# 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 larger tenders and faster payments to suppliers. This draws new suppliers into competition, especially small, young, and distant firms that face participation and delivery 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 rely heavily on private suppliers to buy medicines, build roads, and provide basic services for their residents.[1] Financial constraints, however, often impede the procurement process, especially in developing economies where local governments struggle to finance their purchases and pay their suppliers on time (World Bank, 2025). These constraints are believed to deter firms from entering public procurement markets (OECD, 2018), potentially raising prices and generating other inefficiencies (e.g., Bandiera et al., 2009), but direct evidence on this channel 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 quasi-experimental relief in local governments' financial constraints. We combine population-based discontinuities in federal funding allocations to Brazilian municipalities with granular procurement auction data at the item level to study how local governments' financial constraints affect procurement competition and associated outcomes. Municipalities just above and below a funding cutoff have nearly identical populations and should therefore face comparable economic conditions and similar underlying demand for public goods. We find that when their available funding increases, municipalities tender larger volumes and pay their suppliers faster. In turn, this fosters participation, especially by small and young suppliers that are themselves constrained. Higher participation decreases large 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 infrastructure and sanitation, sug-

[1] Public procurement accounts for approximately 13% of GDP in the average OECD country, and can constitute more than 70% of a firm's sales in some industries (Asturias and Garcia-Santana, 2025). Nearly two-thirds of total procurement spending occurs at the local level (OECD, 2024, 2025).

gesting pass-through benefits to local populations in developing economies.

Our empirical strategy is based 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 (in 2014, they amounted to BRL 64 billion, or USD 27.2 billion), and they are an essential source of financial flexibility since Brazilian municipalities' taxation and borrowing opportunities are restricted by federal law.[2] These transfers, which make up 28% of total municipal revenues in our sample, 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 regression discontinuity design (RDD) around population-based FPM thresholds. Because transfers jump discontinuously at these thresholds according to a fixed legal formula, variation in funding is driven by population counts rather than local economic conditions or political economy. We combine this RDD identification strategy with granular procurement auction data at the item level, covering more than 15 million procurement observations from 853 municipalities in Minas Gerais, the largest Brazilian state by number of municipalities, 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 main result shows that higher federal transfers are associated with greater supplier participation in municipal procurement. The 20% increase in transfers around the average FPM threshold in our sample raises the number of bidders in auctions for the same item by 11–19%, suggesting that local governments' constraints directly af-

[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.

fect suppliers' willingness to participate in public procurement. This baseline finding is robust to a range of alternative specifications and validation checks. For example, McCrary density tests show no evidence of bunching around the FPM thresholds, and other sources of municipal revenue and financing are balanced around them. We also document quantitatively similar effects when we study within-municipality variation as municipalities cross FPM thresholds over time, addressing potential concerns about unobserved differences between municipalities. Our estimates are also robust to different RDD polynomial orders, kernels, and bandwidths. Importantly, we find economically larger effects for smaller municipalities and for municipalities with higher levels of debt around the same cutoff—precisely where financial constraints are more likely to bind. This heterogeneity supports the interpretation that the relaxation of municipal financial constraints, rather than confounding variation, is the main driver of higher participation.

How does a relaxation of local governments' financial constraints shape procurement participants' incentives and the composition of the supplier pool? On the one hand, better-financed buyers may attract larger and more productive suppliers who can meet greater scale demand, consistent with models of assortative matching between buyers and suppliers (Melitz, 2003; Sugita et al., 2023). Incumbent suppliers may also be well placed to capture additional spending given their established relationships with the buyer and familiarity with procurement procedures. On the other hand, small and young firms that are typically financially constrained (Hadlock and Pierce, 2010) may find it difficult to pay fixed costs (e.g., participation and delivery), and be particularly sensitive to improvements in buyers' purchase volumes. Lacking access to trade credit and bank financing to cover operating costs while awaiting payment, they may also be more sensitive to buyers' payment speed. Under this view, relaxing municipal constraints would disproportionately draw in the most financially constrained suppliers, rather than larger firms and incumbents.

Our evidence supports the prediction that relaxing municipal constraints dispropor-

tionately attracts constrained suppliers to public procurement. First, we find that jumps in federal transfers at the FPM thresholds allow local governments to increase the size of their procurement tenders: a 20% increase in transfers is associated with an 8.6% increase in the purchase volume of the same item. Consistent with the interpretation that higher purchase volumes 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 20% increase in FPM transfers reduces the number of days until payment by 12 days, a 17% decrease relative to the sample average. The likelihood of exceedingly slow payments (e.g., payments made more than three months after delivery) and default (i.e., municipalities not paying their suppliers at all) also decreases significantly. 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] Additionally, we find weaker effects in municipalities with high levels of bank competition, suggesting that improving suppliers' liquidity management capabilities (e.g., by accessing a credit line or by selling receivables for a low haircut) can make them less susceptible to their buyers' financial conditions.

We also show that the same variation in transfers decreases the concentration of input markets, the market shares of incumbent suppliers, and the prices that local governments ultimately pay in procurement: a 20% increase in transfers reduces the price that *the same*

[3]Most 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, suppliers must deliver to municipalities that are often 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.

[4]As in many developing countries, small and young firms in Brazil have limited access to trade credit (Rohner, 2019; Intelligence, 2020; Lanna, 2021) and bank credit, making their cash flows heavily reliant on buyers' payments (World Bank, 2024).

*supplier* charges for *the same item* to municipalities around the same FPM threshold by 4%. These estimates are more pronounced for larger suppliers, suggesting that larger firms are more likely to earn rents when municipalities are constrained and lose some of these rents when small suppliers compete for procurement. In contrast, the price effects completely disappear when we compare auctions with the same number of bidders. These findings provide support for the interpretation that our price effects arise from competition rather than from other channels (e.g., suppliers offering discounts for larger purchases and faster payments).

Several pieces of evidence suggest that our findings are unlikely to result from increased 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 differences in participation are unlikely to be driven by the addition of phantom suppliers (e.g., Fazio and Zaldokas, 2024) or cartel expansion (e.g., Pesendorfer, 2000; Kawai and Nakabayashi, 2022). Finally, we find *weaker* effects in auctions of goods and services that more directly benefit bureaucrats and politicians (e.g., administrative facilities and operational services), suggesting that higher funding is more likely to be directed to the consumption of local populations rather than to local governments themselves. We also discuss additional channels that could rationalize our main findings on participation (e.g., differences in government efficiency and visibility; differences in firms' supply around the FPM cutoffs), but for which we find less empirical evidence.

Our findings highlight two economic benefits from the relaxation of municipal financial constraints. First, improving municipalities' budgets and payment speed encourages entry into procurement by small, young, and otherwise constrained suppliers. Consistent with the interpretation that larger contract size and payment reliability can have

long-lasting effects on these suppliers, we also find that first-time suppliers to municipalities just-above an FPM threshold subsequently win more contracts and are more likely to survive than other suppliers. Second, we show that the estimated participation and price effects are particularly pronounced for essential public goods and services such as infrastructure and sanitation, suggesting pass-through 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 through competition, thus increasing local governments' effective purchasing power.

Outside of the Brazilian laboratory, our findings are likely to extend to other developing economies where most firms are small and medium-sized enterprises (SMEs), where local governments struggle to finance their budgets and heavily rely on federal transfers, and where banks are reluctant to purchase government receivables (see, e.g., World Bank, 2024, 2025). In this sense, policy interventions aimed at mitigating the financial constraints of local governments (e.g., rewarding payment speed) and those of small suppliers (e.g. promoting bank credit and reducing haircuts on government receivables' purchases) could have beneficial effects for SME growth and for procurement efficiency far beyond Brazil.

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, 2022). We complement this literature by showing that the financial constraints of governments and prospective suppliers are important yet understudied barriers to procurement participa-

tion and sources of market concentration.[5]

Second, our work contributes to an extensive literature that studies how financial constraints shape 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). These studies rely on data from private corporations, where the prices buyers pay and the intensity of supplier competition are typically unobservable. Procurement auction data are public by law, allowing us to observe both. To our knowledge, our paper is the first to use the laboratory of public procurement to document how the financial constraints of customers and suppliers jointly affect input market participation, competition, and prices.

Third, we contribute to the literature on the effects of local governments' financial constraints (e.g., Adelino et al., 2017; Yi, 2021; Agrawal and Kim, 2022; Dagostino, 2025). 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. Our findings suggest that, by lowering procurement prices, competition can increase local governments' effective purchasing power, and thus act as a potential source of the fiscal multiplier documented in related studies (e.g., Corbi et al., 2019).

[5]The closest evidence concerns payment timing alone: Barrot and Nanda (2020) find that accelerating federal payments to U.S. contractors under the Quickpay reform raised employment at affected firms. Our setting moves the buyer's budget, which in turn affects both tender size and payment speed, and lets us observe participation, competition, and prices rather than just incumbent contractors' outcomes.

# 2 Institutional Background

## 2.1 Local Government Borrowing and Federal Transfers

**Municipal Borrowing.** Brazilian municipalities face tight legal limits on borrowing, a legacy of the subnational debt crises and federal bailouts that occurred during the 1980s and 1990s. During those decades, states and municipalities ran persistent deficits and the federal government repeatedly stepped in to rescue them, in 1989, 1993, and 1997. These bailouts weakened subnational fiscal discipline and created expectations of future rescues (Bevilaqua, 2000; Rodden, 2006). To prevent this from recurring after the final 1997 debt restructuring, the federal government tightened subnational borrowing, first through the 2000 Fiscal Responsibility Law (*Lei de Responsabilidade Fiscal*, LRF; Complementary Law 101/2000) and then through Federal Senate resolutions issued under the debt and "golden-rule" clauses of the 1988 Constitution (arts. 52 and 167) (Goldfajn and Guardia, 2003).

