies the impact of

financial constraints on customer-supplier relationships. Prior research shows that buyers' financial health affects suppliers' extension of trade credit and the design of contract terms (e.g., Ng et al., 1999; Giannetti et al., 2011). Related work documents how trade credit provision and payment terms vary with the institutional environment (e.g., Fisman and Love, 2003; Klapper et al., 2012; Fabbri and Menichini, 2010), and how financial distress propagates through supply chains (e.g., Jacobson and von Schedvin, 2015; Barrot, 2016; Costello, 2020). To our knowledge our paper is the first to use the laboratory of public procurement to document how customers' and suppliers' financial constraints affect input market competition and prices, outcomes that are typically unobservable in corporate settings.

Third, we contribute to the literature studying the effects of local governments' financial constraints (e.g.,Adelino et al., 2021; Yi, 2021; Agrawal and Kim, 2022; Dagostino, 2024). While this literature has typically focused on aggregate variables such as local output and employment, our focus on procurement-level outcomes allows us to study government behavior (quantities tendered, payment speed), supplier characteristics and responses (participation, size, age), and resulting equilibrium prices. We argue that, by lowering procurement prices, the competitive effects proposed in this paper increase local governments' effective purchasing power, and thus may act as a potential source of the fiscal multiplier (e.g., Corbi et al., 2019).

2 Institutional Background

2.1 FPM Program

The *Fundo de Participação dos Municípios* (FPM) is a major Federal transfer program that allocates funds to Brazilian municipalities based on their population. Introduced in 1965 and codified in its current form by the 1988 Federal Constitution, the FPM is

one of the primary sources of revenue for local municipalities, especially smaller ones. The scheme's design creates sharp discontinuities in the transfers that the Federal government assigns to individual municipalities at predetermined population thresholds, which provides a quasi-experimental setting to study the effects of Federal transfers on local economic outcomes.

The FPM allocation mechanism works as follows. Every year, the central government determines the total fund pool as a fixed percentage (22.5%, since 1993) of total revenue from Federal income taxes (*Imposto de Renda*, IR) and industrial product taxes (*Imposto de Produtos Industrializados*, IPI). This total fund pool is assigned to individual states based on time-invariant shares, determined in 1989 based on state-level population and per capita income. Within each state, individual municipalities are then assigned to local population brackets based on estimates issued by the Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatisticas*, IBGE) before the end of October every year.

Based on the IBGE estimates, the Federal Budget Court publishes FPM coefficients for all municipalities in Brazil, which determine the extent of federal transfers to municipal governments. Higher population brackets are associated with larger FPM coefficients, and hence larger FPM transfers. Based on the Federal Budget Court's FPM coefficients, municipalities then form their budgets, which are approved by municipal councils by year-end. After approval, FPM funds are transferred to municipalities throughout the following year.

FPM transfers are nonlinearly increasing in the local population. First, transfer amounts are calculated by multiplying the state's total FPM allocation by the ratio of each municipality's FPM coefficient to the sum of all coefficients within that state. Since more densely populated municipalities have larger FPM coefficients, they receive a larger share of the state-level FPM allocation than smaller municipalities. Second, the population brackets that determine the FPM coefficients are precisely defined at the Federal

level (Law no. 1,881/1981), and the discrete nature of the allocation mechanism creates large jumps in transfers as municipalities cross predetermined population cutoffs. For example, the first three cutoffs are respectively set at 10,188, 13,584, and 16,980 residents, implying a bracket width of 3,396 inhabitants between each cutoff pair. For all municipalities larger than 16,981 residents, the bracket width doubles to 6,792 residents. Overall, crossing a threshold results in an average 20% increase in FPM transfers in our sample.

FPM transfers constitute a crucial source of revenue for local municipal budgets: In our sample, they account for 31% of total municipal revenues on average.[5] In contrast, Brazilian municipalities have limited ability to change local taxes, whose impact on municipalities' revenues is already low: on average, local taxes represent only 6% of total revenues for smaller municipalities with less than 50,000 residents. Finally, just as in other developing markets (World Bank, 2025) institutional constraints and financial intermediation frictions prevent municipalities from borrowing from banks and from capital markets.[6] In sum, the discontinuous changes in FPM transfers that we study in this paper represent major reliefs of municipal financial constraints when borrowing opportunities are limited.

2.2 Municipal Procurement in Brazil

Public procurement in Brazil is governed by a unified federal framework that applies to all levels of government, including more than 5,500 municipalities. The primary legislation includes Law 8.666/1993, which establishes general rules for public contracts,

[5]The extent of local governments' reliance on federal transfers is consistent to that of other developed and developing economies, ranging from 20-30% in advanced economies such as the United States (27.5% of state and local revenue), Australia (19% of local revenue), and Germany (36% of municipal revenue), to 40-80% in emerging markets such as India (40% of state revenue), Turkey (70% of local revenue), Mexico (over 80% of sub-national revenue), and Argentina (60.6% of provincial revenue). For more information, see Internet Appendix Table A.1.

[6]The institutional constraints are primarily a reflection of Brazil's Fiscal Responsibility Law (Lei de Responsabilidade Fiscal, LRF), enacted in 2000.

and Law 10.520/2002, which created a specialized auction-based modality called *pregão* for the acquisition of common goods and services, defined as those whose performance and quality standards can be objectively specified in the bidding notice. *Pregão* can be conducted either electronically (*pregão eletrônico*) or in person (*pregão presencial*). While electronic auctions are becoming increasingly widespread, municipalities continue to rely heavily on in-person sessions due to limited technological infrastructure and supplier familiarity with digital platforms.

The procurement process (whether electronic or in-person) follows a standardized two-phase structure: a preparatory phase and an external (public) phase. The preparatory phase establishes the legal and administrative foundation for the procurement, while the external phase involves public notices, credentialing, and bidding. In turn, bidding involves a first sealed-envelope auction phase and a live bidding phase, where bidders satisfying certain criteria make verbal offers and the firm offering the lowest price wins the auction. In Internet Appendix Section A.I, we provide more institutional details about municipal public procurement in Brazil.

3 Empirical Setting

3.1 Data

Our data comes from two main sources. First, we use data on procurement outcomes from the Open Data Portal of the State Court of Accounts (*Portal de Dados Abertos do Tribunal de Contas do Estado*). This portal provides detailed information on procurement outcomes for all municipalities in Minas Gerais, the largest state in Brazil by number of municipalities. The dataset includes variables such as procurement prices, quantities purchased, number of bidders participating in procurement auctions, detailed item descriptions, identities of winning suppliers, dates of contract awards and payments, and

payment timelines for each municipal purchase. To our knowledge, our paper is among the first to use this dataset on municipal procurement.

The procurement dataset ranges from 2014 to 2020, and it includes 15.5 million procurement auctions covering approximately 900,000 distinct items purchased from 115,000 unique suppliers. For the purpose of this study, items are defined as the interaction of the product/service description (e.g., apples) and their associated unit of measure (e.g., kilograms). Table A.2 in the Internet Appendix provides an example of selected products and services in our data.

Due to its size and diversity, the state of Minas Gerais provides an excellent laboratory for our analysis.[7] With 853 municipalities, the state includes approximately 15% of all Brazilian municipalities and 10% of the total Brazilian population. The state encompasses a wide range of socioeconomic conditions, ranging from highly urbanized areas (e.g., Belo Horizonte and Uberlandia) to rural communities (e.g., Paracatu and Santo Antonio do Amparo), which allows us to examine the effects of Federal transfers across different economic areas within a single state. The Minas Gerais municipal procurement data also covers a wide range of goods and services purchased by municipalities, which allows us to conduct a detailed analysis of how financial constraints affect procurement processes in the cross-section of product types.

Our second main data source is the IBGE's population estimates, which we use to determine the municipal population thresholds that determine FPM transfer amounts to municipalities in Minas Gerais. These population figures enable us to identify and compare outcomes in municipalities just above and below the FPM thresholds. Following Corbi et al. (2019), we complement this primary source with information on actual FPM transfers from the Brazilian National Treasury. This data provides the exact amounts

[7]While the municipal procurement data is available only for three Brazilian states, namely, Ceara, Minas Gerais, Rio Grande do Sul, and Parana. We focus on Minas Gerais due to data comparability issues (e.g., presence of duplicate observations, unclear item classification and comparability across auctions and municipalities) for the other states.

transferred to each municipality, allowing us to precisely measure the variation in the financial resources available to local governments. Figure 1 presents heat maps of FPM transfers and population across municipalities in Minas Gerais. It provides evidence of large geographical variation within the state: the largest municipalities in the state have, on average, more than six times the population of smallest municipalities, and they receive on average more than twice as large Federal transfers.

Following Corbi et al. (2019), we focus on municipalities in Minas Gerais in the bottom eight population cutoffs (i.e., municipalities with less than 61,128 residents). This sample includes around 90% of all the municipalities in Minas Gerais, and thus reduces small sample and local continuity concerns around larger population thresholds. Additionally, smaller municipalities allow us to focus on smaller, more financially constrained municipalities, where the marginal impact of FPM transfers may be larger. Our final dataset is a procurement auction-item-level panel of around 4.56 million observations over the 2014-2020 period. Table 1 provides the sample summary statistics for the main variables in the paper.

3.2 Estimation

We exploit variation in FPM transfers across Brazilian municipalities to study how relaxing financial constraints affects procurement competition. Preliminary in-sample evidence suggests that relaxing local municipalities' financial constraints through FPM transfers may indeed affect input markets. For example, Panel (a) of Figure 2 shows a positive correlation between FPM transfers and local procurement spending, confirming the intuitive prediction that larger budgets should on average be associated with larger spending. Similarly, Panel (b) of Figure 2 shows a positive correlation between FPM transfers and the average number of participants in individual procurement auctions, suggesting that lower financial constraints may affect suppliers' participation incentives.

The correlations documented in Figure 2 may naturally be driven by observable or unobservable characteristics simultaneously correlated to FPM transfers, municipalities' budget, and procurement participation. For example, high-FPM municipalities are larger, and more likely to have higher tax revenues and larger local supplier pools. More generally, identifying the effects of financial constraints on procurement outcomes is challenging because financial constraints are endogenous to local economic conditions, which can independently affect procurement competition.

To address these identification challenges, we exploit quasi-experimental variation in Federal transfers induced by the FPM's threshold based allocation mechanism—specifically, the large discontinuities in FPM transfers described in Section 2.1. Figure 3 confirms that the FPM allocation mechanism creates large discontinuities in transfer amounts in our sample, allowing us to implement a regression discontinuity design (RDD) comparing procurement outcomes on either side of the FPM thresholds. Specifically, in our baseline tests we compare procurement outcomes in municipalities just above and just below a given population threshold, and otherwise similar except for the size of the FPM transfer. Additionally, in robustness tests we compare procurement outcomes in the same municipality before and after the municipality crosses a population threshold, thus exploiting time series variation as the municipality obtains discontinuously larger FPM transfers over time.

Actual transfers may deviate from their law-implied amounts due to imperfect enforcement, political economy considerations, and local economic conditions. As a result, we follow Corbi et al. (2019) and implement a two-stage fuzzy RDD where we instrument actual transfers with their law-implied values to capture quasi-exogenous transfer variation around the FPM thresholds. Formally, the second stage of the RDD specification takes the form

$$Y_{i(c)pt} = \alpha + \beta T_{i(c)t} + f(P_{i(c)t} - P_{ct}) + \gamma_{FE} + \epsilon_{i(c)pt} \tag{1}$$

where $Y_{i(c)pt}$ is the relevant procurement outcome (e.g., number of auction participants, price paid) for item p in municipality i (around the population cutoff c) in year t; $T_{i(c)t}$ represents the FPM transfer received by municipality i in year t; $P_{i(c)t}$ is municipality i's population in year t; P_{ct} is the nearest population cutoff in year t; $f(.)$ is a flexible polynomial; γ_{FE} is a vector of fixed effects; and $\epsilon_{i(c)pt}$ is a regression error term. In the first stage, we instrument $T_{i(c)t}$ with its law-implied counterpart $\tilde{T}_{i(c)t}$:

$$T_{i(c)t} = \tilde{\alpha} + \tilde{\beta}\tilde{T}_{i(c)t} + f(P_{i(c)t} - P_{ct}) + \tilde{\gamma}_{FE} + \tilde{\epsilon}_{i(c)t} \tag{2}$$

where all the other variables have the same meaning as in equation (1). The set of fixed effects we use in the first and second stages are identical, and we let them vary across specifications.

The two-stage RDD specifications (1)-(2) are akin to an RDD based on population thresholds (e.g., Gagliarducci and Nannicini, 2013; Casas-Arce and Saiz, 2015; Grembi et al., 2016, Asher and Novosad (2020), Agarwal et al. (2023) among others), with the only difference that we replace the standard RDD treatment indicator with the actual transfer T received by the municipality, instrumented by its law-implied counterpart $\tilde{T}$. Since FPM transfers typically differ around each cutoff, this two-stage RDD provides an intuitive interpretation of our estimates in terms of elasticities as opposed to an average of treatment effects across multiple cutoffs associated with potentially large differences in FPM transfer jumps. In robustness tests, we also provide evidence from standard RDD specifications using indicators for inclusion in higher-FPM population brackets as opposed to transfer amounts.