These rules make borrowing a minor source of municipal finance. Municipalities cannot issue bonds: Complementary Law 148/2014 (art. 11) prohibits all subnational governments from issuing debt securities, and no municipal bond market exists in Brazil (von Mettenheim, 2012). Bank credit is also capped in several ways: i) the "golden rule" (art. 167, III) prohibits borrowing beyond capital expenditures; ii) Senate Resolution 43/2001 (art. 7) limits annual credit operations to 16% of net current revenue (*receita corrente líquida*, RCL) and annual debt service to 11.5% of RCL; and iii) Senate Resolution 40/2001 (art. 3) caps consolidated net debt at 1.2 times RCL. A municipality that exceeds these limits, or the LRF's 60% cap on personnel spending (art. 19), loses access to new credit and to voluntary transfers (arts. 23 and 31).[6]

[6] A voluntary transfer is a discretionary, project-specific delivery of funds to another federative entity for cooperation, aid, or financial assistance that does not arise from a constitutional or legal mandate. In contrast, the FPM is a constitutionally mandated transfer.

**FPM Program.** The *Fundo de Participação dos Municípios* (FPM) is a major federal transfer program that allocates funds to Brazilian municipalities according to their population. Established in 1965 and codified by the 1988 Federal Constitution, it is the primary source of revenue for most municipalities, especially smaller ones. For our purpose, the program's design creates sharp discontinuities in the transfers that the federal government allocates to individual municipalities at predetermined population thresholds, creating quasi-experimental variation in municipal funding.

The FPM allocation mechanism has two layers. At the national level, the federal government sets the total fund pool at 22.5% of income and industrial-product tax revenues (a share that has been constant since 1993). This total fund pool is assigned to individual states based on time-invariant shares, which in turn depend on state-level population and per capita income. At the state level, each municipality is assigned to a population bracket. This bracket determines an FPM coefficient, and the municipality receives a share of the state pool proportional to its coefficient. Importantly, the FPM coefficients increase *discretely* across population brackets, such that crossing a population threshold produces a sharp jump in transfers. In our sample, these jumps average approximately 20%.

The population brackets are set by federal law (Law no. 1,881/1981), and the discrete nature of the allocation mechanism creates large jumps in transfers as municipalities cross predetermined population cutoffs. The first three cutoffs lie at 10,188, 13,584, and 16,980 inhabitants, implying a bracket width of 3,396 inhabitants between each cutoff pair. Beyond 16,981 residents, the bracket width doubles to 6,792 residents. Population estimates are produced annually by the Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística*, IBGE), and the federal budget court converts them into binding FPM coefficients by year-end. Municipalities then approve their budgets and receive transfers throughout the following year. Because population estimates are determined centrally, municipalities have little scope to manipulate their assigned

brackets.[7]

FPM transfers constitute a crucial source of revenue for local municipal budgets. In our sample, they account for 28% of total municipal revenues on average.[8] In contrast, Brazilian municipalities have limited tax authority: local taxes contribute only 6% of total revenues for municipalities with fewer than 50,000 residents and federal law restricts municipal borrowing, so that FPM transfers represent the primary source of financial flexibility for most municipalities. This is not unique to Brazil, as other developing markets also experience similar limitations (see World Bank, 2025, and Columns I and II of Internet Appendix Table A.1).

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

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, 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 or in person. While electronic auctions are becoming increasingly widespread, municipalities continue to rely heavily on in-person sessions due

[7]Previous work highlights potential pitfalls of the centralized mechanism (Litschig, 2012; Monasterio, 2013; Eggers et al., 2018). As in Corbi et al. (2019), our two-stage least squares design largely allows us to overcome the resulting identification concerns.

[8]The extent of local governments' reliance on federal transfers is consistent with that of other developed and developing economies such as the United States (where federal transfers constitute 27.5% of state and local revenue), Germany (48.5% of local revenue), China (43.0% of state and local revenue), Argentina (47.7% of provincial revenue), and Mexico (71.5% of local revenue). See Column I of Internet Appendix Table A.1.

to limited technological infrastructure and supplier familiarity with digital platforms. Online auctions constitute only 3% of all the auctions in our sample.

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 auction bidders, 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 the raw data 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

combination of the product/service description (e.g., apples) and their associated unit of measure (e.g., kilograms). Internet Appendix Table A.2 provides an example of selected products and services in our data, ranked by the total BRL value across all auctions in our sample.[9]

Due to its size and diversity, the state of Minas Gerais provides an excellent laboratory for our analysis.[10] 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 FPM municipal population thresholds and transfer amounts to the municipalities in Minas Gerais. 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 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

[9]While gasoline and regular diesel constitute the largest share of auctions in terms of value, auctions of these items represent only 0.048% and 0.008% of the total number of auctions. The industry is also relatively competitive in Brazil, with 235 (47) distinct firms winning procurement contracts for gasoline (diesel) in our sample.

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

largest municipalities in the state have, on average, more than six times the population of the smallest municipalities, and they receive on average more than twice as large federal transfers.

Similar to Corbi et al. (2019), we focus on municipalities in Minas Gerais in the bottom eight population cutoffs (i.e., those 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. Our final dataset is a procurement auction-item-level panel of around 10.8 million observations over the 2014-2020 period. Table 1 reports 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 local municipalities' financial constraints may limit supplier participation in public procurement. For example, Panel (a) of Figure 2 confirms the intuitive prediction that larger budgets should on average be associated with more 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 jointly correlated with FPM transfers, municipal budgets, and procurement participation. For example, municipalities that receive larger FPM transfers are also larger, and thus tend to have higher tax revenues and larger 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 also 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 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. We compare procurement outcomes in municipalities just above and just below a given population threshold that are 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 crosses a population threshold and receives discontinuously larger FPM transfers.

In practice, actual transfers can deviate from their law-implied amounts due to imperfect enforcement, political considerations, and local economic conditions (Litschig, 2012; Monasterio, 2013). As a result, we follow Corbi et al. (2019) and implement a two-stage fuzzy RDD instrumenting actual transfers with their law-implied counterparts to capture quasi-exogenous transfer variation. Formally, the second stage of the RDD specification takes the following form:

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

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 $t$; $P_{i(c)t-1}$ is municipality $i$'s population in year $t-1$; $P_{ct-1}$ is the nearest population cutoff in year $t-1$; $f(.)$ is a flexible polynomial; $\gamma_{FE}$ 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 $\tilde{T}_{i(c)t}$:

$$T_{i(c)t} = \tilde{\alpha} + \tilde{\beta}\tilde{T}_{i(c)t} + f(P_{i(c)t-1} - P_{ct-1}) + \tilde{\gamma}_{FE} + \tilde{\epsilon}_{i(c)t} \tag{2}$$

where all the other variables have the same meaning as in Equation (1). We use the same set of fixed effects in the first stage and in the second stage, and we let them vary across specifications.

The two-stage RDD specifications (1)-(2) are similar to an RDD based on population thresholds (see, e.g., Litschig and Morrison, 2013; Gadenne, 2017; Filho and Litschig, 2022 for RDDs using the FPM and Gagliarducci and Nannicini, 2013; Casas-Arce and Saiz, 2015; Grembi et al., 2016; Asher and Novosad, 2020; Agarwal et al., 2023 for applications outside Brazil), with the only difference that we replace the 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 $\beta$, 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) by two-stage least squares (2SLS) within narrow bandwidths around each population cutoff, using the optimal triangular bandwidth procedure in Calonico et al. (2014).[11] For auction-item-level outcomes we two-way cluster standard

[11]The bandwidth is chosen separately for each population cutoff and each outcome variable. For municipality-level outcomes, we apply the bandwidth selection directly to the outcome. For auction-level outcomes, we first demean the outcome within each item, cutoff, and year, and then apply the bandwidth selection to the demeaned outcome variable. This step ensures that the bandwidth reflects the variation used in the 2SLS estimation, rather than being driven by cross-sectional heterogeneity across products that the fixed effects already absorb. We then estimate Equations (1)-(2) by 2SLS on the pooled sample of observations within the cutoff-specific bandwidth for each outcome.

errors at the municipality and item level. For outcomes measured at the municipality-year, procurement-year, or winner level (where the item dimension is unavailable), we cluster at the municipality level.

A causal interpretation of our estimates of $\beta$ requires two identifying assumptions. First, municipalities should not be able to manipulate their population to obtain larger transfers. We argue that this possibility is highly unlikely to occur in our setting, as population estimates are independently determined at the federal level by the IBGE, significantly reducing the opportunity for local manipulation. Additionally, McCrary tests do not reject the null hypothesis that the density of observations is continuous at the thresholds, suggesting no systematic manipulation of the running variable.

Second, our estimates of $\beta$ should not result from indirect effects of other channels 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 municipal spending of similar magnitude as the transfers; iii) we document covariate balance in other sources of municipal revenue and borrowing, suggesting that municipalities do not use higher FPM funds to lower local taxes, provide subsidies to firms, or reduce their leverage; and iv) we document that larger transfers attract participants and winning suppliers from *other municipalities*, which are geographically and fiscally insulated from direct transfers and from local income and employment spillovers. Since these nonlocal suppliers respond to the same FPM discontinuities as local ones, their behavior is most naturally explained by municipalities' own procurement decisions rather than other local economic channels. In sum, in our setting any competing confounding channel should arguably work through municipalities' use of their FPM transfers in procurement.

# 4 Results

## 4.1 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 RDD 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 0.534. Since FPM transfers increase by 20% on average at the population thresholds in our sample, this implies that municipalities just above a cutoff attract 10.68% more bidders per procurement auction than those just below.

Our baseline effects remain robust and economically significant across all specifications, with elasticities ranging from 0.534 to 0.960 depending on the fixed effects structure: Column II adds item $\times$ cutoff $\times$ year fixed effects in addition to MesoRegion fixed effects, allowing us to compare procurement outcomes *for the same item* across municipalities just above and below the same population threshold in the same year. Column III instead interacts MesoRegion and cutoff fixed effects, thus focusing on municipalities with homogeneous geographic, economic and social characteristics.[12] Column IV simultaneously controls for item $\times$ cutoff $\times$ year and MesoRegion $\times$ cutoff $\times$ year fixed effects, and yields the largest estimated elasticity (0.960), showing that our are stable (or even economically larger) under more demanding specifications. Overall, given the average 20% FPM transfer discontinuity in our sample, our estimates imply that municipalities just above an FPM threshold have approximately 11–19% more bidders per

[12]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.

auction than those just below the threshold.

Figure 4 corroborates these estimates with visual evidence from a regression discontinuity plot around the pooled FPM thresholds in our sample. Specifically, Figure 4 plots the number of auction participants (in logs, and residualized) against municipalities' population distance to their nearest FPM cutoff. The vertical line at zero represents the pooled FPM thresholds in our sample. Figure 4 shows a 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 supplier participation is concentrated at points where federal transfers discontinuously increase.

#### 4.1.1 Robustness

The effects documented in Table 2 survive a comprehensive series 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 first concern is that municipalities might manipulate their population to secure higher transfers. While this concern is less relevant in a 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 0.89), suggesting that municipalities do not strategically position themselves to receive higher transfers. The smooth density of population around the cutoffs is consistent with our identifying assumption that treatment assignment is quasi-random in a neighborhood of the thresholds.

**Outliers and Influential Observations.** A second concern is that our results might be driven by a small number of municipalities with unusual characteristics, or by influential observations around the FPM thresholds. Figure A.2 aims at addressing these concerns by showing the distribution of estimated coefficients when we sequentially remove individual municipalities from the sample, demonstrating that no single municipality drives our results. Similarly, in Figure A.3 we provide evidence from a "donut" RDD exercise where we exclude observations within $\pm 10$ to $\pm 300$ residents of each population threshold (see Dowd, 2021). We find that our results are virtually unchanged regardless of the donut range chosen, suggesting that our estimates do not arise from outliers.

**First stage.** Our 2SLS design requires a strong relationship between law-implied transfers (the instrument) and actual transfers. Figure A.4 shows that actual transfers jump sharply at the population thresholds, validating our first-stage relationship and confirming that the FPM formula generates meaningful variation in actual transfers. Table A.3 reports the corresponding first-stage estimates (Equation (2)). The law-implied transfer is a powerful predictor of actual transfers, with a first-stage $F$-statistic of at least 237 across all fixed effects structures.

**Covariate Balance.** If other federal transfers, state grants, or local tax revenues also change around the FPM thresholds, our estimates could partially reflect these changes in alternative funding sources rather than the FPM alone. In Figure A.5, Panels (a) to (c), we address this concern by showing that other federal and state transfers are balanced around the FPM cutoffs. The findings in Panel (c) also mitigate potential concerns that our baseline estimates may arise from local governments providing tax relief to local suppliers. Additionally, Panels (d) and (e) show no differences in local municipalities' borrowing around the FPM thresholds, suggesting that municipalities that receive additional transfers do not use these transfers to repay existing loans. Finally, Panel (f) shows that audit probabilities under the CGU's Federal Entity Oversight Program (*Programa de*

*Fiscalização de Entes Federativos*) do not change significantly around the FPM thresholds.[13] This suggests that increased oversight on local governments receiving more funding is unlikely to drive our baseline estimates.

**Additional Robustness.** We also show that our baseline findings hold when we include alternative sets of fixed effects in our baseline specification. For example, when we i) experiment with alternative RD polynomial, kernel, and bandwidth choices; ii) replace the continuous treatment variable in specification (1) with a standard RD treatment indicator; and iii) estimate our main specifications with Poisson regressions and using alternative standard error clustering methods. We leave a detailed description of these tests to the Internet Appendix Section A.II.

#### 4.1.2 Financial Constraints: Validation

Our baseline estimates show that FPM transfers increase bidder participation, and the covariate balance results presented in Section 4.1.1 suggest that these differences are not due to changes in other sources of municipal revenue and borrowing. In this section, we provide evidence consistent with the hypothesis that higher government transfers relieve local governments' financial constraints: municipalities above and below the FPM thresholds have similar populations, economic conditions, and demand for public goods, but municipalities just-below an FPM cutoff find it more difficult to meet such demand than those just-above the same cutoff. To validate this interpretation, we ask three questions. First, do the additional transfers translate into municipal spending, or are they saved or offset by reductions in other revenues? Second, is the participation response larger where constraints are most likely to bind—in smaller municipalities, for which the transfer is a larger share of the budget, and in municipalities carrying more debt?

[13] During the early years of our sample (before 2015), the CGU selected municipalities for audit via a public lottery. Since 2015, it has adopted a risk-based methodology informed by prior findings and data analytics, so audit assignment is no longer random. The balance result in Panel (f) indicates that neither selection mechanism produces a discontinuity in audit probability around FPM thresholds.

Third, do we find stronger effects for municipalities with more debt before the transfer increase? The evidence answers yes on all three counts.

In Table 3, Panel A, we start by answering the first question. In the first two Columns of this panel, we document that a 1% increase in FPM transfers increases municipal revenues by 0.28%–0.42%, validating the interpretation that jumps in federal transfers are not associated with changes in other sources of revenue: total municipal revenues increase by roughly the amount of the FPM transfer.[14] Next, Columns III and IV of Panel A show nearly identical magnitudes for local municipalities' expenditures, suggesting that municipalities just above the FPM cutoffs increase their expenditures in lockstep with 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, municipalities just above the FPM cutoffs in our sample appear to spend all the additional federal funding rather than saving some of 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 FPM transfers is larger (Column I) as 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 are 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 shows no evidence of differences in municipalities' leverage around the FPM cutoffs, in Appendix Table A.10 we provide additional evidence to mitigate such concerns using predetermined debt levels in a stacked difference-in-differences design. Table A.10 shows that municipalities with high loan

[14]The FPM transfers constitute around 28% of municipal revenue in our sample.

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. Specifically, municipalities with low baseline debt show no significant response to transfer increases (the baseline coefficient in the first row of Table A.10 ranges from $-0.07$ to $-0.14$), but those with high predetermined loan ratios experience substantial increases in procurement competition. 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.

## 4.2 Mechanism

In this section, we study the economic mechanisms that may affect supplier participation decisions. We argue that our baseline estimates stem from suppliers internalizing buyers' increased purchasing power and payment reliability as they secure more federal funding. In Section 4.5, we also discuss alternative mechanisms (e.g., differences in government efficiency, corruption) for which we find less empirical support.

### 4.2.1 Procurement Scale and Payment Reliability

In Table 4, we first provide evidence that higher federal funding increases the quantities that municipalities tender in procurement auctions. At the auction level, Column I of Table 4 shows that a 20% increase in FPM transfers is associated with a 21% increase in the quantity tendered in the average auction of a given item. At the municipality level (i.e., when we aggregate quantities of a given product purchased by a municipality in a given year), Column II shows that the same 20% increase in FPM transfers is associated with an 8.6% increase in overall quantities purchased.

A potential explanation for the estimates in Columns I and II is that municipalities

just-above an FPM threshold can use some of their additional funding to improve procurement efficiency (e.g., by spending resources to streamline the procurement process). However, Column III of Table 4 shows no evidence of differences in the *frequency* of procurement auctions for a given item, suggesting that improved efficiency is unlikely to be a first-order driver of the differences in the overall procurement size we observe at the municipality-level. This null result suggests that potential channels correlated with government efficiency (e.g., more effective marketing campaigns for procurement auctions) are also unlikely to be primary drivers of our baseline findings on supplier participation.

Next, in Table 5 we show that, conditional on contract assignment, higher FPM transfers increase municipalities' payment reliability: A 20% increase in FPM transfers reduces the fraction of a procurement's purchase orders paid more than 15, 30, and 90 days after delivery by 5, 4.2, and 3.2 percentage points (8.3%, 9.5%, and 12.8% of the respective sample means; see Table 5, Columns I to III). More generally, a 20% increase in transfers reduces the number of days until payment by 12 days, a 17% decrease from the average days until payment of 71 days (Table 5, Column IV).

We find that higher transfers also reduce outright defaults by local municipalities (i.e., the fraction of goods and services that are never paid to suppliers decreases). Although actual municipal defaults are relatively infrequent in our data (only about 0.2% delivered goods and services are never paid for, on average), Column V of Table 5 shows that a 20% increase in FPM transfers is associated with a statistically significant 0.1 percentage points decrease in the fraction of delivered goods and services that municipalities never pay for, a 50% reduction relative to the sample average.

#### 4.2.2 Suppliers' Fixed Costs and Financial Constraints

In this section, we study the mechanism through which larger tenders and faster payments stimulate supplier participation. We provide evidence suggesting that larger procurement contracts help suppliers cover their fixed costs, and that payment timeliness

relaxes suppliers' own liquidity constraints. We also discuss potential alternatives such as differences in product quality, procurement efficiency, and corruption, for which we find less empirical support.

Various types of fixed costs can prevent potential suppliers from participating in procurement auctions (e.g., Bajari and Hortaçsu, 2003; Li and Zheng, 2009; Coviello and Mariniello, 2014). In Table 6, we analyze one specific friction, namely, procurement participation and delivery costs, that our data allows us to test for.[15] As in most developing economies, local procurement auctions in Brazil require suppliers to send employees or other delegates to obtain accreditation and participate in the bidding process. Even conditional on winning, many municipalities are geographically isolated and difficult to reach by suppliers located in other municipalities. In sum, geographic distance may impose fixed costs, and remote suppliers may find it profitable (in net present value terms) to bid only if the contract is large enough to cover these costs.