The coefficient of interest in equation (1) is β, the average (local) elasticity of procurement outcome Y to FPM transfers for municipalities around the FPM population cutoffs. By focusing on discontinuous changes in FPM transfers while controlling for smooth population polynomials, these specifications also allow us to isolate the effect

of transfers from other population-related factors that might influence procurement processes. We estimate equations (1)-(2) using two-stage least squares (2SLS) within narrow bandwidths around the population cutoffs. Our specifications use optimal uniform bandwidths calculated using the procedure in Calonico et al. (2014) around each cutoff, and we cluster standard errors at the municipality-item level.

A causal interpretation of our estimates of the coefficient β relies on two identifying assumptions. First, municipalities should not be allowed to manipulate their population to obtain larger transfers. We argue that this possibility is highly unlikely to be verified in our setting, as population estimates are independently determined at the Federal level by the IBGE, thus significantly reducing the opportunity for local manipulation. Additionally, standard McCrary tests do not reject the null hypothesis that the density of observations is continuous at the thresholds (see Internet Appendix Figure A.1), suggesting no systematic manipulation of the running variable (p-value of 0.46).[8]

Second, our estimates of β should not result from indirect effects of other outcomes that the literature has previously linked to jumps in FPM transfers (e.g., local private sector employment, as in Corbi et al., 2019). We argue that this concern is likely to be reduced in our setting, since i) we focus on primary market spending by the *first recipients* of the FPM transfers (as opposed to downstream firms); ii) we document increases in procurement spending of similar magnitude as the transfers; iii) we document evidence of covariate balance in other sources of municipal revenue and borrowing, suggesting that municipalities do not use higher FPM funds to lower local taxes or reduce their leverage; and iv) we document higher participation by suppliers from *other municipalities*, which are arguably unaffected by direct transfers or other local spillovers. In sum, in our setting any competing confounding channel should arguably work through municipalities' use of their FPM transfers in procurement.

[8]Corbi et al. (2019) also find no evidence of manipulation around the FPM population thresholds, further supporting the validity of this first identifying assumption.

4 Federal Transfers and Procurement Participation

We begin our analysis by examining whether municipal financial constraints affect suppliers' willingness to participate in public procurement auctions using the fuzzy regression discontinuity design described in Section 3.2. Table 2 presents our main findings using the natural logarithm of the number of auction participants as the dependent variable. The estimates presented in Table 2 provide evidence that relaxing municipal financial constraints significantly increases competition in procurement markets. Our baseline specification in Column I yields an elasticity of 0.663, implying that a 10% increase in FPM transfers leads to a 6.63% increase in the number of bidders per procurement auction.

Our baseline effects remain robust and economically significant across all specifications, with elasticities ranging from 0.391 to 0.667 depending on the fixed effects structure: Column II includes winner $\times$ cutoff $\times$ year fixed effects, allowing us to compare procurement outcomes *for the same winning supplier* selling to municipalities just above and below the population threshold within the same year. This specification mitigates concerns that our results reflect changes in the composition of winning suppliers around the cutoffs rather than genuine competition effects. Column III incorporates mesoregion $\times$ cutoff $\times$ year fixed, thus focusing on adjacent municipalities with homogeneous geographic, economic and social characteristics.[9] Our estimates are statistically and economically similar even when we simultaneously control for both sets of fixed effects in Column IV, confirming the overall stability of our baseline findings. Overall, given the average 20% FPM transfer discontinuity in our sample, our estimates imply that municipalities just above the population thresholds experience approximately 8-13% more bidders per auction than those just below the thresholds.

[9]Mesoregions are subdivisions within each state defined by the IBGE based on three dimensions: social processes, natural environment, and spatial networks of communication. See https://www.ibge.gov.br/en/geosciences/territorial-organization/regional-division/21536-regional-divisions-of-brazil.html?edicao=19797.

In Figure 4, we corroborate our baseline estimates with visual evidence from a regression discontinuity plot around the pooled FPM thresholds in our sample. Specifically, Figure 4 plots the residual log number of participants against the distance from municipalities' populations to their nearest FPM cutoffs. The vertical line at zero represents the pooled FPM thresholds in our sample. Figure 4 shows a large, discontinuous increase in the number of procurement participants around the FPM population cutoffs. The sharp upward jump at the threshold confirms our regression results visually, demonstrating that the increase in competition is concentrated precisely at the points where federal transfers discontinuously increase.

4.1 Robustness

The competition effects documented in Table 2 survive a comprehensive battery of robustness tests, each designed to address specific threats to our identification strategy and causal interpretation. In this section we describe these tests, leaving their associated tables and figures to the Internet Appendix.

Manipulation of the Running Variable. A key concern in regression discontinuity designs is that agents might manipulate the running variable—in our case, municipalities may manipulate population—to influence treatment assignment. While this concern is less likely to be verified in our setting, where FPM transfers are based on centralized population estimates, in Figure A.1 we report the estimates of a formal McCrary density test to detect potential discontinuities in the running variable. Figure A.1 shows no evidence of systematic population manipulation around the FPM thresholds (the estimated p-value is 0.46), confirming that municipalities do not strategically position themselves to receive higher transfers. The smooth distribution of population around cutoffs validates our identifying assumption that treatment assignment is quasi-random in a neighborhood of the thresholds.

Outliers and Influential Observations. Our results might be driven by a small number of municipalities with unusual characteristics. Figure A.2 addresses this concern by showing the distribution of estimated coefficients when we sequentially remove individual municipalities from the sample, demonstrating that no single municipality drives our results.

Misclassification Near Cutoffs. Measurement error in population data could lead to misclassification of treatment status for municipalities very close to thresholds. While our two-step RD relies on law-implied transfer values and thus reduces this concern, Figure A.3 presents "donut" regression discontinuity results where we exclude observations in a range of 0.1% to 3% of each population threshold. The persistence of our results when excluding these potentially problematic observations confirms that measurement error does not bias our estimates.

First-Stage Validity. The credibility of our instrumental variables approach depends on a strong first-stage relationship between law-implied and actual transfers. Figure A.4 provides visual confirmation by presenting regression discontinuity plots for federal transfers themselves, showing clear discontinuous jumps at population thresholds that validate our first-stage relationship and confirm that the FPM formula generates meaningful variation in actual transfers. Table A.5 also shows the estimates from the first stage (equation 2).

Covariate Balance. Our results might reflect concurrent changes in other funding sources rather than FPM transfers specifically. Figure A.5, Panels A to C, address this concern by demonstrating that other federal and state transfers are balanced around the FPM cutoffs, mitigating concerns that our results may be driven by simultaneous changes in alternative revenue sources. Additionally, Panel D of Figure A.5 shows no differences in local municipalities' borrowing around the FPM thresholds, suggesting that municipali-

ties that receive additional transfers do not use these transfers to repay existing loans.

Cross-Sectional vs. Time-Series Variation. Our baseline results primarily exploit cross-sectional variation across municipalities near different thresholds, raising potential concerns about unobserved heterogeneity across municipalities. Table A.3 addresses this by including municipality-cutoff fixed effects, focusing identification solely on municipalities that cross population thresholds within our sample period. Table A.3 shows that our estimated coefficients remain positive and statistically significant (elasticities ranging from 0.11 to 0.50), confirming that our findings hold when exploiting within-municipality variation over time.

Functional Form Assumptions. Regression discontinuity estimates can be sensitive to polynomial order and bandwidth choices. Table A.4 addresses these concerns systematically. Panel A demonstrates robustness across polynomial orders (zero-order through cubic, while omitting the baseline linear polynomials), with coefficients ranging from 0.08 to 0.64. Panel B confirms stability across different kernel weighting schemes (triangular, Epanechnikov, and uniform, our baseline), providing elasticities between 0.55 and 0.82. These tests ensure our findings do not arise from particular functional form assumptions.

Continuous vs. Discrete Treatment. Our instrumented transfer approach differs from standard RDD implementations. Table A.6 presents results using threshold dummy variables rather than instrumented transfers, yielding comparable effect sizes and confirming that our instrumental variables approach produces estimates consistent with those of standard RDD methods.

Distributional Assumptions. Table A.7 employs Poisson regressions, suggesting that our baseline estimates are not systematically affected by the presence of zeros and near-

zero observations in the dependent variable.

Sample Selection. Our results might be sensitive to the optimal bandwidth selection procedure. Table A.8 demonstrates robustness when using the entire sample with a uniform 10% bandwidth around each threshold rather than optimal bandwidth selection, showing that our findings are not driven by the particular observations selected by the bandwidth algorithm.

4.2 Municipalities' Financial Constraints: Validation

In Table 3, we provide evidence to validate the interpretation that changes in Federal transfers relieve municipalities' financial constraints. In the first two columns of Panel A, we document that a 1% increase in FPM transfers increases municipal revenues by 0.35%-0.49%, validating the interpretation that total municipal revenues only increase by the amount of the FPM transfer around the FPM thresholds in our sample.[10]. Additionally, Columns III and IV of Panel A show nearly identical magnitudes for local municipalities' expenditures around the FPM cutoffs, suggesting that municipalities just above the FPM cutoffs increase their expenditures in lockstep with the extent of the additional funding they receive. Consistent with this interpretation, Columns V and VI of Panel A show no evidence of differences in the *ratio* of revenues to expenditures for municipalities just above and just below the FPM cutoffs. In sum, Panel A suggests that municipalities just above the FPM cutoff seem to spend all the additional federal funding as opposed to saving it.

In Table 3, Panel B, we provide additional evidence from the cross-section of municipalities' financial constraints. We document economically larger effects for small municipalities for which the relative size of the FPM transfers are larger (Column I) as

[10]The FPM transfers constitute between 30% and 40% of municipal revenue in our sample. Also see A.5 for evidence of balance in other revenue sources.

well as for municipalities with higher levels of debt *around the same cutoff* (Column II), consistent with the interpretation that the marginal effects of FPM transfers on procurement participation is larger for municipalities that are ex-ante more constrained.

A possible concern with the findings presented in Table 3, Panel B, Column II, is that the sorting variable, debt, may change endogenously around the FPM thresholds. Although Panel D of Appendix Figure A.5 show no evidence of differences in municipalities' leverage around the FPM cutoffs, in Appendix Table A.9 we provide additional evidence to mitigate such concerns using pre-determined debt levels in a stacked difference-in-differences design. Table A.9 shows that municipalities with high loan ratios *before* crossing an FPM threshold experience significantly larger increases in procurement participation *after* crossing the threshold, relative to the control group of municipalities that do not cross the threshold. While municipalities with low baseline debt show no significant response to transfer increases (the baseline coefficient in the first row of Table A.9 from -0.05 to -0.25), those with high pre-determined loan ratios exhibit substantial increases in procurement competition: the triple differences coefficients reported in the second row of Table A.9 range from 0.68 to 0.94, depending on the event window specification. This pattern provides additional support for our hypothesis that the effects of federal transfers on procurement participation work primarily through the relaxation of binding financial constraints in our sample.

5 Mechanism

In this section, we study the economic mechanisms that may affect supplier participation decisions. We argue that our baseline effects stem from suppliers internalizing buyers' increased purchasing power and payment reliability as they secure more federal funding.

5.1 Procurement Scale and Payment Reliability

We first provide evidence that higher federal funding increases the frequency of public procurement, the quantities that municipalities tender in any given auction, and the speed of payment to suppliers. In Column I of Table 4, we start by showing that a 10% difference in FPM transfers is associated to a 0.88% increase in the average quantity tendered by the average municipality in our sample. Similarly, Column II of Table 4 shows that higher federal transfers enable municipalities to conduct more frequent procurement auctions—a 10% increase in FPM transfers leads to a 0.45% increase in the number of auctions at the municipality-item-year level. Overall, Column III shows that higher quantities per auction and more auctions jointly imply and a substantial 5.69% increase in overall quantity purchased of the same item for a 10% increase in FPM transfers.

In Table 5, we also show that, conditional on contract assignment, higher FPM transfers increase municipalities' payment reliability. For example, Column I of Table 5, Panel A, shows that a 10% increase in FPM transfers is associated with a 2.6 p.p. decrease in the probability that the supplier is paid more than one month after delivery. Similarly, Column IV shows that a 10% increase in FPM transfers is associated with a 2.2 p.p. decrease in the probability that the supplier is paid more than five months after delivery.

On the intensive margin, Panel B of Table 5 provides evidence that higher FPM transfers are associated with higher payment speed both for the first payment made to the supplier (Columns I and II) and for the last payment (Columns III and IV). For example, Column I shows that a 10% increase in FPM transfers is associated with a 15.3% increase in the speed of first payment relative to the first delivery, and Column IV shows that the same 10% increase in FPM transfers is associated with a 12.7% increase in the speed of the last payment relative to the final product delivery. Although actual municipal defaults are relatively infrequent in our data (only 0.1% of the delivered procurement items are never paid for by municipalities), Column V shows that higher transfers appear to

have a marginal effect on defaults as well: a 10% increase in FPM transfers increases the percentage of delivered goods that municipalities never pay for by 5.1%.

5.2 Suppliers' Fixed Costs and Financial Constraints

In this section, we leverage the cross-section of supplier characteristics to study the mechanism through which larger tenders and faster payments stimulate supplier participation. We provide evidence suggesting that larger and more frequent procurement help suppliers cover their fixed costs, and that payment timeliness relaxes suppliers' own liquidity constraints.