Table 6 provides evidence consistent with this hypothesis: the average distance between the buying municipality and auction participants increases by 24% (a 24.8 km increase from the average distance of 103.4 km) for a 20% increase in transfers, both in the full sample (Column I) and when we restrict the sample to suppliers from other municipalities (Column II). As a result, the distance to the winning supplier increases by 17% (a 16.4 km increase from the average winning supplier distance of 96.3 km) for a 20% increase in FPM transfers around a cutoff (Column III). These estimates validate our fixed cost hypothesis by suggesting that larger tenders allow far-flung suppliers to cover their fixed participation and delivery costs. They are also helpful to mitigate concerns that our findings may arise from supply-side channels (e.g., higher productive capacity

[15]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 and discourage participation. 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, our findings on supplier financial constraints are consistent with the existence of these other fixed costs.

due to direct government transfers to suppliers; spillovers from other local firms): much of the observed increases in distance can be attributed to suppliers *from other municipalities*, which are outside the scope of direct transfers by local governments and arguably less subject to local spillovers.

Next, we study how municipalities' constraints interact with those of their suppliers. In developing economies, suppliers often lack broad access to trade financing and credit, primarily relying on customers' payments to finance their own expenses.[16] Buyers' improved payment reliability can make 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).[17] Consistent with the hypothesis that constrained suppliers are most affected by an increase in customers' payment timeliness, Panel A of Table 7 shows that FPM transfers are associated with higher participation by micro and small participants (Columns I and II), younger participants (Column III), and participants that are relatively new to procurement (Column IV). For example, Columns I of Table 7 shows that a 20% increase in FPM transfers increases the fraction of micro participants by 5 percentage points, a 9% increase relative to the sample average micro participant share of 0.56. Column II of Table 7 documents similar effects when we focus on small participants with revenue below BRL 4.8 million.

Panel B of Table 7 also documents similar effects in the pool of *winning* suppliers, suggesting that increased participation by small and young suppliers increases effective competition for incumbents. Overall, the patterns documented in Table 7 align with theoretical work emphasizing how financing frictions may lead to concentration and

[16]See, e.g., `https://blogs.worldbank.org/en/trade/greasing-wheels-commerce-trade-finance-and-credit`.

[17]We use official government classifications at the firm registry (*Receita Federal*) to define firm size categories. Specifically, we define firms as micro firms if their revenue is lower than BRL 360 thousand (size category 1); as small firms if their revenue is lower than BRL 4.8 million (size category 2); and as large firms if their revenue is higher than BRL 4.8 million (size category 3).

the exclusion of small but efficient firms (Acemoglu et al., 2009). Consistent with this interpretation, our results demonstrate that improved municipal finances can meaningfully support small enterprise development by expanding their access to public sector opportunities.

We also ask whether competition in the banking sector interacts with local suppliers' financial constraints. On the extensive margin, competition may induce some banks to include riskier borrowers in their lending portfolios (see, e.g., Allen and Gale, 2000). On the intensive margin, Brazilian banks buy receivables issued to firms by local governments (see Internet Appendix Table A.1), and the size of the associated haircut may decrease when the local banking sector is more competitive. In sum, banking competition may improve suppliers' ability to manage payment delays (e.g., by accessing a credit line for the first time or by selling their receivables) and make them less susceptible to their prospective buyers' financial constraints. In Internet Appendix Table A.11 we find evidence consistent with this hypothesis: suppliers' participation response to FPM transfers is significantly weaker (stronger) in municipalities with more (less) competitive local credit markets.

## 4.3 Input Market Competition and Procurement Prices

Next, we investigate how higher supplier participation shapes input market structure and procurement prices.

### 4.3.1 Input Market Competition

In Table 8, we investigate whether higher supplier participation for municipalities just-above the FPM cutoffs translates into higher competition. In other words, we ask whether new participants are more competitive than incumbents, and whether their presence affects 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 20% increase in FPM transfers reduces individual winning suppliers' market share by 0.084 percentage points, an 8.4% decrease from the average market share of 1%. In a similar spirit, Column II of Table 8 examines the supplier Herfindahl-Hirschman Index (HHI) at the municipality-year level (i.e., the overall input market concentration across all items purchased by the municipality). The estimates presented in Column II imply that the average FPM transfer jump in our sample decreases municipality-level concentration by 0.016, 18% of the sample mean. These findings complement our earlier findings on bidder participation by suggesting that the additional competitors attracted by higher FPM transfers succeed in winning contracts and gaining meaningful market shares.

#### 4.3.2 Procurement Prices

In Table 9, we test whether the increase in competition documented above translates into lower procurement prices (see, e.g., Li and Zheng, 2009). The data provides evidence consistent with this hypothesis. For example, Column I of Table 9 shows that a 20% increase in FPM transfers leads to 7.92% lower average procurement prices of the same item around the same cutoff. This effect is stable across empirical specifications, ranging from $-7.8\%$ to $-8.8\%$ across Columns I–IV. Even our most demanding specification (Column V), which includes winner $\times$ cutoff $\times$ year fixed effects, yields a price reduction of 3.96% for a 20% increase in transfers. This specification is especially informative because it compares prices charged by the same supplier for the same item to municipalities just above and below the same FPM threshold, isolating the effect of municipal financial conditions on prices while holding supplier and product identity constant. It also 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 Table 9 is large: FPM 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 4–8.8% less for the same good compared to those just-below the thresholds. Because our design compares the same items across comparable municipalities, these estimates suggest that financially constrained municipalities may pay supra-competitive prices due to limited supplier participation and concentrated procurement markets.

## 4.4 Local Economic Effects

### 4.4.1 Supplier Growth

The cross-sectional estimates presented in Section 4.2.2 suggest potential benefits for local economic development, and particularly for small, young, and far-flung suppliers that are the most responsive to FPM transfers. But do municipal financial constraints make a difference for suppliers in the long run? In Internet Appendix Table A.12, we study the long-run procurement behavior and survival of suppliers that win a contract from less financially constrained municipal buyers *for the first time*. We find that these suppliers subsequently win more contracts, win larger contracts, and are more likely to survive over horizons of up to ten years. While these findings cannot be interpreted as causal, they suggest that larger contract size and higher payment reliability can affect the trajectory of new suppliers' growth well beyond the first auction.

### 4.4.2 Competition, Prices, and Pass-through

In this section, we link competition and price effects to the well-being of local residents. Our hypothesis is that, by increasing competition and reducing prices, FPM transfers may increase municipalities' effective purchasing power 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 this 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 allows $b$ to purchase *more* than 20 additional units relative to $a$. If these effects are particularly strong for essential goods and services (e.g., medicines and healthcare), our competitive effects may then have pass-through benefits for local populations.

Figure 5 studies the relationship between competitive effects and price effects across different categories of items, distinguishing products that primarily benefit local populations (e.g., public safety and security, water and sanitation, food and nutrition) from those that primarily benefit government operations (e.g., administrative materials and IT equipment).[18] Panel A shows that products in public safety, environmental services, and infrastructure experience among the largest increases in bidder participation, with estimated elasticities exceeding one. Panel B shows that the largest and most statistically significant price reductions arise for water and sanitation, public infrastructure, and environmental services categories, where a 20% increase in transfers is associated with price reductions of roughly 12% to 22%. Food and nutrition and public safety, categories that are likely to impact local well-being, show similarly large participation and price effects. In sum, Figure 5 suggests that the competitive effects we document are likely to benefit local populations via a price reduction channel.

Figure A.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 indicates that the items with larger increases in competition around FPM transfers systematically exhibit larger price reductions, reinforcing

[18] Appendix Table A.13 reports a detailed description of each product category. Appendix Table A.14 reports the estimated participation and price effects across all categories, not only the high-sensitivity categories included in Figure 5.

our interpretation of competition (as opposed to direct effects, as discussed in the next section). The fact that we observe weaker effects for government consumption products than for population-serving ones also suggests that municipal financial constraints may create inefficiencies in the provision of basic public goods, consistent with the recent evidence in World Bank (2025). Taken together, our findings suggest that relieving local municipalities' constraints may benefit local populations by stimulating procurement competition and increasing local governments' effective purchasing power.

## 4.5 Alternative Mechanisms and Potential Confounders

Our proposed mechanism consists of two parts. First, relaxing financial constraints increases municipalities' purchasing power and payment speed, which attracts small, young, and otherwise constrained suppliers to procurement. Second, the resulting supplier competition decreases procurement prices. In this section, we discuss alternative mechanisms for our findings and show that they only receive limited empirical support. We also discuss potential confounders (e.g., product quality) that could affect some of our estimates.

**Supplier participation.** A first hypothesis is that our participation findings may be due to firm-side supply factors rather than municipalities' demand (e.g., if direct transfers from local governments allow suppliers to increase capacity). However, our findings hold within-supplier-cutoff-year (shutting down supply-side variation at the firm-level), and nonlocal suppliers (who are unlikely to receive direct transfers from local governments) respond even in auctions without any local participants, suggesting that our estimates are primarily driven by demand.

A second hypothesis is that our findings reflect corruption: Brollo et al. (2013) document higher corruption in municipalities that receive more FPM funding. In turn, corruption could rationalize our baseline findings if new participants are connected or

otherwise tied to the local government. However, three pieces of evidence suggest that corruption is unlikely to be a primary driver of differences in participation in our setting. First, while corruption in procurement would typically result in higher prices (e.g., due to bid-rigging, Fazio and Zaldokas, 2024; and collusive behavior Pesendorfer, 2000; Kawai and Nakabayashi, 2022), we find that equilibrium prices *decrease* in funding allocations even when the same firm supplies the same item to municipalities with different funding levels. Second, we find weaker effects in auctions of goods and services that more directly benefit bureaucrats and politicians (e.g., administrative and operational services), suggesting that higher funding is more likely to be directed to the consumption of local populations as opposed to that of local governments. Third, we find effects for nonlocal, distant suppliers, who are arguably less likely to be connected to local municipal governments.

A third hypothesis is that higher funding allows governments to increase the efficiency and visibility of the procurement auction (e.g., by hiring marketing personnel or procurement officers), potentially attracting bidders. While we view this hypothesis as complementary to our proposed mechanism, Column III of Table 4 shows no evidence of differences in the frequency of procurement auctions for a given item. Since one would expect procurement efficiency and visibility to be positively correlated with frequency, this null result provides suggestive evidence that improved efficiency is unlikely to be a first-order determinant of firms' participation.