In Table 6, we start by analyzing procurement participation and item delivery costs: as in most developing economies, procurement auctions in Brazil require suppliers to send employees or other delegates to obtain accreditation and participate in the bidding. Even conditional on winning, many municipalities are geographically isolated and difficult to reach, suggesting that remote suppliers may be willing to bid only if the contract size can cover the fixed travel and administrative expenses.[11]

Table 6 shows that higher FPM transfers result in higher participation as well as winning bids by non-local suppliers (i.e., suppliers located outside the focal municipality). For example, Column II that a 10% increase in FPM transfers is associated with a 1.3% decrease in the probability that the auction winner for procurement of the same item comes from the focal municipality. Consistent with the interpretation that larger contracts allow suppliers to cover their fixed participation costs, Column III also documents a larger increase in the number of participant when the municipality is isolated (i.e.,

[11]There are arguably other types of fixed costs that may prevent the participation of some suppliers. For example, bidding for and supplying specific inputs involves substantial preparation costs (e.g., understanding technical specifications and completing paperwork) as well as production adjustment costs, which may be independent of scale. However, data on individual tenders and supplier production is unavailable in our setting, which complicates measurement. As long as these costs are more binding for constrained suppliers, the evidence below on supplier financial constraints is also consistent with the existence of these other fixed costs.

it follows in the top tercile of the distribution of average distance from is neighboring municipalities).

Next, we study how FPM transfers interact with suppliers' own liquidity constraints. In developing economies where credit markets are often imperfect, suppliers lack access to trade financing (and credit more broadly), primarily rely on customers' payments to finance their own expenses. In this sense, improved payment speed may make procurement participation more attractive, especially for small and liquidity constrained suppliers.

In Table 7, we test these hypotheses using supplier size and age as proxies for their financial constraints (Hadlock and Pierce, 2010).[12] Consistent with the hypothesis that constrained suppliers are the most affected by an increase in customers' payment timeliness, Panel A of Table 7 shows that FPM transfers are associated with higher participation by smaller participants (Column I), younger participants (Column II), and participants that are relatively new to procurement (Column III). For example, Column I shows that a 10% increase in FPM transfers leads to a 0.44 percentage point increase in the fraction of small participants across procurement auctions. Panel B of Table 7 documents similar effects in the pool of winning suppliers, suggesting that increased participation by supplier participation increases effective competition for incumbents.

Overall, the cross-sectional results of this section provides additional validation for our financial constraints mechanism while also suggesting potential benefits for local economic development. Specifically, the concentration of effects among small, young, and far-flung suppliers confirms that municipal financial constraints may create specific entry barriers for these firms. These patterns align with theoretical work emphasizing how financing frictions may lead to concentration and the exclusion of small but effi-

[12]We use official government classifications at the firm registry (*Receita Federal*) to define firm size categories. Specifically, Brazilian firms are defined as micro firms if their revenue is lower than BRL 360 thousand (size category 1); as small firms if their revenue falls between BRL 360 thousand and BRL 4.8 million (size category 2); and as large firms if their revenue is higher than 4.8 million (size category 3). In Table 7, small firms are those falling in size categories 1 and 2.

cient firms (Acemoglu et al., 2009), while our results demonstrate that improved municipal finances can meaningfully support small enterprise development through enhanced access to public sector opportunities.

6 Input Market Competition and Procurement Prices

We conclude by investigating how higher supplier participation shapes market structure and procurement prices, both unconditionally and across products with different impact for local populations' welfare.

6.1 Input Market Competition

In Table 8, we start by investigating whether higher supplier participation for municipalities just-above the FPM cutoffs (as documented in Table 2) effectively translate into higher competition. In other words, we ask whether new participants are more competitive than incumbents, and whether their presence changes procurement market structure. Table 8 provides evidence that higher federal transfers indeed lead to more competitive procurement markets. For example, Column I shows that a 10% increase in FPM transfers reduces individual winning suppliers' market share by 0.057 percentage points, which represents a 5.7% decrease from the average market share of 1%. While this effect may appear modest in absolute terms, it reflects meaningful changes in market dynamics when considered relative to the baseline concentration levels in our sample.

In a similar spirit, Columns II and III examine Herfindahl-Hirschman Indices (HHI) calculated at different levels of aggregation. Column II shows that a 10% increase in transfers reduces the municipality-level HHI by 1.27%, indicating a substantial decrease in market concentration as measured by the sum of squared supplier market shares within each municipality-year. Column III presents results for the municipality-item-

year HHI, providing an even more granular view of competitive dynamics. Here, we find that higher transfers reduce concentration by 0.38%, suggesting that competition operates not only at the aggregate municipal level but also within specific product categories.

In sum, the findings of Table 8 complement our earlier results on bidder participation by demonstrating that the additional competitors attracted by higher federal transfers do not merely represent marginal players but actually succeed in winning contracts and gaining meaningful market share. As we argue below, such redistribution of market shares from incumbent to new and smaller suppliers appears to represent an important mechanism through which improved municipal finances translate into procurement prices.

6.2 Procurement Prices

In Table 9, Panel A, we next ask whether increased competition and reduced market concentration result in lower procurement prices (see, e.g., Li and Zheng (2009) and Costello (2020)). The data provides evidence consistent with this hypothesis: For example, Column I shows that a 10% increase in FPM transfers leads to a 4.39% reduction in the average procurement price of the same item around the same cutoff, representing a large and statistically significant elasticity. This effect appears to be stable across empirical specifications, with coefficients ranging from -0.44 to -0.46 depending on the fixed effects structure. Even our most demanding specification, which includes both winner $\times$ cutoff $\times$ year and mesoregion $\times$ cutoff $\times$ year fixed effects, yields a price reduction of 4.54% for a 10% increase in transfers.

The inclusion of winner $\times$ cutoff $\times$ year fixed effects in Columns II and IV is particularly important for identification, as it allows us to compare prices charged by the same supplier for the same item to municipalities just above and below the FPM thresholds.

This specification effectively asks whether identical suppliers charge different prices to otherwise similar municipalities that differ only in their federal transfer receipts. The persistence of large negative coefficients in these specifications supports our interpretation that the observed price differences around the same FPM cutoff reflect genuine competitive effects rather than changes in the identity of the supplier or in the products being procured.

The economic magnitude of the estimates presented in Panel A of Table 9 is large: Federal transfers increase by 20% on average around the FPM population thresholds in our sample, implying that municipalities just-above the average cutoff in our sample pay approximately 9% less for the same goods compared to those just-below the thresholds. In turn, this evidence suggests potentially meaningful budget savings that can be redirected toward additional public services or infrastructure investments. Importantly, the observed price differences are unlikely to reflect differences in quality, as our empirical design compares procurement of identical items across similar municipalities. Instead, they suggest that financially constrained municipalities may pay supra-competitive prices due to limited supplier participation and market concentration.

The price differences we document in Table 9, Panel A, may not arise exclusively from differences in competition around the FPM cutoffs. As we show in Section 5.1, higher FPM transfers are associated with higher tender quantities, which could be associated with unit price discounts. Additionally, suppliers may directly incorporate municipalities' expected payment delays and default risks into their pricing strategies, even absent competitive pressure. While we view these channels as plausible complements to our competitive effects, in Panel B of Table 9 we investigate whether the price differences we document in Table 9 vary with supplier size. Our hypothesis is that, if the documented price differences are determined *exclusively* by quantity related discounts or delay premia, such differences would be quantitatively similar along the supplier size distribution. If anything, absent changes in competition we could expect muted effects for larger sup-

pliers with more bargaining power. In contrast, if the documented price differences are determined primarily by competition, we would expect larger price differences for large suppliers who, as we show in Section 5.2, are more likely to be rent-earning incumbents when municipalities are more constrained.

To test these alternative channels, in Panel B of Table 9 we interact our baseline FPM transfers with indicators for supplier size, where suppliers are defined as micro firms, small firms, and large firms based on official government classifications (see footnote 12). Table 9, Panel B, shows that for micro and small firms a 10% increase in FPM transfers leads to price reductions of 2.90% to 3.75%, depending on the specification. Additionally, large firms exhibit substantially larger price responses: the estimated interaction coefficients range from -0.36 to -0.50 percentage points, implying total price reductions of 7.0% to 8.2% for a 10% increase in transfers when contracts are won by large firms. We interpret the baseline effects on small and micro firms as consistent with either a direct price channel or with increased competition. We interpret the incremental effects on large firms as evidence of rent erosion due to the participation of small firms in procurement. In sum, our results suggest that even if small firms do not always win procurement contracts when municipalities secure more FPM funding, their participation in the auction is still beneficial because it reduces the rents of larger incumbents.

6.3 Competition, Prices, and Local Economic Effects

In Section 5.2, we documented a first economic benefit of relaxing local municipalities' financial constraints: incentivizing access to procurement for small and constrained suppliers. In this section, we complement this evidence by linking competition and price effects to local economic welfare. Our hypothesis is that, by increasing competition and reducing prices, FPM transfers may increase municipalities' effective purchasing power above and beyond their monetary values.

For example, suppose that municipalities a and b, located just below and just above an FPM cutoff respectively receive FPM transfers of BRL 100 and BRL 120, and they spend their entire budgets on the same good. If the price of such good is BRL 1, and if prices are constant around the FPM thresholds, municipality b can afford to buy 20 more units of the good than municipality a. However, if competition is higher and prices lower in municipality b than in a, this can allow b to purchase more than 20 units than a. If these effects are particularly strong when suppliers provide essential goods and services (e.g., medicines and healthcare), our competitive effects may have pass-through benefits for local populations.

In Figures 5 and 6, we study the relationship between competitive effects and price effects across different categories of items. In Figure 5, Panel A, we start by presenting our main estimates of the relationship between FPM transfers and procurement participation (Table 2, Column III) across ten major product categories. In doing so, we distinguish between items that are more likely to benefit the local population (e.g., healthcare-related products and products related to water and sanitation) and products that are more likely to benefit local governments (e.g., administrative materials). In Panel B, we repeat the same exercise but focus on the relationship between FPM transfers and product prices.

Figure 5 shows that healthcare and medical products experience the largest increases in competition, with estimated elasticities exceeding one, and correspondingly exhibit substantial price reductions (approximately 50 basis points for a 10% increase in transfers). Public health services, public infrastructure, all categories that are likely to impact local welfare, show similarly large effects. In sum, Figure 5 suggests that the competitive effects we document are likely to benefit local populations via a price reduction channel.

Figure 6 makes the relationship between competition and consumer benefits explicit by plotting the correlation between our estimated effects on participation and prices. The negative correlation documented in Figure 6 demonstrates that the products and items experiencing greater increases in competition around FPM transfers systematically

exhibit greater price reductions, thus validating the interpretation that our estimated price effects are largely determined by competition (as opposed to direct effects, as discussed in the previous section). The heterogeneous effects across product categories—specifically, the fact that we observe weaker effects for government consumption products than for others—also indicate that municipal financial constraints may create severe inefficiencies in the provision of basic public goods, consistent with the recent evidence in World Bank (2025). In sum, our findings suggest that relieving local municipalities' constraints may affect local populations by stimulating procurement competition and increasing local governments' effective purchasing power of essential goods.

7 Conclusion

We provide novel evidence that local government financial constraints impede procurement competition. Using quasi-experimental variation in local governments' financial constraints from Brazil's federal transfer program and detailed procurement data from municipalities from the State of Minas Gerais, we demonstrate that relaxing financial constraints substantially increases the number of procurement bidders and reduce procurement prices through two primary mechanisms: larger and more frequent procurement opportunities that justify suppliers' participation costs, and improved payment reliability that reduces counterparty risk. The benefits are concentrated among financially constrained municipalities and disproportionately attract smaller, younger suppliers who had previously been excluded from public procurement markets.

The economic implications of our findings arguably extend beyond direct fiscal effects. We observe larger competition and price improvements for essential public goods—healthcare, public infrastructure, and social services—that directly impact local populations. This suggests that municipal financial constraints may create particularly severe inefficiencies in basic public service provision, effectively taxing residents through high

procurement costs that reduce the quantity of available services.

The analysis also highlights the potential for fiscal policy to serve broader economic development objectives. Our evidence that improved municipal finances enhance market access for small suppliers suggests that supporting local government financial health can stimulate small business development and democratize access to government contracting opportunities. Our findings ultimately demonstrate that municipal financial health is a crucial determinant of public sector efficiency, and that in contexts where local governments face binding financial constraints, federal transfers can generate substantial welfare improvements by restoring competitive market functioning and enabling more efficient public service delivery.

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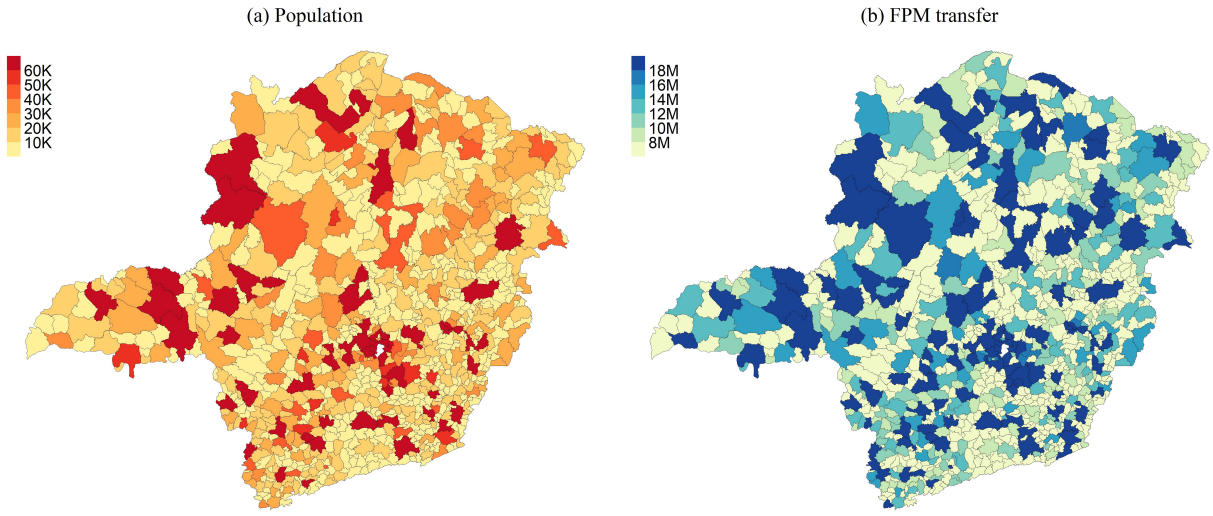
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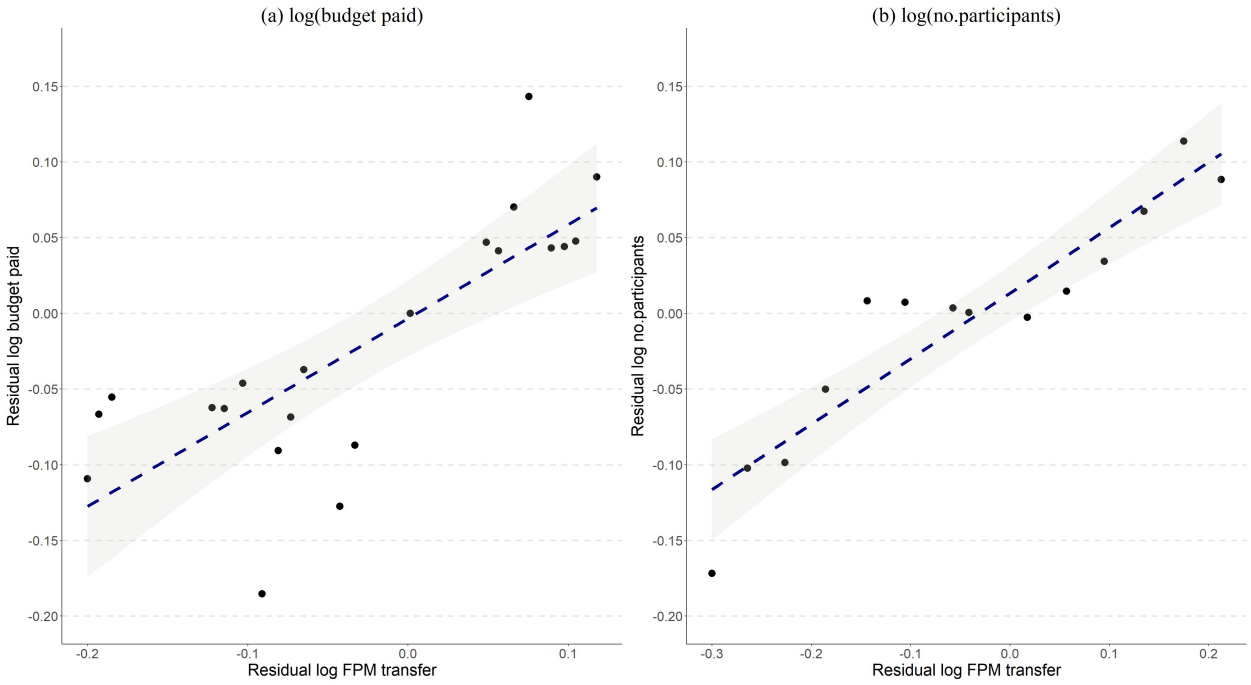
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Figure 1: Population and Federal Transfers: Heatmaps



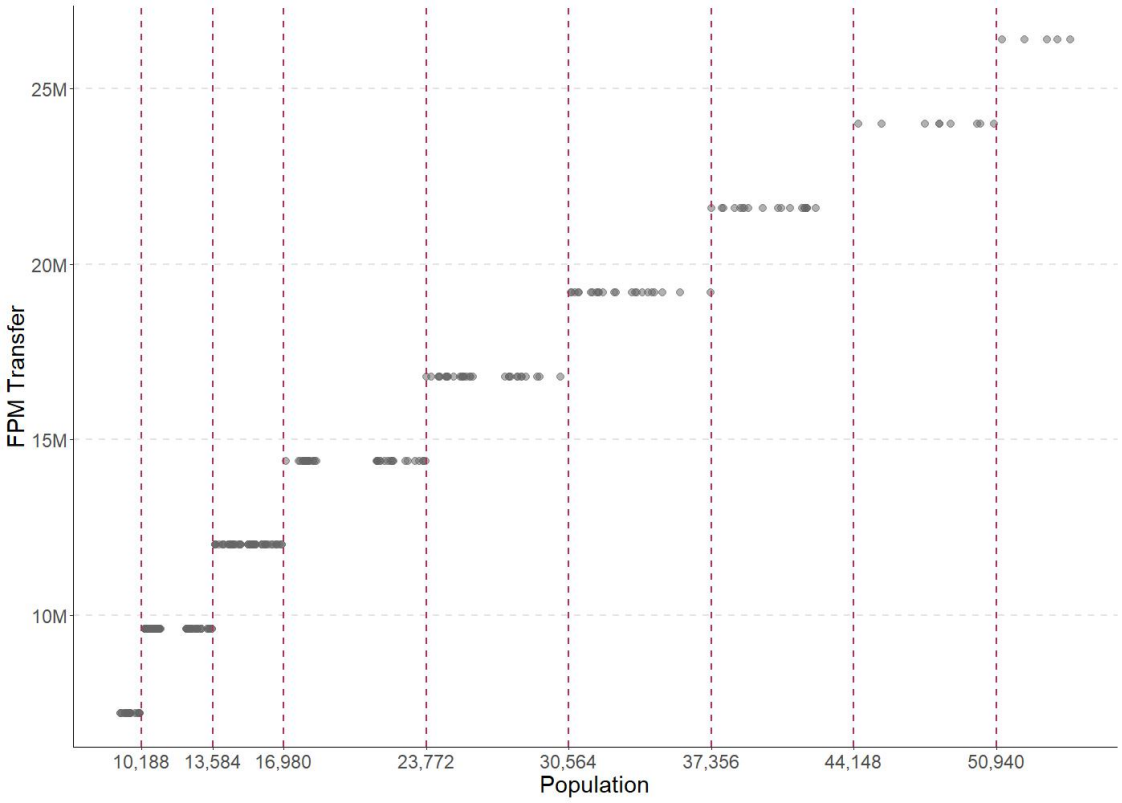
Notes: This figure shows heatmaps of average population (Panel (a)) and average FPM transfers (Panel (b)) for municipalities in the State of Minas Gerais. The sample period is 2014-2020.

Figure 2: Federal Transfers, Budget Spending, and Procurement Participation



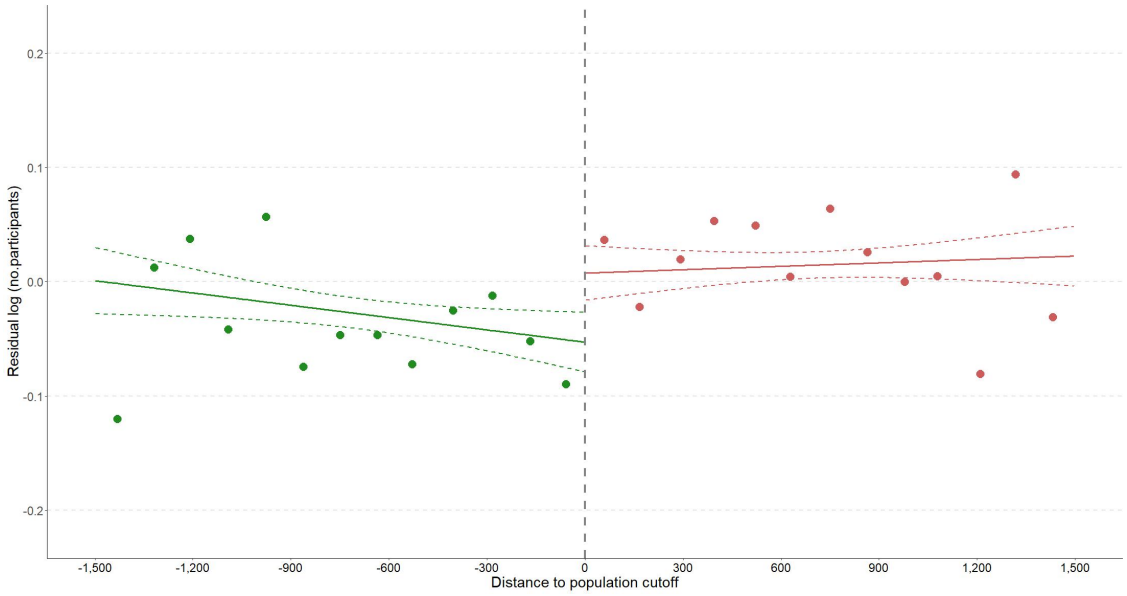
Notes: This figure presents visual evidence on the relationship between municipality-level FPM transfers, municipality-level spending, and average number of participants for auctions in that municipality. In Panel (a), the unit of observation is a municipality-year. We plot residualized budgets (the value paid across all purchases for a municipality over a year) over residualized FPM transfers for the same municipality-year. To facilitate comparisons across municipalities of different size and across different years, we first residualize budget spending and FPM transfer by first taking the natural logarithm of budgets and FPM transfers and then subtracting the mean of these log values for each cutoff-year group. For Panel (b), where we observe the number of participants of individual auction by municipalities in each year, we residualize the relevant variables by first taking their natural logarithm and then subtracting their means for each item-cutoff-year. The sample includes municipalities within a 10% bandwidth around their nearest population cutoffs, and the sample period is 2014-2020. In both panels, we also report estimated linear fits with their associated 95% confidence intervals.

Figure 3: Federal Transfers around FPM Population Thresholds



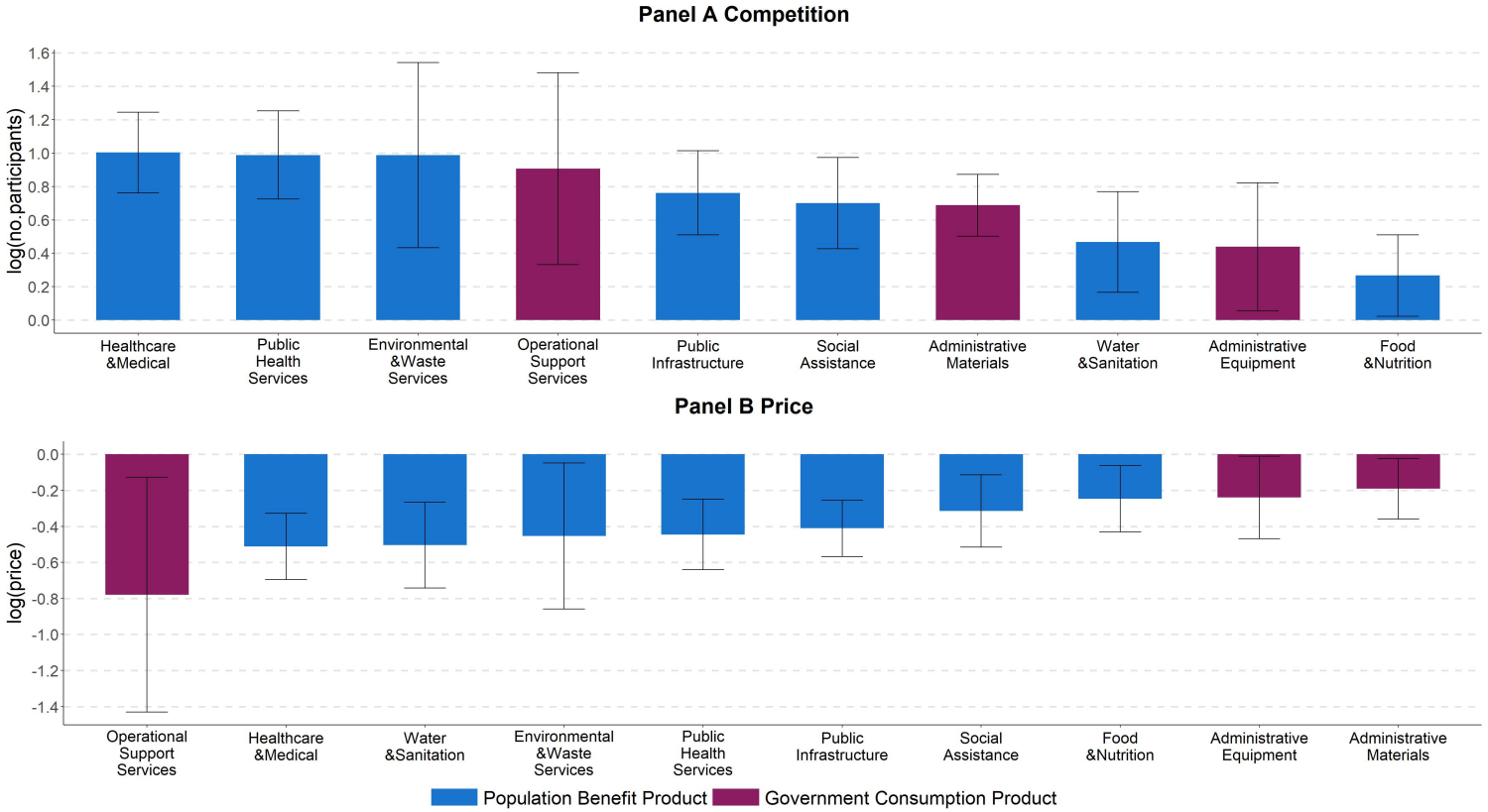
Notes: This figure shows FPM Federal transfers across different population thresholds in our sample. Each dot denotes transfers to municipalities within a 10% bandwidth around their nearest population cutoff. The vertical dashed lines in red indicate FPM population cutoffs. The data comes from a single cross-section in 2018.