**Procurement prices.** The price differences documented in Table 9 could, in principle, reflect channels other than competition. As we show in Section 4.2.1, higher FPM transfers are associated with higher tender quantities, which could translate into quantity discounts. Additionally, suppliers might 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 proposed

competitive effects, we address these alternatives in three ways. First, in Panel A of Table A.15 we show that the estimated price reductions remain robust after directly controlling for tender quantity and payment times. These estimates suggest that quantities and payment times alone cannot fully explain differences in procurement prices for municipalities with different FPM funding.

The estimates reported in Panel A of Table A.15, while suggestive, do not allow us to disentangle direct effects (i.e., potential discounts associated with higher procurement quantities and lower delays) from indirect effects passing through competition (i.e., the fact that higher quantities and lower delays attract more bidders). In Panel B of Table A.15, we therefore present the estimates of a second set of tests, where we aim at shutting down competitive effects by including fixed effects for the number of bidders above and below a cutoff-year. Our hypothesis in these tests is that, if our price estimates are primarily due to competition, we should not observe price differences when comparing auctions with the same number of bidders above and below a cutoff. If our estimates are instead due to the direct effect of quantity discounts, payment speed premia, or other channels, we should observe price differences even when controlling for competition. Panel B of Table A.15 supports the competition channel: once we absorb variation in the number of bidders through fixed effects, our estimated price elasticities to FPM transfers attenuate substantially.

Third, we also examine whether the price differences documented in Table 9 vary with supplier size. If price reductions are exclusively due to direct effects, such differences would be quantitatively similar across the supplier size distribution. If anything, absent changes in competition we would expect muted effects for larger suppliers with more bargaining power. In contrast, if price reductions are determined primarily by competition, we would expect larger price differences for larger suppliers who, as we argue above in Section 4.2.2, are more likely to be rent-earning incumbents when municipalities are more constrained. Table A.16 provides additional evidence consistent

with our proposed mechanism: large winners' prices exhibit 40% to 143% (29% to 36%) higher price sensitivity to the FPM transfers than micro (small) winners, depending on the empirical specification. These findings suggest an equilibrium where large firms can earn rents by selling to financially constrained municipalities because small suppliers face entry barriers to procurement. When municipalities' constraints are lifted, small suppliers' participation reduces the rents of larger incumbents.

Finally, a potential concern is that municipalities with more funding may choose products of different quality. Since quality has a direct impact on prices, this could act as a confounding factor to our proposed competition mechanism. While this concern cannot be fully ruled out, the granularity of our item definitions (see Internet Appendix Table A.2) coupled with the use of granular item and winner fixed effects allows us to compare tenders of narrowly defined items provided by the same supplier to municipalities just-above and just-below the FPM thresholds.[19] Moreover, in Internet Appendix Table A.17 we show that jumps in FPM transfers are not systematically correlated with contract cancellations and cost overruns as proxies for poor supplier performance. Overall, these findings suggest that differences in the quality of products and their suppliers are unlikely to be systematic sources of bias for our price estimates.

# 5 Policy Implications and External Validity

The findings presented in Section 4.4 suggest that policy interventions targeted at fostering participation may have positive effects on supplier growth and on procurement competition. On the demand side, such interventions could include relaxing binding borrowing constraints for smaller municipalities (e.g., through subsidized lending by state-owned banks), rewarding municipalities' payment speed (e.g., by providing larger

[19] Testing for differences in product quality is particularly challenging in our setting: absent detailed supplier information, product quality is usually measured as the residual of a price-quantity regression (Khandelwal et al., 2013). However, both prices and quantities respond to the FPM transfers, which implies a mechanical correlation between FPM transfers and these residuals.

transfers to municipalities' that pay their suppliers earlier), and discouraging late payments (e.g., by imposing regulatory penalties), among others. One potential benefit of schemes such as penalties is that they may increase procurement efficiency without imposing large costs on the federal budget. On the supply side, such interventions could include direct federal transfers (e.g., subsidies or federal tax rebates) for suppliers that participate in municipal procurement, especially when they are small or otherwise constrained. They could also include limits to the haircuts that banks apply to purchase municipal trade credit from suppliers, as well as subsidized bank borrowing for suppliers that participate in public procurement. Consistent with this view, in Internet Appendix Section A.III we use a completely different source of variation in *suppliers'* financial constraints from the 2017–2018 reform of the Brazilian Development Bank to show that higher borrowing costs induced by this reform discouraged supplier participation in local procurement.

Similar arguments suggest that our findings and policy prescriptions are likely to apply to economies where i) local governments are heavily dependent on federal transfers; and ii) local governments and their suppliers face financial constraints. The first condition is a pervasive feature of subnational governments worldwide. This, we argue, makes our findings broadly applicable, subject to the important caveat that different national governments may impose different requirements for the use of these transfers (e.g., random audits; spending requirements on certain goods and services). The second condition appears to be satisfied primarily in developing economies, where the vast majority of firms are financially constrained SMEs (World Bank, 2024), where local governments find it difficult to pay their suppliers on time and finance essential investment (World Bank, 2025), and where banks appear to be reluctant to purchase government receivables from firms.[20]

[20]See Internet Appendix Table A.1, Columns III and IV. Typical haircuts range from 10% to 30% in both developing and developed countries. In China, government receivables are seldom accepted by banks.

# 6 Conclusion

We show that local governments' 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 through two primary mechanisms: larger procurement opportunities that justify suppliers' fixed costs, and improved payment reliability that reduces counterparty risk. The effects are concentrated among constrained municipalities and among small, young suppliers that are otherwise excluded from public procurement markets. Higher participation by these suppliers reduces large firms' rents, and the prices that governments ultimately pay for the purchase of goods and services.

The economic implications of our findings arguably extend beyond direct fiscal effects. We observe higher competition and larger price reductions for essential public goods, such as public infrastructure and safety, that directly impact local populations. This suggests that financial constraints can effectively tax residents through low competition and high procurement costs that reduce the government's effective purchasing power and the quantity of available goods and services.

Our analysis also highlights the potential for fiscal policy to serve broader economic development objectives: fostering supplier participation, either by incentivizing local governments to pay their suppliers faster or by reducing entry barriers for suppliers, can stimulate SME growth. Associated policy interventions could be aimed at discouraging late payments or fostering the competitiveness of local banking markets, and could be achieved without changing the amount of federal transfers. In this sense, our findings suggest that low-cost policies that promote procurement access can unlock large potential benefits, both in Brazil and in other developing countries where local governments

and their suppliers face financial constraints (World Bank, 2025).

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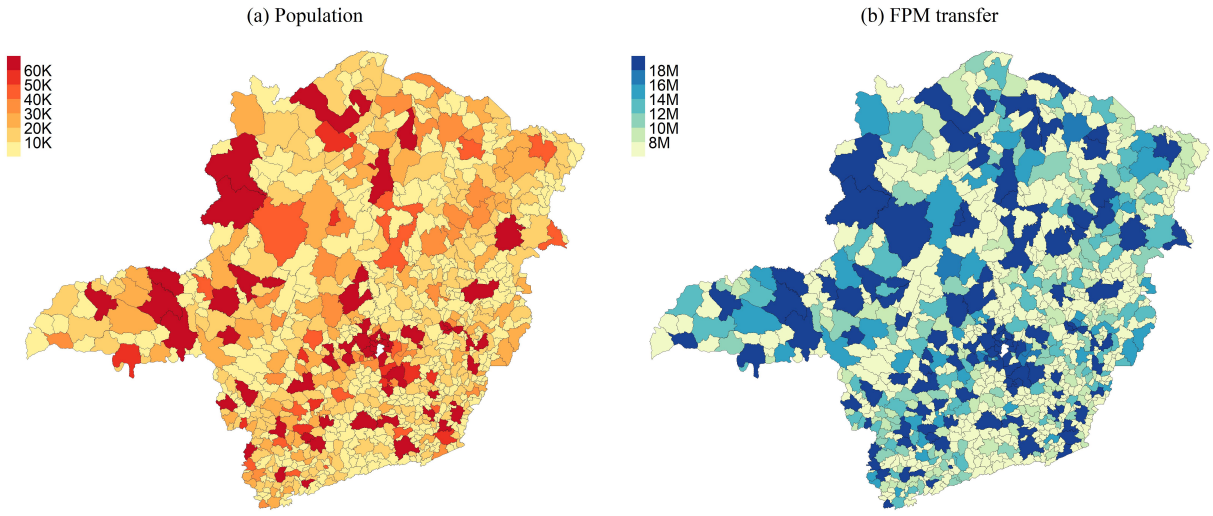
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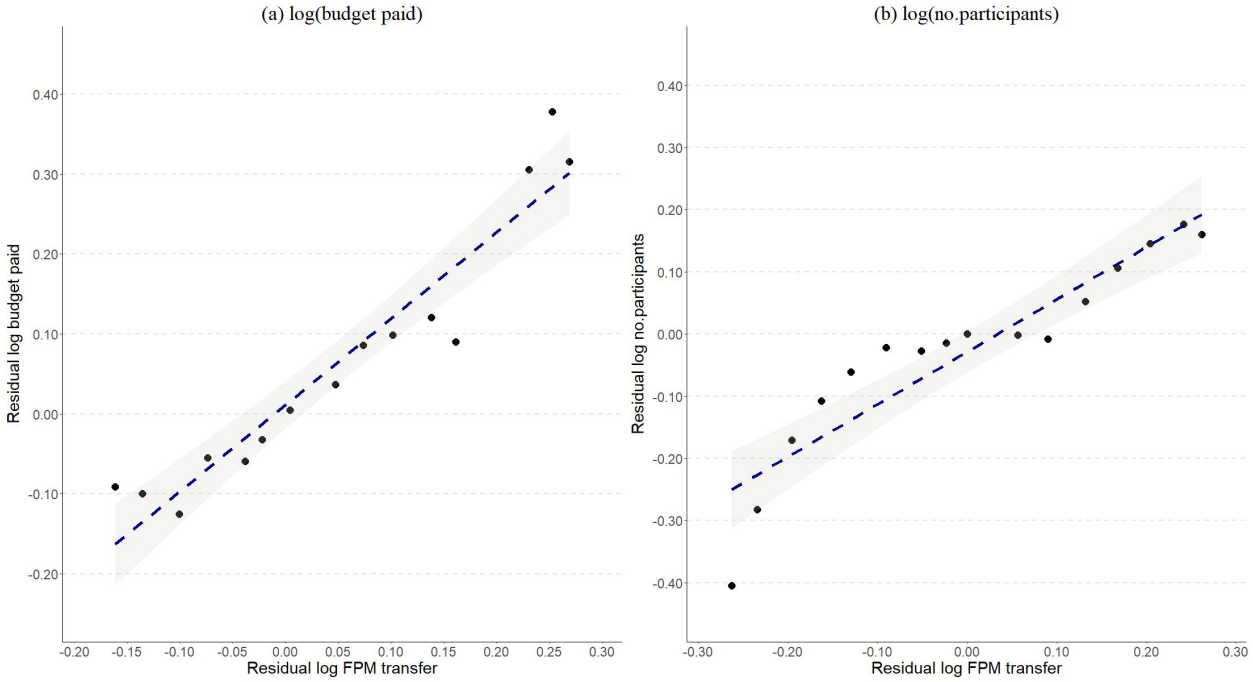
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Figure 1: Population and Federal Transfers: Heatmaps