Figure 4: RD Plot: Procurement Participation



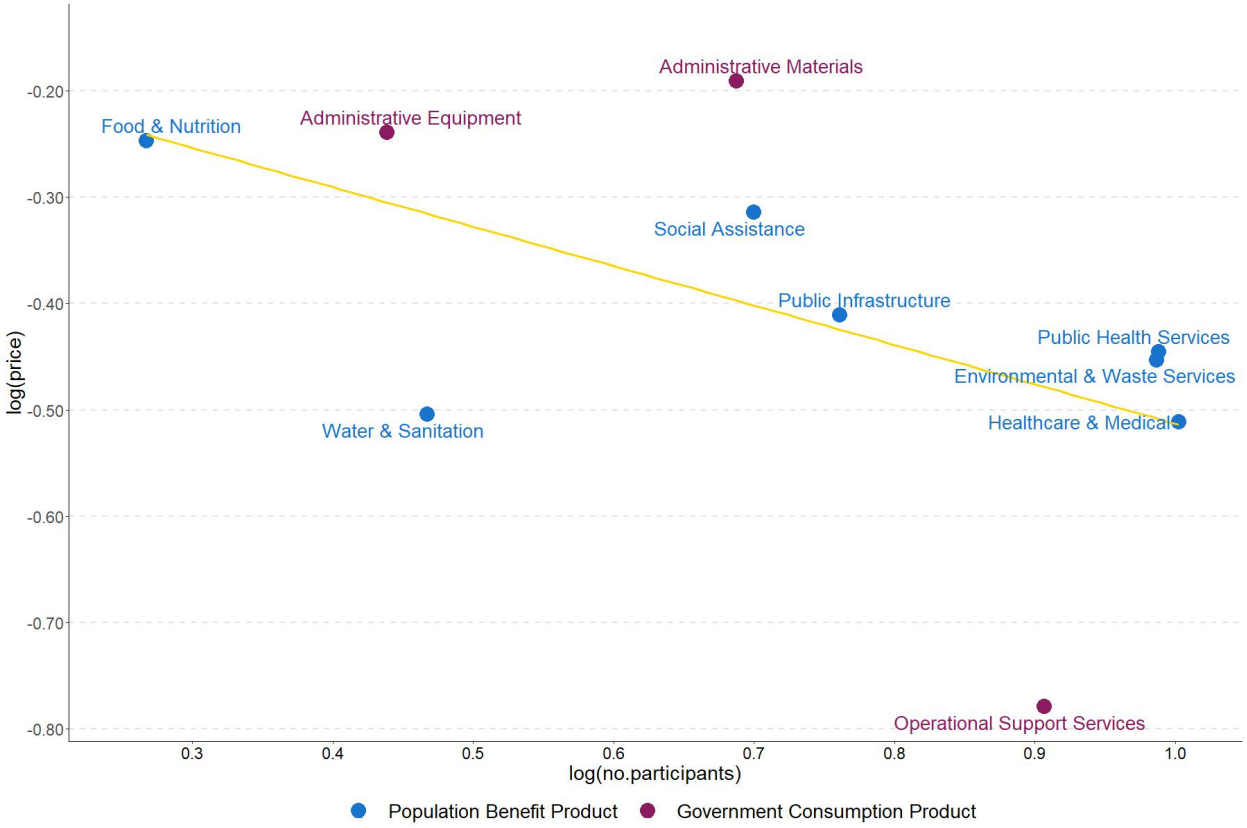
Notes: This figure presents an RD plot for the number of participants around the pooled FPM thresholds in our sample. We report average residualized values of the (log) number of participants in 26 bins of the running variable (each municipality's distance from the nearest population cutoff), as well as linear fits below and above the pooled thresholds along with their associated 95% confidence intervals. The unit of observation is a municipality-year. *Residual log (no.participants)* is the difference between the log-transformed average number of auction participants at the municipality-year level, and the average (log) number of auction participants at the cutoff-year-mesoregion level, where each municipality is assigned to its closest FPM cutoff in any given year. Green dots indicate auctions held by municipalities with relatively low funding (i.e., municipalities with populations below their nearest FPM cutoff), and red dots denote auctions held by municipalities with relatively high funding (i.e., municipalities with populations above their nearest FPM cutoff). Within each bin, each observation is weighted by the relative size of the FPM transfer jump around the cutoff. The sample period is 2014-2020.

Figure 5: Competition and Pricing in the Cross-section of Products



Notes: This figure reports the estimated effects of FPM transfers on procurement participation (Panel A) and prices (Panel B) in the cross-section of procurement products, while categorizing products as products more likely to benefit local populations (in blue) and products more likely to benefit government officials (in maroon). Within each panel, products are ranked by the magnitude of estimated changes across products. All dependent variables are log-transformed, and estimates come from our preferred specification with item-cutoff-year fixed effects and mesoregion-cutoff-year fixed effects (e.g., Column III of Table 2). Detailed product descriptions are reported in Table A.10, and estimates in tabular form in Table A.11. The sample period is 2014-2020.

Figure 6: Competition Effects and Price Effects



Notes: This figure presents the correlation between estimated competition effects and estimated price effects for the product categories included in Figure 5. As in Figure 5, products are categorized based on their likelihood of benefiting local populations (in blue) and government officials (in maroon). Detailed product descriptions are reported in Table A.10, and estimates in tabular form in Table A.11. The sample period is 2014-2020.

Table 1: Summary Statistics

	Mean	Standard Deviation	Min	Median	Max	Observation
Panel A. Auction-Item-Year Level						
No.participants	4.18	3.28	1	3	18	1,803,716
Price	245.26	993.55	0.08	15.80	8,300.00	2,658,780
Fraction of small participants	0.85	0.28	0	1	1	1,957,877
Average participant age	13.47	6.90	1.00	13.00	36.50	2,103,658
Average participant procurement age	2.05	1.61	0.00	2.00	6.00	2,017,310
p(Small winning supplier)	0.85	0.36	0	1	1	2,077,790
Winning supplier age	13.66	10.28	0	11	44	2,308,386
Winning supplier procurement age	2.16	1.87	0	2	6	3,234,856
Panel B. Winner-Year level						
Winning supplier market share	0.01	0.02	0.00	0.00	0.11	169,211
Panel C. Procurement-Year level						
Delays (days): first delivery $\rightarrow$ first payment	25.27	31.99	0.97	15.00	193.95	35,632
Delays (days): first delivery $\rightarrow$ final payment	68.93	90.42	1.00	28.64	420.53	40,271
Delays (days): final delivery $\rightarrow$ first payment	27.52	35.46	0.80	16.00	216.00	27,674
Delays (days): final delivery $\rightarrow$ final payment	36.28	56.03	1.00	18.39	361.39	35,143
Fraction of delivered goods/services never paid	0.001	0.009	0.000	0.000	0.088	43,149
Panel D. Municipality-Item-Year level						
No.auctions	1.64	1.59	1	1	11	1,875,959
Quantity	1,988.40	8,585.80	1	66	70,000	1,755,338
Herfindahl-Hirschman Index	0.95	0.14	0.41	1	1	1,483,211
Panel E. Municipality-Year level						
Herfindahl-Hirschman Index	0.08	0.11	0.02	0.05	0.79	1,833
FPM transfer (BRL)	13,693,138	5,217,942	5,613,685	12,491,187	28,698,240	1,891*
Expenses (BRL)	50,092,440	41,394,992	3,817,772	37,065,310	423,607,446	1,866*
Revene (BRL)	61,769,744	52,008,070	2,591,040	45,326,371	565,281,123	1,865*
Population (inhab.)	22,506	12,912	9,174	16,791	59,857	1,891*

This table reports summary statistics for variables in our data from 2014 to 2020. Sample size varies across variables; for each, we report the effective number of observations used in the regressions, based on the optimal bandwidth selection method from Calonico et al. (2014). Observations with (*) are summary statistics for the entire sample.

Table 2: Federal Transfers and Procurement Participation

	log(no.participants)			
	I	II	III	IV
Log FPM transfer	0.6627***	0.3914***	0.6672***	0.5119***
	(0.0371)	(0.0386)	(0.0400)	(0.0426)
Observations	1,803,716	1,803,716	1,803,716	1,803,716
R2	0.67716	0.90894	0.71447	0.91292
Bandwidth	Optimal	Optimal	Optimal	Optimal
Item-Cutoff-Year FE	Yes	Yes	Yes	Yes
Winner-Cutoff-Year FE		Yes		Yes
MesoRegion-Cutoff-Year FE			Yes	Yes

This table reports the effects of federal transfers on the number of participants in the auctions of items procured by each municipality, using the two-step regression discontinuity design (RDD) method described in Section 3.2. The dependent variable is the natural logarithm of the number of auction participants. Log FPM transfer is the natural logarithm of the FPM Federal transfers, instrumented by the municipality's law-implied transfer. All specifications are estimated with a linear polynomial fit around the threshold, and a uniform kernel for local weighting. The table shows the effective sample size, determined using the optimal bandwidth selection method from Calonico et al. (2014). Standard errors are clustered at the item-municipality-threshold level. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. The sample period is 2014-2020.

Table 3: Financial Constraints: Municipality Spending, Size, and Leverage

	Panel A Municipality Revenue and Spending					
	log(revenue)		log(expenses)		Revenue-to-Expense Ratio	
	I	II	III	IV	V	VI
Log FPM transfer	0.3542*	0.4944***	0.3361*	0.4878***	0.036	0.0704
	(0.1981)	(0.1042)	(0.1977)	(0.0951)	(0.0257)	(0.0734)
Observations	1,708	1,708	1,724	1,724	1,694	1,694
R2	0.78100	0.98437	0.77707	0.98221	0.22770	0.44634
Bandwidth	Optimal	Optimal	Optimal	Optimal	Optimal	Optimal
Cutoff-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Municipality-Cutoff FE		Yes		Yes		Yes

	Panel B: Municipality Size and Leverage	
	log(no.participants)	
	I	II
Log FPM transfer · Cutoffs 1-3 (Small)	0.6800***	
	(0.0449)	
Log FPM transfer · Cutoffs 4-8 (Large)	-0.1913	
	(0.1912)	
Log FPM transfer · High Loan Ratio		1.499***
		(0.0533)
Log FPM transfer · Low Loan Ratio		0.8716***
		(0.0653)
Equality Test (p-value)	0.0000	0.0000
Observations	1,803,716	2,094,971
R2	0.71467	0.78360
Bandwidth	Optimal	Optimal
Item-Cutoff-Year FE	Yes	Yes
MesoRegion-Cutoff-Year FE	Yes	Yes

This table reports the effects of FPM transfers on municipal revenue and spending (Panel A), and the effects of FPM transfers on participation in the cross-section of municipality size and leverage (Panel B). In panel A, the dependent variables are log(revenue) in Columns I-II, log(expenses) in Columns III-IV, and the Revenue-to-Expense Ratio in Columns V-VI. Data is from the Brazilian municipality finances (Finbra) dataset provided by the Treasury. In Panel B, the dependent variable is the natural logarithm of the number of auction participants. In Column I, we group municipalities into relatively small (those around the first three FPM thresholds from the bottom) and relatively large municipalities (those around population thresholds 4 to 8). In Column II, loan ratio is the ratio of the municipality's total (short- and long-term) loans to the municipality's total assets (from Finbra), and we rank municipalities based on the lagged value of this loan ratio within a threshold. In Panel B, we also report *p*-values for coefficient equality tests in each column. Both panels are estimated the two-stage RDD described in Section 3.2, using a linear polynomial and a uniform kernel for local weighting. The effective sample size is determined using the optimal bandwidth selection method from Calonico et al. (2014). Standard errors are clustered at the municipality-threshold level in Panel A, and item-municipality-threshold level in Panel B. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. The sample period is 2014-2020.

Table 4: Mechanism: Procurement Size and Frequency

	log(quantity) *Auction*	log(no.auctions) *Municipality-Item*	log(quantity) *Municipality-Item*
	I	II	III
Log FPM transfer	0.8771***	0.0445**	0.5694***
	(0.0586)	(0.0183)	(0.0488)
Observations	2,455,087	1,875,959	1,755,338
R2	0.86094	0.70451	0.88994
Bandwidth	Optimal	Optimal	Optimal
Item-Cutoff-Year FE	Yes	Yes	Yes
MesoRegion-Cutoff-Year FE	Yes	Yes	Yes

This table reports estimates of the effect of FPM transfers on procurement size and frequency. In Column I, we use the natural logarithm of the auction purchasing quantity as the dependent variable. In Column II, we use the natural logarithm of the total number of auctions at the municipality-item-year level. In Column III, we use the natural logarithm of the total purchasing quantity at the municipality-item-year level. The procedure we use to construct this table is otherwise identical to that described in Table 2. Standard errors are clustered at the item-municipality-threshold level. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. The sample period is 2014-2020.

Table 5: Mechanism: Speed of Payment and Defaults

	I	II	III	IV	V
	Panel A: Probability of Slow Payments				
	p(days>60)	p(days>90)	p(days>120)	p(days>150)	p(days>180)
Log FPM transfer	-0.2619*	-0.2691**	-0.2820***	-0.2222**	-0.0419*
	(0.1497)	(0.1324)	(0.1031)	(0.1026)	(0.0247)
Observations	35,255	34,958	38,681	41,979	43,714
R2	0.22744	0.16837	0.13720	0.11832	0.13389
	Panel B: Days Until Payment and Default				
	log(Days until Payment)				Fraction of delivered
	first delivery → *first payment*	*final delivery* → *first payment*	*first delivery* → *final payment*	*final delivery* → *final payment*	goods/services never paid
Log FPM transfer	-1.531***	-1.706***	-1.372***	-1.271***	-0.0051*
	(0.4867)	(0.5379)	(0.4292)	(0.4811)	(0.0029)
Observations	35,632	27,674	40,271	35,143	43,149
R2	0.14509	0.18095	0.11576	0.13355	0.03805
Bandwidth	Optimal	Optimal	Optimal	Optimal	Optimal
Cutoff-Year FE	Yes	Yes	Yes	Yes	Yes
MesoRegion-Cutoff-Year FE	Yes	Yes	Yes	Yes	Yes

This table reports our estimates of the effect of FPM transfers on procurement speed of payment. In Panel A, the dependent variables are indicators equal to one if the days until payment after delivery exceed 60 days (Column I), 90 days (Column II), 120 days (Column III), 150 days (Column IV), and 180 days (Column V), and equal to zero otherwise. In Panel B, the dependent variables are the difference (in days) between first payment and first delivery (Column I), first payment and final delivery (Column II), final payment and first delivery (Column III), and final payment and final delivery (Column IV). In Column V, we use default (i.e., the fraction of delivered goods/services never paid) as the dependent variable. All specifications in both panels include threshold-year and threshold-year-mesoregion fixed effects. Standard errors are clustered at the municipality-threshold level in columns I & II, and municipality-threshold level in columns III. The procedure we use to construct this table is otherwise identical to that described in Table 2. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. The sample period is 2014-2020.

Table 6: Geographic Composition of the Supplier Pool

	Fraction of Local Participants	Local Winning Supplier	log(no.participants)
	I	II	III
Log FPM transfer	-0.1458***	-0.1252***	
	(0.0212)	(0.0260)	
Log FPM transfer · Isolated Municipality=0			0.7799***
			(0.0640)
Log FPM transfer · Isolated Municipality=1			1.059***
			(0.0792)
Equality Test (p-value)			0.0057
Observations	1,313,025	1,545,623	1,136,085
R2	0.82435	0.72145	0.76538
Bandwidth	Optimal	Optimal	Optimal
Item-Cutoff-Year FE	Yes	Yes	Yes
MesoRegion-Cutoff-Year FE	Yes	Yes	Yes

This table reports our estimates of the effects of FPM transfers on the geographic composition of the participant and supplier pools. The dependent variables are the fraction of local participants (Column I), an indicator equal to one if the winning supplier of the auction is from the focal municipality and equal to zero otherwise (Column II), and the natural logarithm of the number of participants (Column III). Isolated Municipality is an indicator equal to one if the municipality is in the top tercile of the distribution of average distance from its neighboring municipalities, and equal to zero otherwise. In Column III, we also report the *p*-value of a coefficient equality test. Log FPM transfer is the natural logarithm of the Federal transfers, instrumented by the predicted transfer according to pre-defined rules based on population cutoffs. The procedure we use to construct this table is otherwise identical to that described in Table 2. Standard errors are clustered at the item-municipality-threshold level. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. The sample period is 2014-2020.

Table 7: Supplier Size and Age

	I	II	III
	Panel A: Participant Size and Age		
	Fraction of Small Participants	Average Participant Age	Average Participant Procurement Age
Log FPM transfer	0.0436***	-4.895***	-0.4019***
	(0.0093)	(0.4114)	(0.0403)
Observations	1,957,877	2,103,658	2,017,310
R2	0.81778	0.64934	0.90987
	Panel B: Winning Supplier Size and Age		
	p(Small Winning Supplier)	Winning Supplier Age	Winning Supplier Procurement Age
Log FPM transfer	0.0713***	-4.298***	-0.3986***
	(0.0137)	(0.4701)	(0.0403)
Observations	2,077,790	2,308,386	3,234,856
R2	0.72620	0.55441	0.80415
Bandwidth	Optimal	Optimal	Optimal
Item-Cutoff-Year FE	Yes	Yes	Yes
MesoRegion-Cutoff-Year FE	Yes	Yes	Yes

This table reports our estimates of the effects of FPM transfers on participants' and winning suppliers' size and age. In Panel A, we focus on the size and the age of auction participants. In Column I, the dependent variable is the fraction of small participants (small or micro-sized firms with revenues below BRL 4.8 million) across all auctions held by the municipality in a given year, where we borrow participant size categories from official classifications. In Column II, the dependent variable is the average participant age since establishment. In Column III, the dependent variable is the average participant age since its first public procurement auction. In Panel B, we focus on the size and the age of auction winners. In Column I, the dependent variable is an indicator variable equal to one if the winning supplier is a small or micro-sized firm, and equal to zero otherwise. In Column II, the dependent variable is the average winner age since establishment. In Column III, the dependent variable is the average winner age since its first public procurement auction. The procedure we use to construct this table is otherwise identical to that described in Table 2. Standard errors are clustered at the item-municipality-threshold level. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. The sample period is 2014-2020.

Table 8: Input Market Competition

	Winning Supplier Market Share	Herfindahl-Hirschman Index (Municipality)	Herfindahl-Hirschman Index (Municipality-Item)
	I	II	III
Log FPM transfer	-0.0057**	-0.1267**	-0.0379***
	(0.0023)	(0.0508)	(0.0049)
Observations	169,211	1,833	1,483,211
R2	0.04019	0.32510	0.58346
Bandwidth	Optimal	Optimal	Optimal
Cutoff-Year FE	Yes	Yes	
Item-Cutoff-Year FE			Yes
MesoRegion-Cutoff-Year FE	Yes	Yes	Yes

This table reports our estimates of the effects of FPM transfers on input market competition. In Column I, the dependent variable is the winner's market share, defined as the total value (in BRL) purchased from the supplier divided by the total value purchased in procurement by the municipality in a given year. In Column II, the dependent variable is the municipality-year Herfindahl-Hirschman Index (HHI), calculated as the sum of squared supplier market shares across all items and procurement auctions. In Column III, the dependent variable is the municipality-item-year HHI, defined as the sum of squared supplier market shares at the municipality-item-year level. We interpret the dependent variables in Columns II and III as measures of input market concentration for a given municipality in a given year. Standard errors are clustered at the municipality-threshold level in Columns I and II, and item-municipality-threshold level in Column III. The procedure we use to construct this table is otherwise identical to that described in Table 2. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. The sample period is 2014-2020.

Table 9: Federal Transfers and Procurement Prices

	log(price)			
	I	II	III	IV
	Panel A FPM Transfers and Procurement Prices			
Log FPM transfer	-0.4386***	-0.4647***	-0.4561***	-0.4541***
	(0.0262)	(0.0401)	(0.0297)	(0.0428)
Observations	2,658,780	2,658,780	2,658,780	2,658,780
R2	0.91655	0.93581	0.91860	0.93693
Bandwidth	Optimal	Optimal	Optimal	Optimal
Item-Cutoff-Year FE	Yes	Yes	Yes	Yes
Winner-Cutoff-Year FE		Yes		Yes
MesoRegion-Cutoff-Year FE			Yes	Yes
	Panel B Procurement Prices in the Cross-section of Supplier Size			
Log FPM Transfer	-0.3241***	-0.3746***	-0.2899***	-0.2958***
	(0.0357)	(0.0380)	(0.0658)	(0.0659)
Log FPM Transfer · Supplier Size = 2 (Small Firm)	-0.0819	-0.0629	-0.0843	-0.0975
	(0.0512)	(0.0502)	(0.0831)	(0.0822)
Log FPM Transfer · Supplier Size = 3 (Large Firm)	-0.4970***	-0.3627***	-0.4598***	-0.4048***
	(0.0680)	(0.0644)	(0.0972)	(0.0924)
Observations	2,648,831	2,648,831	2,648,831	2,648,831
R2	0.91642	0.91843	0.93533	0.93646
Bandwidth	Optimal	Optimal	Optimal	Optimal
Item-Cutoff-Year FE	Yes	Yes	Yes	Yes
SupplierSize-Cutoff-Year FE	Yes	Yes		
Winner-Cutoff-Year FE			Yes	Yes
MesoRegion-Cutoff-Year FE		Yes		Yes

This table reports our estimates of the effects of FPM transfers on procurement prices. both unconditionally (Panel A) and in the cross-section of supplier size (Panel B). The dependent variable is the natural logarithm of the price that the municipality pays to the procurement auction winner. In Panel B, we interact our baseline independent variable, log FPM transfer, with indicator variables for small suppliers (suppliers with revenue between BRL 360 thousand and BRL 4.8 million, size category 2) and for large suppliers (suppliers with revenue higher than 4.8 million, size category 3), while taking micro suppliers (suppliers with revenues below BRL 360 thousand) as the baseline category. The fixed effects combinations are identical across columns in Panels A and B, and the procedure we use to construct this table is otherwise identical to that described in Table 2. Standard errors are clustered at the item-municipality-threshold level. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. The sample period is 2014-2020.

Internet Appendix for "Financially Constrained Procurement"

Intended for online publication only

A.I Municipal Procurement in Brazil

In both in-person and electronic auctions, the public procurement process in Brazil follows a standardized two-phase structure: a preparatory phase and an external (public) phase. The preparatory phase establishes the legal and administrative foundation for the procurement. According to Article 3 of Law 10.520/2002, the contracting authority must justify the need for the purchase, define the object with precision and clarity, establish qualification requirements, specify proposal acceptance criteria and contract terms, and designate an auctioneer (*pregoeiro*) and support team to manage the process. The municipality also prepares a cost estimate based on market research and allocates the necessary budgetary resources.

The external phase begins with the publication of the bidding notice (*edital*) in the official gazette and, when applicable, on the municipality's website. Law 10.520/2002 requires a minimum interval of eight working days between publication and the session. At the designated time, interested suppliers or their legal representatives must attend the public session for credentialing. This step verifies the legal authority of representatives to act on behalf of the firm. Representatives must present either: (i) the company's articles of incorporation or bylaws, if they are partners or directors with signing authority; or (ii) a power of attorney, accompanied by the company's constitutive documents, if they are designated agents. Firms must also submit a signed declaration (outside the sealed envelopes) stating that they meet all qualification requirements specified in the edital.

Following credentialing, participants submit two sealed envelopes: Envelope 1 contains the price proposal, and Envelope 2 contains qualification documents. The price proposal must specify the brand or model of goods offered, unit and total prices, delivery timelines, and payment conditions. Proposals must be typed or printed, signed by a legal representative, and strictly conform to the technical specifications in the edital. The qualification envelope includes documents demonstrating the business registration cer-

tification, tax and labour regularity certificates, and evidence of economic and financial capacity.

In the public session, the auctioneer opens all Envelope 1 submissions, verifies conformity with the edital's technical requirements, and ranks the proposals by price. Article 4, VIII of Law 10.520/2002 establishes the selection rule for the competitive stage: the author of the lowest initial proposal and all those whose prices are within 10% above that minimum are invited to participate in verbal bidding.[A.I.1] The verbal bidding phase is conducted as a descending, open-outcry auction. The auctioneer calls on eligible participants in sequential order, starting from the highest price among those selected, to offer progressively lower bids. Bidding continues in iterative rounds until no participant is willing to reduce their price further. This dynamic competitive mechanism is a defining feature of the *pregão* system, designed to extract maximum price concessions through real-time strategic interaction among suppliers.

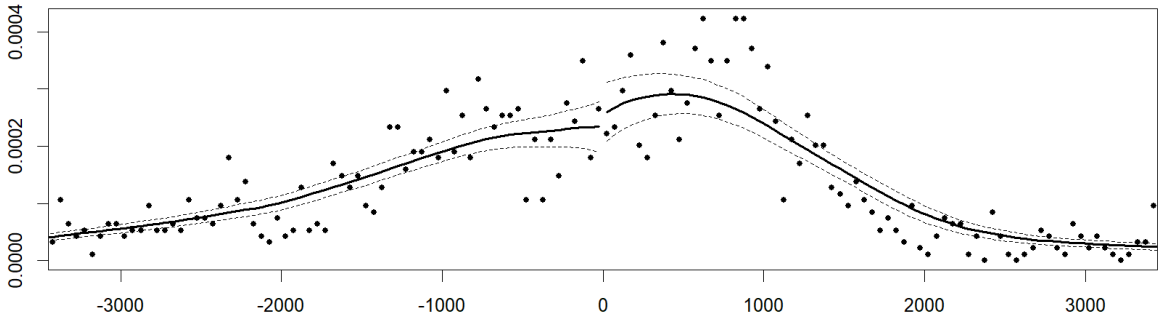
Once the bidding concludes, the auctioneer declares the firm offering the lowest price as the provisional winner, subject to qualification verification. At this point, Envelope 2 of the leading bidder is opened, and the auctioneer examines whether all required documents are present and valid. If the provisional winner fails qualification (due to missing, invalid, or non-compliant documents) or if their proposal is found unacceptable upon closer technical review, the auctioneer moves to the next-ranked bidder and repeats the verification process. This sequence continues until a qualified supplier is identified. Article 4, XVII of Law 10.520/2002 authorizes the auctioneer to negotiate directly with the leading qualified bidder to obtain further price reductions. The municipality then issues a purchase order or formal contract, and the supplier must deliver the goods within the specified timeframe. Upon delivery, the receiving department verifies compliance with quantity, quality, and technical specifications.