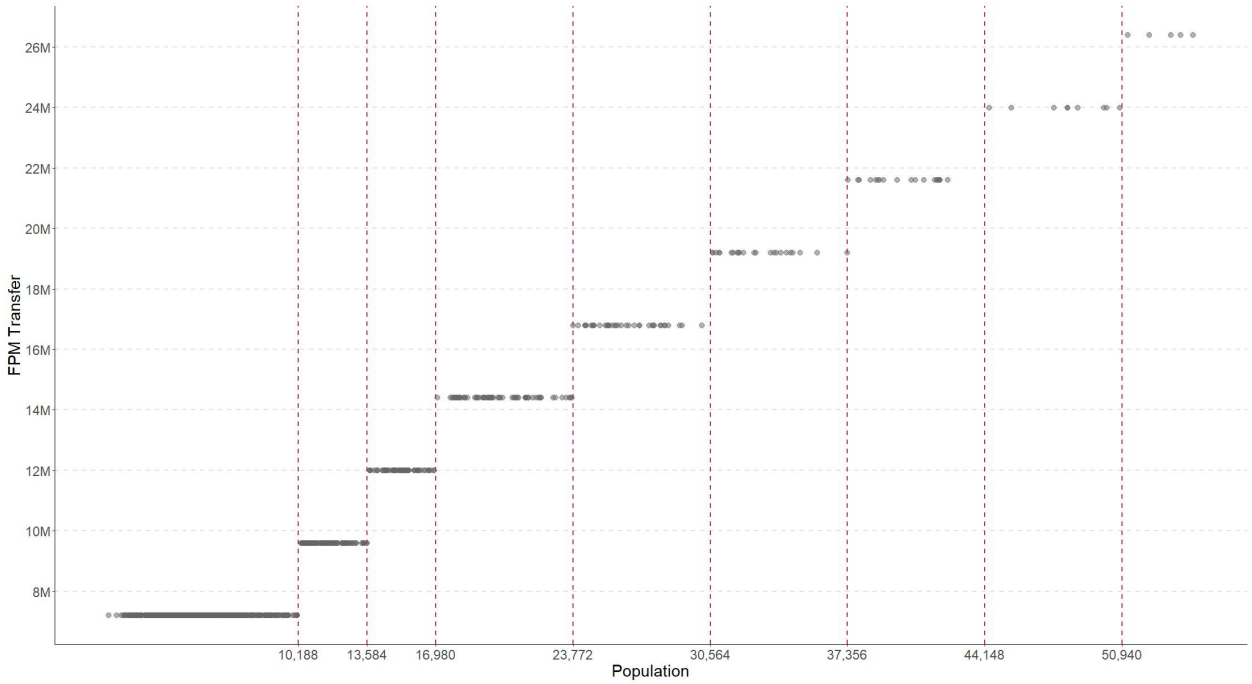

This figure shows heatmaps of average population (Panel (a)) and average FPM transfers (Panel (b)) for municipalities in the state of Minas Gerais. The sample period is 2014-2020.

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



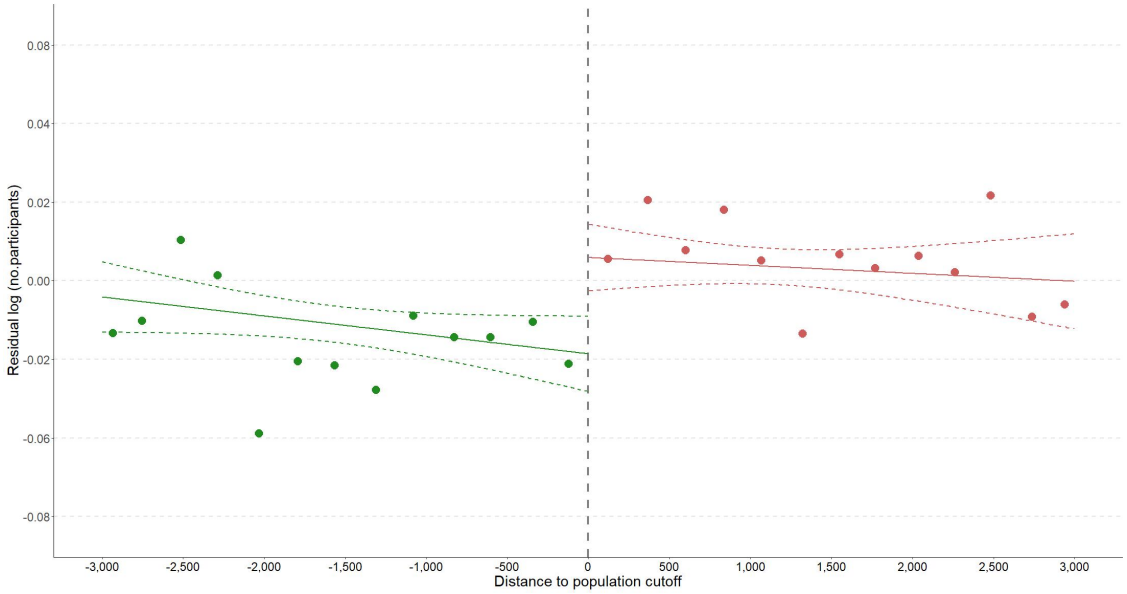

This figure presents visual evidence on the relationship between municipality-level FPM transfers, municipality-level spending, and the average number of participants for auctions in that municipality. In Panel (a), the unit of observation is a municipality-year. We plot budgets (the value paid across all purchases for a municipality over a year) over FPM transfers for the same municipality-year. To facilitate comparisons across municipalities of different sizes and across different years, we residualize budget spending and FPM transfers by plotting their natural logarithm net of MesoRegion-cutoff-year fixed effects. For Panel (b), where we observe the number of participants of individual auctions by municipalities in each year, we residualize the relevant variables by taking their natural logarithm net of item-cutoff-year fixed effects. In both panels, we also report estimated linear fits with their associated 95% confidence intervals. The sample period is 2014-2020.

Figure 3: Federal Transfers around FPM Population Thresholds



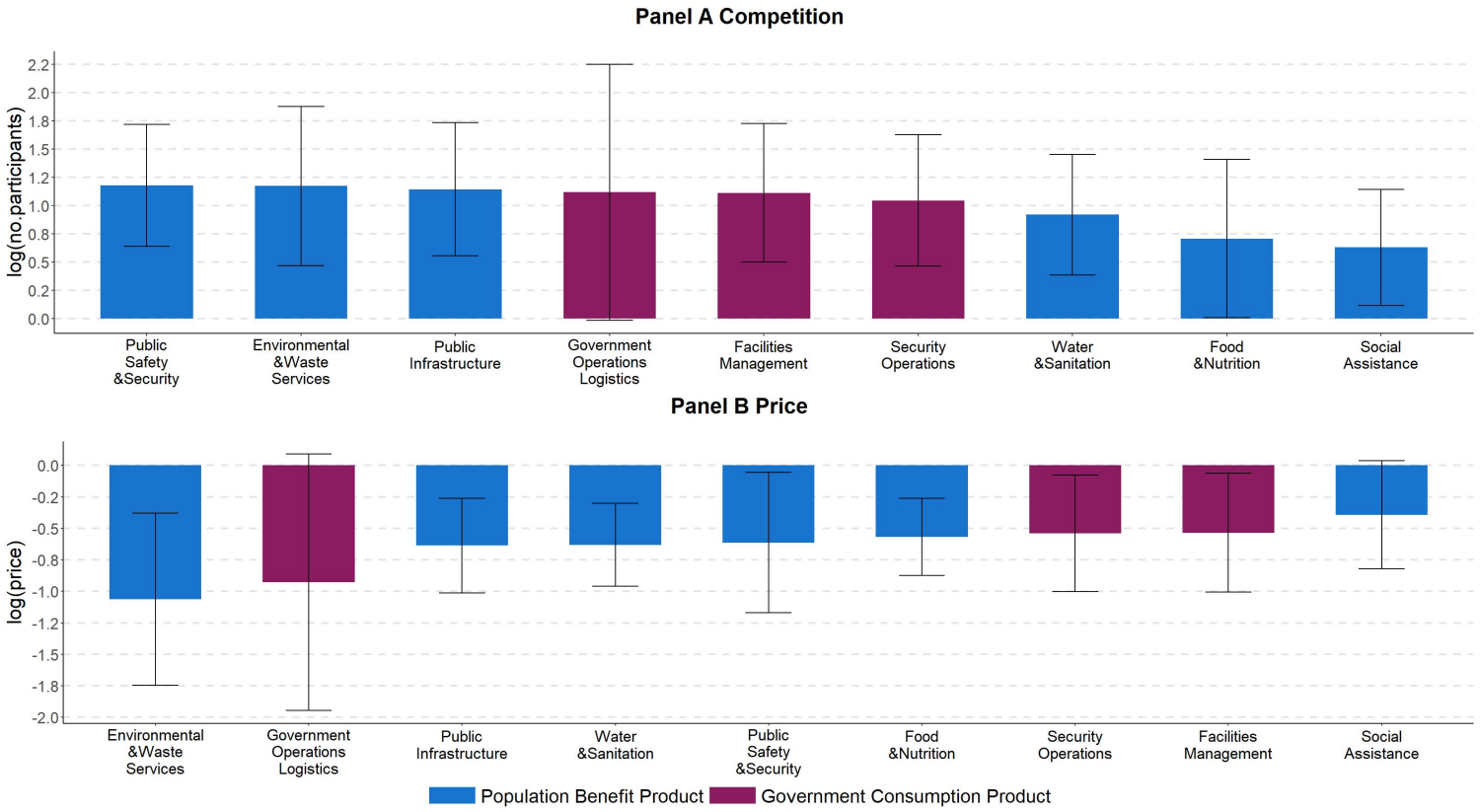

This figure shows FPM federal transfers across different population thresholds in our sample. Each dot denotes transfers to municipalities around population cutoffs. The vertical dashed lines in red indicate FPM population cutoffs. The data comes from a single cross-section in 2018.

Figure 4: RD Plot: Procurement Participation




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. *Residual log (# participants)* is the log number of auction participants net of item-cutoff-year and MesoRegion-cutoff-year fixed effects. The resulting residuals are then averaged to the municipality-cutoff-year level. 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




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 more likely to benefit local populations (in blue) and more likely to benefit governments (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 IV of Table 2). For brevity, we present only products with significant changes in both number of participants and prices. Estimates across all products are in tabular form in Table A.14, and detailed product descriptions are reported in Table A.13. Error bars represent 95% confidence intervals. The sample period is 2014-2020.

Table 1: Summary Statistics

| (Full Sample) | Mean | Standard Deviation | p10 | Median | p90 | Observation |
|---|---|---|---|---|---|---|
| *Panel A. Auction-Item-Year Level* | | | | | | |
| # participants | 3.89 | 3.02 | 1.00 | 3.00 | 8.00 | 10,816,510 |
| Quantity | 867.53 | 3,739.58 | 2.00 | 30.00 | 1,000.00 | 10,816,510 |
| Price | 214.15 | 854.05 | 0.73 | 13.90 | 305.00 | 10,816,510 |
| Distance to Auction, km (Average Participants) | 103.41 | 121.92 | 0.00 | 59.74 | 268.81 | 10,790,915 |
| Distance to Auction, km (Winning Supplier) | 96.34 | 149.58 | 0.00 | 41.85 | 266.19 | 10,775,123 |
| Share of micro participants | 0.56 | 0.37 | 0.00 | 0.57 | 1.00 | 10,790,978 |
| Share of small participants | 0.85 | 0.29 | 0.33 | 1.00 | 1.00 | 10,790,978 |
| Average Participant Age (Since Est.) | 13.75 | 7.13 | 5.00 | 13.00 | 23.00 | 10,790,978 |
| Average Participant Age (Since First Proc.) | 2.13 | 1.62 | 0.00 | 2.00 | 4.40 | 10,816,510 |
| p(Micro winning supplier) | 0.55 | 0.50 | 0.00 | 1.00 | 1.00 | 10,775,653 |
| p(Small winning supplier) | 0.85 | 0.36 | 0.00 | 1.00 | 1.00 | 10,775,653 |
| Winning supplier age (Since Est.) | 14.00 | 10.42 | 2.00 | 12.00 | 29.00 | 10,775,653 |
| Winning supplier age (Since First Proc.) | 2.18 | 1.87 | 0.00 | 2.00 | 5.00 | 10,816,505 |
| *Panel B. Winner-Year level* | | | | | | |
| Winning supplier market share | 0.01 | 0.02 | 0.00 | 0.00 | 0.03 | 432,765 |
| *Panel C. Municipality-Item-Year Level* | | | | | | |
| # auctions | 1.32 | 0.93 | 1.00 | 1.00 | 2.00 | 7,859,566 |
| Quantity | 1,256.52 | 5,135.51 | 3.00 | 50.00 | 1,600.00 | 7,659,668 |
| *Panel D. Procurement-Year level* | | | | | | |
| Fraction of delivered goods/services never paid | 0.002 | 0.012 | 0.000 | 0.000 | 0.000 | 119,759 |
| Days Until Payment (days) | 70.78 | 94.42 | 3.86 | 28.50 | 218.00 | 119,498 |
| Fraction(Days Until Payment>15) | 0.60 | 0.42 | 0.00 | 0.75 | 1.00 | 119,498 |
| Fraction(Days Until Payment>30) | 0.44 | 0.43 | 0.00 | 0.33 | 1.00 | 119,498 |
| Fraction(Days Until Payment>90) | 0.25 | 0.39 | 0.00 | 0.00 | 1.00 | 119,498 |
| *Panel E. Municipality-Year level* | | | | | | |
| Herfindahl-Hirschman Index | 0.09 | 0.09 | 0.03 | 0.06 | 0.14 | 5,482 |
| FPM transfer (BRL) | 9,378,546 | 4,141,850 | 5,969,120 | 7,494,712 | 15,653,586 | 5,482 |
| Revenue (BRL) | 33,040,688.34 | 26,365,063.42 | 14,326,900.40 | 22,511,891.77 | 66,191,461.19 | 5,401 |
| Expense (BRL) | 26,717,753.54 | 21,507,879.84 | 11,353,446.51 | 18,173,148.59 | 53,476,737.92 | 5,401 |
| Revenue-to-Expense Ratio | 1.24 | 0.08 | 1.15 | 1.24 | 1.35 | 5,398 |
| Population (inhab.) | 11,458 | 10,006 | 3,264 | 7,531 | 25,398 | 5,482 |

This table reports summary statistics for key variables from 2014 to 2020. For each variable, we report the distribution for the full sample, and we use the effective sample size in the regressions, based on the optimal bandwidth selection method from Calonico et al. (2014).

Table 2: Federal Transfers and Procurement Participation

| | log(# participants) | | | |
|---|---|---|---|---|
| | I | II | III | IV |
| Log FPM transfer | 0.5338*** | 0.6468*** | 0.6754*** | 0.9600*** |
| | (0.1933) | (0.1915) | (0.1983) | (0.2089) |
| Full Sample | 10,816,510 | 10,816,510 | 10,816,510 | 10,816,510 |
| Effective Sample Size | 1,507,083 | 1,507,083 | 1,507,083 | 1,507,083 |
| R2 | 0.62178 | 0.89234 | 0.89611 | 0.90212 |
| Bandwidth | Optimal | Optimal | Optimal | Optimal |
| Item FE | Yes | | | |
| Cutoff-Year FE | Yes | | | |
| MesoRegion FE | Yes | Yes | | |
| Item-Cutoff-Year FE | | Yes | Yes | Yes |
| MesoRegion-Cutoff FE | | | Yes | |
| MesoRegion-Cutoff-Year FE | | | | 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-stage 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 two-way clustered at the municipality and item level. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. The sample period is 2014-2020.

Table 3: Municipal Financial Constraints

| | **Panel A Municipality Revenue and Spending** | | | | | |
|---|---|---|---|---|---|---|
| | log(revenue) | | log(expenses) | | Revenue-to-Expense Ratio | |
| | I | II | III | IV | V | VI |
| Log FPM transfer | 0.4249** | 0.2758* | 0.4529*** | 0.3163* | -0.0035 | -0.0112 |
| | (0.1690) | (0.1558) | (0.1726) | (0.1643) | (0.0324) | (0.0362) |
| Full Sample | 5,401 | 5,401 | 5,401 | 5,401 | 5,398 | 5,398 |
| Effective Sample Size | 2,429 | 2,429 | 2,486 | 2,486 | 2,471 | 2,471 |
| R2 | 0.79394 | 0.88004 | 0.79419 | 0.87246 | 0.10943 | 0.27429 |
| Bandwidth | Optimal | Optimal | Optimal | Optimal | Optimal | Optimal |
| Cutoff-Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| MesoRegion-Cutoff-Year FE | | Yes | | Yes | | Yes |

Table 3: Municipal Financial Constraints (cont.)