[A.I.1] If fewer than three proposals fall within this range, Article 4, IX extends the invitation to the authors of the three lowest proposals, regardless of the percentage difference.

This institutional framework (combining transparent public procedures, dynamic competitive bidding, and legal protections for small businesses) shapes the strategic environment in which municipalities and suppliers interact, and forms the context for analyzing how fiscal constraints influence procurement outcomes.

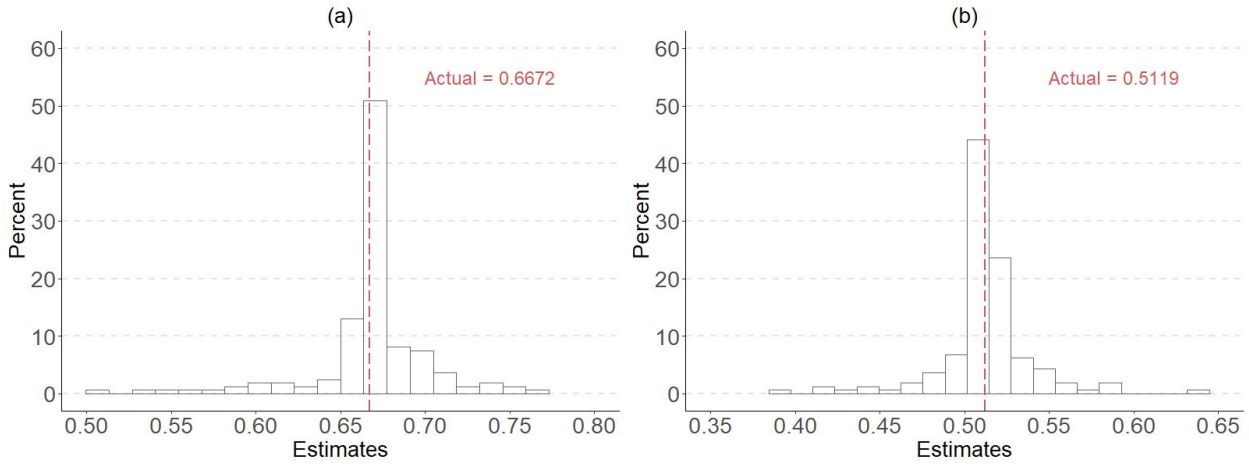
A.II Additional Figures and Tables

Figure A.1: McCrary Tests for Manipulation of the Running Variable



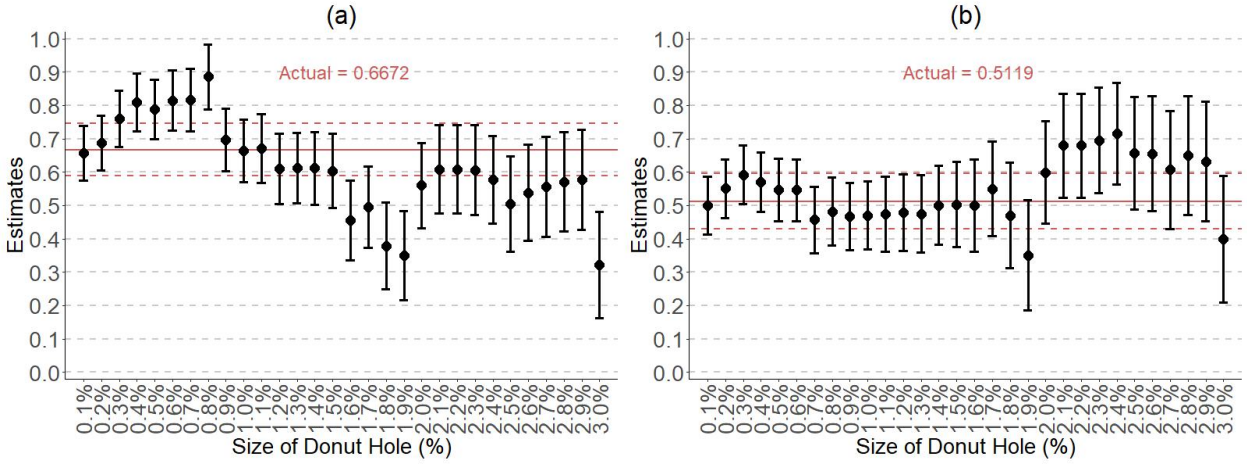
Notes: The figure displays the estimates of McCrary tests for manipulation of the running variable across the pooled FPM thresholds in our sample.

Figure A.2: Robustness: Removing Individual Municipalities from the Sample



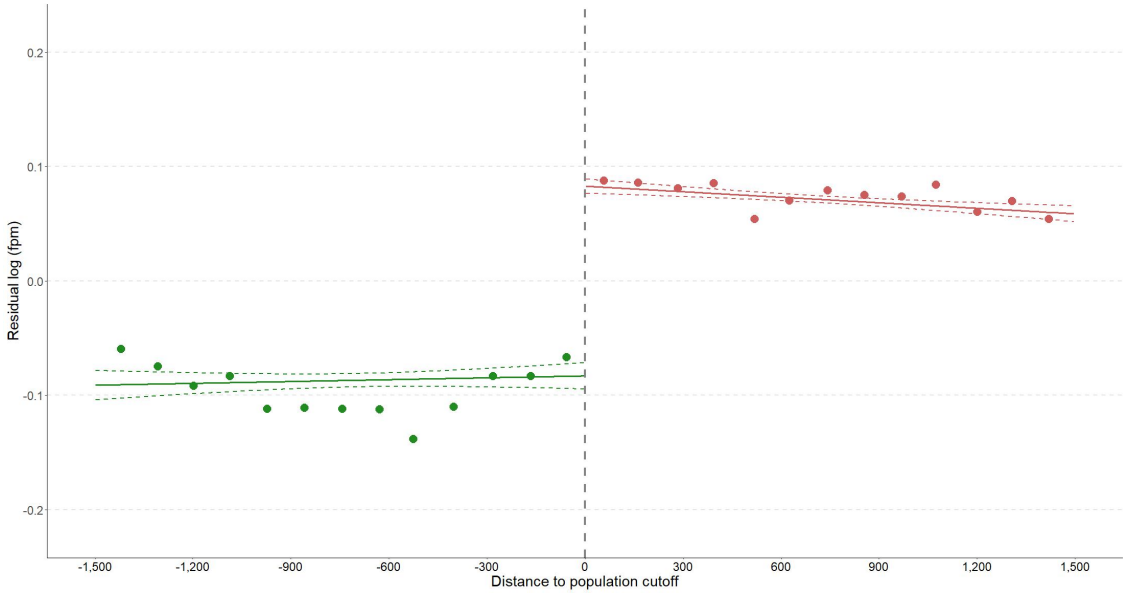
Notes: The figure shows the distribution of our estimates of the coefficient β from our two-stage RD preferred specifications (Table 2, Columns III and IV) after we remove one municipality at a time from the sample. The vertical dashed dotted lines in Panels (a) and (b) are the coefficients reported in Columns III and IV of Table 2.

Figure A.3: Robustness: Donut Regression Discontinuity



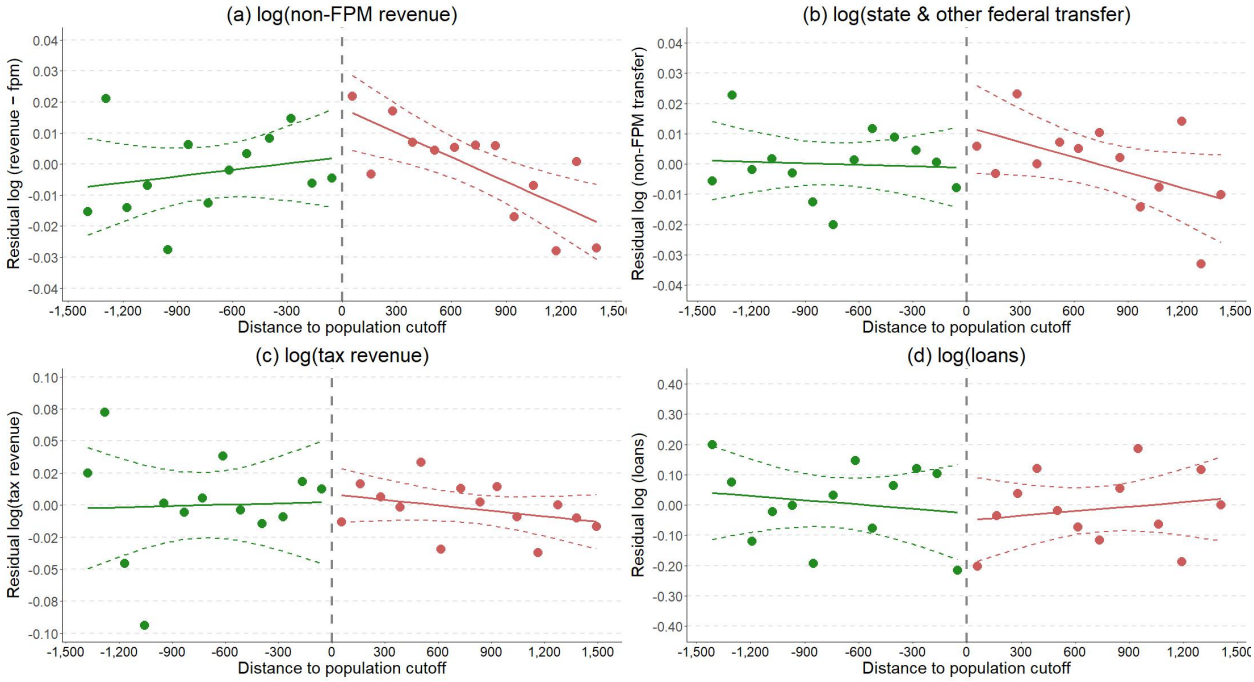
Notes: The figure reports point estimates and associated 95% confidence intervals from our two-stage RD preferred specifications (Table 2, Columns III and IV) after removing from the sample data points in small neighborhoods of each population threshold. The size of these "donut holes" ranges from 0.1% to 3%, and it is reported on the horizontal axis of each panel. The solid horizontal lines (in red) in Panels (a) and (b) are the coefficients reported in Table 2 Columns III and IV, respectively. The horizontal dashed lines (in red) are their associated 95% confidence intervals.

Figure A.4: RD Plot for Federal Transfers



Notes: This figure provides visual validation for the first stage of our two-stage RDD by showing discontinuities in FPM transfers around the pooled thresholds in our sample. The procedure we use to construct this figure is identical to that we use in Figure 4, with the exception that we plot residual FPM transfers (as opposed to procurement participants) as functions of local municipalities' populations.

Figure A.5: Covariate Balance: Non-FPM Revenue, Other Transfers, Taxes, and Loans



Notes: This figure presents the estimates of covariate balance tests for non-FPM sources of municipal revenues and for municipal borrowing. In Panel (a), residual log non-FPM revenue is the difference between (log-transformed) non-FPM revenues at the municipality-year level and their average over cutoffs, years, and municipalities. In Panel (b), residual log state & non-FPM federal transfer is the difference between (log-transformed) non-FPM transfers (from both State and Federal governments) and their average over cutoffs, years, and municipalities. In Panel (c), residual log tax revenues are the difference between (log-transformed) local tax revenues and their average over cutoffs, years, and municipalities. In Panel (d), residual log loans is the difference between (log-transformed) municipal loan amounts and their average over cutoffs, years, and municipalities. The procedure used to construct this figure is otherwise identical to that we use to construct Figure 4.

Table A.1: Federal Transfers Across Countries

Country	Federal Transfers	Source
United States	27.5% of state and local government revenue (2021)	U.S. Census Bureau (2021)
Australia	19% of local government revenue (2022-23)	Victorian Auditor-General's Office
Germany	36% of municipal revenue (2021)	Federal Ministry Report
Turkey	70% of local government revenue (2016)	World Bank (2023)
India	40% of state government revenue	Khemani (2007)
Mexico	85% of sub-national government revenue	OECD Working Papers
Argentina	60.6% of provincial revenue (2014)	World Bank Working Papers

Notes: This table presents the share of Federal transfers in sub-national government revenues across different countries. Sub-national governments include state, provincial, and local governments, depending on the country's administrative structure. All percentages are reported as shares of total revenue for the respective government level.

Table A.2: Selected Procurement Items

Item Description	Unit
Petrol	liter
Banana	kg
Watermelon	kg
Mineral water 500ml	unit
Protective eyewear	unit
Nails	kg
USB flash drive, 16GB	unit
Ibuprofen, 600 mg	pill
Rubbing alcohol	liter
Toilet fixture	unit
Nasal Cannula	unit
20W Fluorecent lamp	unit
Bleach	liter
35mm Padlock	unit
Digital Thermometer	unit

Notes: This table presents examples of products that are commonly found in our public procurement sample, along with their units.

Table A.3: Robustness: Within-municipality Analysis

	log(no.participants)			
	I	II	III	IV
Log FPM transfer	0.1137**	0.3470***	0.3073***	0.5037***
	(0.0523)	(0.0578)	(0.0658)	(0.0671)
Observations	1,803,716	1,803,716	1,803,716	1,803,716
R2	0.74140	0.91807	0.74920	0.92004
Bandwidth	Optimal	Optimal	Optimal	Optimal
Item-Cutoff-Year FE	Yes	Yes	Yes	Yes
Winner-Cutoff-Year FE		Yes		Yes
MesoRegion-Cutoff-Year FE			Yes	Yes
Municipality-Cutoff FE	Yes	Yes	Yes	Yes

Notes: This table reports a robustness test to our main estimates in Table 2, by comparing changes in the number of auction participants as the same municipality crosses an FPM cutoff over time with the inclusion of municipality $\times$ cutoff fixed effects. The table is otherwise identical to Table 2 in the paper. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. The sample period is 2014-2020.

Table A.4: Robustness: Polynomial Order and Kernel Weight

	log(no.participants)					
	I	II	III	IV	V	VI
	Panel A. Polynomial Order					
Log FPM transfer	0.4178***	0.0800***	0.6348***	0.5139***	0.6020***	0.2282***
	(0.0218)	(0.0216)	(0.0401)	(0.0426)	(0.0471)	(0.0517)
Observations	1,803,716	1,803,716	1,803,716	1,803,716	1,803,716	1,803,716
R2	0.71378	0.91266	0.71457	0.91292	0.71455	0.91297
Polynomial Order	Zero	Zero	Quadratic	Quadratic	Cubic	Cubic
	Panel B. Kernel Weight					
Log FPM transfer	0.8165***	0.5653***	0.7546***	0.5501***	0.6672***	0.5119***
	(0.0416)	(0.0447)	(0.0413)	(0.0441)	(0.0400)	(0.0426)
Observations	1,803,716	1,803,716	1,803,716	1,803,716	1,803,716	1,803,716
R2	0.70888	0.91085	0.70695	0.91012	0.71447	0.91292
Kernel	Triangular	Triangular	Epanechnikov	Epanechnikov	Uniform	Uniform
Bandwidth	Optimal	Optimal	Optimal	Optimal	Optimal	Optimal
Item-Cutoff-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Winner-Cutoff-Year FE		Yes		Yes		Yes
MesoRegion-Cutoff-Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table reports the findings of robustness tests on our preferred specifications (Table 2, Columns III and IV), where we vary the RD polynomial order (Panel A) and kernel weight (Panel B). In Panel B, Columns V-VI, we report our baseline estimates with linear polynomials and uniform kernels as benchmarks. The fixed effect structure is identical across Panels A and B, and the procedure we follow to construct the table is otherwise identical to the procedure we follow to construct Table 2, Columns III and IV in the paper. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. The sample period is 2014-2020.

Table A.5: Two-stage RDD: First Stage Estimates

	log(FPM transfer)			
	I	II	III	IV
Log FPM transfer by law	0.8736***	0.8992***	0.8674***	0.8965***
	(0.0030)	(0.0029)	(0.0029)	(0.0030)
Observations	1,803,716	1,803,716	1,803,716	1,803,716
R2	0.99696	0.99945	0.99808	0.99956
Bandwidth	Optimal	Optimal	Optimal	Optimal
Item-Cutoff-Year FE	Yes	Yes	Yes	Yes
Winner-Cutoff-Year FE		Yes		Yes
MesoRegion-Cutoff-Year FE			Yes	Yes

Notes: This table reports the first stage results of the main Regression Discontinuity specification in equation 2. All specifications are estimated with a linear polynomial fit around the threshold, and a uniform kernel for local weighting. The table shows the effective sample size, determined using the optimal bandwidth selection method from Calonico et al. (2014). Standard errors are clustered at the item-municipality-threshold level. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. The sample period is 2014-2020.

Table A.6: Robustness: Single-stage Regression Discontinuity

	log(no.participants)			
	I	II	III	IV
Above Threshold	0.1064***	0.0668***	0.1429***	0.1086***
	(0.0083)	(0.0095)	(0.0093)	(0.0107)
Observations	1,803,716	1,803,716	1,803,716	1,803,716
R2	0.67613	0.90885	0.71359	0.91281
Bandwidth	Optimal	Optimal	Optimal	Optimal
Item-Cutoff-Year FE	Yes	Yes	Yes	Yes
Winner-Cutoff-Year FE		Yes		Yes
MesoRegion-Cutoff-Year FE			Yes	Yes

Notes: This table reports the results of a robustness test to our baseline findings using a single-stage RD rather than the instrumented RD described in Section 3.2. Above Threshold is an indicator variable equal to one if the municipality is above its nearest FPM threshold, and equal to zero otherwise. All specifications are estimated with a linear polynomial fit around the threshold, and a uniform kernel for local weighting. The table reports the effective sample size, determined using the optimal bandwidth selection method from Calonico et al. (2014). Standard errors are clustered at the item-municipality-threshold level. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. The sample period is 2014-2020.

Table A.7: Robustness: Poisson Regressions

	no.participants			
	I	II	III	IV
Above Threshold	0.1271***	0.0408***	0.2095***	0.0744***
	(0.0072)	(0.0076)	(0.0086)	(0.0082)
Observations	1,810,073	1,810,073	1,810,073	1,810,073
R2	0.68401	0.89672	0.73276	0.90489
Bandwidth	Optimal	Optimal	Optimal	Optimal
Item-Cutoff-Year FE	Yes	Yes	Yes	Yes
Winner-Cutoff-Year FE		Yes		Yes
MesoRegion-Cutoff-Year FE			Yes	Yes

Notes: This table reports the results of a robustness tests on our single-stage estimates from Table A.6, while using Poisson regressions rather than linear OLS regressions. The procedure we use to construct this table is otherwise identical to that we follow to construct Appendix Table A.6. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. The sample period is 2014-2020.

Table A.8: Robustness: Rule-of-thumb RD Bandwidth

	log(no.participants)			
	I	II	III	IV
Log FPM transfer	0.3217***	0.0472**	0.3531***	0.1172***
	(0.0196)	(0.0197)	(0.0208)	(0.0204)
Observations	4,567,944	4,567,944	4,567,944	4,567,944
R2	0.67739	0.89948	0.70499	0.90306
Bandwidth	10%	10%	10%	10%
Item-Cutoff-Year FE	Yes	Yes	Yes	Yes
Winner-Cutoff-Year FE		Yes		Yes
MesoRegion-Cutoff-Year FE			Yes	Yes

Notes: This table reports estimates from a robustness tests on our baseline results in Table 2 while using a rule-of-thumb bandwidth of $\pm$10% population distance around each cutoff rather than the optimal bandwidths of Calonico et al. (2014). The procedure we use to construct this table is otherwise identical to the procedure we use to construct Table 2. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. The sample period is 2014-2020.

Table A.9: Financial Constraints: Stacked Difference-in-differences

	log(no.participants)		
	I	II	III
Δ Log(fpm) · Post	-0.0515	-0.2465	-0.0634
	(0.1515)	(0.1603)	(0.3199)
Δ Log(fpm) · Post · High Loan Ratio (Pre-Determined)	0.6844***	0.9523***	0.9433**
	(0.2490)	(0.2787)	(0.4501)
Window	$[t-1, t+1]$	$[t-1, t+2]$	$[t-2, t+2]$
Observations	1,070,072	1,431,219	1,688,916
R2	0.82238	0.79166	0.77634
Bandwidth	Optimal	Optimal	Optimal
Cutoff-Year-Cohort FE	Yes	Yes	Yes
Municipality-Item-Cutoff-Cohort FE	Yes	Yes	Yes

Notes: This table reports the effects of Federal transfers on the number of participants in a stacked difference-in-differences setting. We define treated municipalities as municipalities that cross their nearest FPM cutoff from below in a pre-specified event window ranging from $[t-1, t+1]$ to $[t-2, t+2]$ years around the crossing year t. For each treated municipality, we define control municipalities as municipalities that do not cross the same cutoff during the event window. We stack cohorts of treated and control municipalities, and estimate the following equation:

$$Y_{i(c)pet} = \alpha_{i(c)pe} + \gamma_{(c)et} + \beta \log(\text{fpm})_{i(c)e} \cdot \text{Post}_{et} + \beta \log(\text{fpm})_{i(c)e} \cdot \text{Post}_{et} \cdot (\text{High Loan Ratio})_{i(c)et-1} + \epsilon_{i(c)pet},$$

where the dependent variable $Y_{i(c)pet}$ is the natural logarithm of the number of procurement participants for item p, in municipality i, threshold c, cohort e, and year t. $\Delta \log(\text{fpm})_{i(c)e}$ is the change in the FPM transfer for municipality i, at threshold c, in cohort e. Post_{et} is an indicator equal to one after the transfer change occurred (i.e., after event year t), and equal to zero otherwise. Loan ratio is the ratio of loan amount (short-term loans and long-term loans) to total municipal assets. High Loan $\text{Ratio}_{i(c)et-1}$ is an indicator variable that equals one if municipality i, at threshold c, in cohort e, has above-median loan ratio in event year $t-1$. All regressions include threshold-cohort-year and municipality-item-threshold-cohort fixed effects. Columns I to III use a 2-year, 3-year, 4-year window around each event. The table shows the effective sample size, determined using the optimal bandwidth selection method from Calonico et al. (2014). The sample size varies depending on the dependent variable. Standard errors are clustered at the municipality-cohort level and shown in parentheses. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively.

Table A.10: Product Descriptions

Category	Product	Description
"Population Benefit" Product	Education Learning	School supplies, educational equipment, and teaching materials used for student education
	Healthcare & Medical	Medicines, hospital supplies, and medical equipment for patient care
	Food & Nutrition	Food items including school meals, fruits, vegetables, and dairy products for public consumption
	Water & Sanitation	Water treatment chemicals, cleaning supplies, and waste management services
	Social & Assistance	Basic necessities like food baskets, hygiene kits, and support materials for vulnerable populations
	Public Infrastructure	Construction materials and road maintenance supplies for public works
	Public Safety & Security	Security services and equipment for protecting public spaces
	Environmental & Waste Services	Waste collection, recycling, and public cleaning services
	Recreation & Culture	Sporting equipment, playground items, and recreational materials for public use
	Public Health Services	Medical equipment, medicines, and laboratory supplies specifically for public health initiatives
"Government Consumption" Product	Administrative Materials	Office supplies, furniture, and standard administrative equipment
	It & Technology	Computers, software, and IT services for government operations
	Operational Support Services	Consulting, legal, accounting, and specialized administrative services
	Facilities Management	Cleaning services and maintenance for government buildings
	Government Operations Logistics	Government vehicles, heavy equipment, and official travel expenses
	Security Operations	Security services specifically for government facilities
	Administrative Equipment	Office furniture and technology equipment for administrative purposes

Notes: The table categorizes items and products in our sample along two broad categories: "Population Benefit" Products more likely targeted to local populations and "Government Consumption" Products more likely targeted to local governments' use. We also provide a detailed description of individual product categories that fall into each broad category.

Table A.11: Competition Effects and Price Effects

Product	log(no.participants)	log(price)	Δno.participants	Δprice	Category
Education & Learning	0.7435***	-0.3427***	3.0573	-1.4325	Population Benefit Product
Healthcare & Medical	1.0825***	-0.5056***	6.5553	-3.2330	Population Benefit Product
Food & Nutrition	0.4182***	-0.5209***	1.5951	-1.9922	Population Benefit Product
Water & Sanitation	0.5007**	-0.4963***	2.0048	-2.0182	Population Benefit Product
Social Assistance	0.6966***	-0.3112**	3.1640	-1.4306	Population Benefit Product
Public Infrastructure	0.7967***	-0.4014***	3.0417	-1.5482	Population Benefit Product
Public Safety & Security	0.1194	-0.2324	0.4720	-0.9350	Population Benefit Product
Environmental & Waste Services	1.0546***	-0.4514*	4.3479	-1.8957	Population Benefit Product
Recreation & Culture	0.4223	-0.7274***	1.4574	-2.5849	Population Benefit Product
Public Health Services	1.0733***	-0.4405***	6.3985	-2.7508	Population Benefit Product
Administrative Materials	0.6828***	-0.2422**	3.1110	-1.1072	Government Consumption Product
IT & Technology	0.1849	-0.2418	0.7258	-0.9396	Government Consumption Product
Operational Support Services	0.9050**	-0.9272**	3.6025	-3.6761	Government Consumption Product
Facilities Management	0.4309	-0.9155*	1.9370	-4.0038	Government Consumption Product
Government Operations Logistics	0.4844	-1.2292***	1.7419	-4.3298	Government Consumption Product
Security Operations	0.1194	-0.2324	0.4720	-0.9350	Government Consumption Product
Administrative Equipment	0.4233*	-0.2285*	1.7798	-0.9645	Government Consumption Product

Notes: The table reports the estimated effects of FPM transfers on participation and procurement prices in the cross-section of products, using our preferred specifications (e.g., Table 2, Column III). We also report estimates of effective changes (as opposed to elasticities) by multiplying the estimated elasticities by the unconditional mean values of the number of auction participants and procurement prices.