| | **Panel B: Municipality Size and Leverage** | |
|---|---|---|
| | log(# participants) | |
| | I | II |
| Log FPM transfer · Cutoffs 1-4 (Small) | 1.704*** | |
| | (0.3007) | |
| Log FPM transfer · Cutoffs 5-8 (Large) | -0.6165 | |
| | (0.7468) | |
| Log FPM transfer · High Loan Ratio | | 1.499*** |
| | | (0.2119) |
| Log FPM transfer · Low Loan Ratio | | 0.8199*** |
| | | (0.2033) |
| Equality Test (p-value) | 0.0039 | 0.0076 |
| Full Sample | 10,816,510 | 18,039,915 |
| Effective Sample Size | 1,507,083 | 2,093,685 |
| R2 | 0.90222 | 0.92600 |
| Bandwidth | Optimal | Optimal |
| Item-Cutoff-Year FE | Yes | |
| MesoRegion-Cutoff-Year FE | Yes | |
| Item-Cutoff-Year-BinaryLoanRatio FE | | Yes |
| MesoRegion-Cutoff-Year-BinaryLoanRatio FE | | 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 four FPM thresholds from the bottom) and relatively large municipalities (those around population cutoffs 5 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, and we rank municipalities based on the lagged value of this loan ratio within each threshold and year using a median split. We stack the data into two groups: the "Low Loan Ratio" group includes all control municipalities together with treated municipalities below the median, and the "High Loan Ratio" group includes the same control municipalities together with treated municipalities above the median. This stacked design yields the same point estimates as running two separate RDs: one per treated leverage group, against the same control group (with all fixed effects interacted with the binary loan ratio indicator). In Panel B, we also report $p$-values for coefficient equality tests in each column. Both panels are estimated using 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 level in Panel A, and two-way clustered at the municipality and item 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 level* | log(quantity) *muni-item level* | log(# auctions) *muni-item level* |
|---|---|---|---|
| | I | II | III |
| Log FPM transfer | 1.047*** | 0.4256* | 0.0172 |
| | (0.2923) | (0.2243) | (0.0435) |
| Full Sample | 10,816,510 | 7,659,668 | 7,859,566 |
| Effective Sample Size | 1,835,931 | 2,724,761 | 3,245,827 |
| R2 | 0.93435 | 0.94100 | 0.80413 |
| 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 purchase quantity as the dependent variable. In Column II, we use the natural logarithm of the total purchase quantity at the municipality-item-year level. In Column III, we use the natural logarithm of the total number of auctions 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 two-way clustered at the municipality and item 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

| | Days Until Payment | | | | Fraction of delivered |
|---|---|---|---|---|---|
| | Fraction(days>15) | Fraction(days>30) | Fraction(days>90) | log(days) | goods/services never paid |
| | I | II | III | IV | V |
| Log FPM transfer | -0.2487* | -0.2085* | -0.1642* | -0.8471** | -0.0050** |
| | (0.1275) | (0.1226) | (0.0877) | (0.3669) | (0.0022) |
| Full Sample | 119,498 | 119,498 | 119,498 | 119,498 | 119,759 |
| Effective Sample Size | 55,447 | 58,570 | 73,464 | 53,169 | 64,354 |
| R2 | 0.09168 | 0.10353 | 0.07014 | 0.10593 | 0.02492 |
| 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. The unit of observation is a procurement-municipality-year level. Each procurement comprises multiple purchase orders, and for each order we observe the dates of delivery and payment, the value delivered, and the value paid. The dependent variables in Columns I-IV are based on days until payment, the difference (in days) between payment and delivery. In Columns I–III, the dependent variable is the fraction of procurement orders paid more than 15 (Column I), 30 (Column II), and 90 (Column III) days after delivery. Column IV uses the natural logarithm of days until payment. In Column V, we use default (i.e., the fraction of delivered goods/services never paid) as the dependent variable. All specifications include cutoff-year and MesoRegion-cutoff-year fixed effects. Standard errors are clustered at the municipality level. 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). ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. The sample period is 2014-2020.

Table 6: Geographic Composition of the Supplier Pool

| | log(Distance to Auction, km) | | |
|---|---|---|---|
| | Participants' Average | | Winning Supplier |
| | I | II | III |
| Log FPM transfer | 1.176*** | 1.210*** | 0.8516*** |
| | (0.2520) | (0.2731) | (0.1940) |
| Full Sample | 10,790,915 | 10,790,915 | 10,790,915 |
| Effective Sample Size | 1,710,969 | 1,041,157 | 1,041,311 |
| Sample restriction | — | Excl. auctions with any local participants | — |
| R2 | 0.91489 | 0.93679 | 0.90086 |
| 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 natural logarithm of the average distance (in km) between participants' municipalities and the procurement municipality in an auction (Columns I and II), and the distance between the winning supplier's municipality and the procurement municipality (Column III). We define a participant or winning supplier as local if it is registered in the procurement municipality. Local suppliers are therefore at a distance of zero and drop out once we take logs. As a result, Columns I and II exclude auctions in which all participants are local, and Column III excludes auctions won by a local supplier. Column II further restricts the sample to auctions without *any* local participants. The procedure we use to construct this table is otherwise identical to that described in Table 2. Standard errors are two-way clustered at the municipality and item 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 | IV |
|---|---|---|---|---|
| | **Panel A: Participant Characteristics** | | | |
| | Participant Share | | log(Average Participant Age+1) | |
| | Micro | Small | Since Est. | Since FP |
| Log FPM transfer | 0.2480*** | 0.1386* | -0.5864*** | -0.2464** |
| | (0.0809) | (0.0759) | (0.1542) | (0.1155) |
| Full Sample | 10,790,978 | 10,790,978 | 10,790,978 | 10,816,510 |
| Effective Sample Size | 1,053,952 | 2,497,049 | 1,165,822 | 1,593,736 |
| $R^2$ | 0.92393 | 0.89490 | 0.89419 | 0.96674 |
| | **Panel B: Winning Supplier Characteristics** | | | |
| | p(Winning Supplier Size) | | log(Winning Supplier Age+1) | |
| | Micro | Small | Since Est. | Since FP |
| Log FPM transfer | 0.4375*** | 0.1929** | -0.6086*** | -0.6866*** |
| | (0.1014) | (0.0777) | (0.1920) | (0.1663) |
| Full Sample | 10,775,653 | 10,775,653 | 10,775,653 | 10,816,505 |
| Effective Sample Size | 1,617,534 | 1,596,391 | 1,570,182 | 1,073,240 |
| $R^2$ | 0.84300 | 0.87815 | 0.80453 | 0.92768 |
| Bandwidth | Optimal | Optimal | Optimal | Optimal |
| Item-Cutoff-Year FE | Yes | Yes | Yes | Yes |
| MesoRegion-Cutoff-Year FE | Yes | 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 Columns I and II, the dependent variable is the share of micro-sized participants (firms with revenue below BRL 360 thousand, Column I), and small-sized participants (firms with revenue below BRL 4.8 million, Column II) across all auctions held by the municipality in a given year. We borrow participant size categories from official classifications, as described in the paper. In Column III, the dependent variable is the average participant age since establishment ("Since Est."). In Column IV, the dependent variable is the average participant age since its first public procurement auction ("Since FP" for first procurement). In Panel B, we focus on the size and the age of auction winners. In Columns I and II, the dependent variable is an indicator variable equal to one if the winning supplier is a micro (Column I) or small-sized (Column II) firm, and equal to zero otherwise. In Column III, the dependent variable is the winner's age since establishment. In Column IV, the dependent variable is the winner's age since its first public procurement auction. In Columns III and IV of both panels, we take log(age+1) to accommodate newly established firms and first-time procurement participants/winners whose recorded age is zero. The fixed effects used in Panel A are the same as those used in Panel B (Item-Cutoff-Year and MesoRegion-Cutoff-Year fixed effects). The procedure we use to construct this table is otherwise identical to that described in Table 2. Standard errors are two-way clustered at the municipality and item 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 |
|---|---|---|
| | I | II |
| Log FPM transfer | -0.0042** | -0.0834** |
| | (0.0020) | (0.0413) |
| Full Sample | 432,765 | 5,482 |
| Effective Sample Size | 231,560 | 2,788 |
| R2 | 0.03507 | 0.19802 |
| Bandwidth | Optimal | Optimal |
| Cutoff-Year FE | Yes | Yes |
| MesoRegion-Cutoff-Year FE | 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. We interpret the dependent variable in Column II as a measure of input market concentration for a given municipality in a given year. Standard errors are clustered at the municipality level. 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 | V |
| Log FPM transfer | -0.3958** | -0.3952*** | -0.3886*** | -0.4375*** | -0.1981* |
| | (0.1767) | (0.1440) | (0.1321) | (0.1450) | (0.1100) |
| Full Sample Size | 10,816,510 | 10,816,510 | 10,816,510 | 10,816,510 | 10,816,510 |
| Effective Sample Size | 2,236,064 | 2,236,064 | 2,236,064 | 2,236,064 | 2,236,064 |
| R2 | 0.91582 | 0.95744 | 0.95769 | 0.95822 | 0.96725 |
| Bandwidth | Optimal | Optimal | Optimal | Optimal | Optimal |
| Item FE | Yes | | | | |
| Cutoff-Year FE | Yes | | | | |
| MesoRegion FE | Yes | Yes | | | |
| Item-Cutoff-Year FE | | Yes | Yes | Yes | Yes |
| MesoRegion-Cutoff FE | | | Yes | | |
| MesoRegion-Cutoff-Year FE | | | | Yes | Yes |
| Winner-Cutoff-Year FE | | | | | Yes |

This table reports our estimates of the effects of FPM transfers on procurement prices. The dependent variable is the natural logarithm of the price that the municipality pays to the procurement auction winner. The procedure we use to construct this table is otherwise identical to that described in Table 2. Standard errors are two-way clustered at the municipality and item 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

certification, tax and labor 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 Robustness

In this section, we describe the findings of additional robustness tests on our baseline results.

**Cross-sectional Variation and Fixed Effects.** Our baseline estimates primarily exploit cross-sectional variation across municipalities near different thresholds, raising potential concerns about unobserved heterogeneity across municipalities. In Column I of Table A.4, we address these potential concerns by including municipality $\times$ cutoff fixed effects in our specification, thus focusing solely on municipalities that cross the FPM thresholds within our sample period. We find economically and statistically similar effects to the baseline, confirming that our findings hold even after absorbing all variation across municipalities. In a similar spirit, in Column II of Table A.4 we document consistent estimates when we include winner $\times$ cutoff $\times$ year fixed effects, suggesting that our baseline findings do not exclusively arise from systematic changes in the supplier pool and that *the same supplier* faces more competition when local municipalities obtain higher transfers from the federal government.

**Functional Form.** RDD estimates can be sensitive to polynomial order and kernel choices. Table A.5 addresses these concerns. Columns I to III replace our baseline linear polynomial orders with zero-order, quadratic, and cubic specifications, respectively. The coefficients range from 0.77 to 1.55, statistically different from zero and economically similar to our estimates in Table 2. Columns IV to V confirm our estimates' stability across al-

ternative kernel weighting schemes (Triangular and Epanechnikov). These tests indicate that our baseline findings are not driven by specific RD functional form assumptions.

**Clustering.** Table A.6 confirms that our preferred estimate is robust to the level at which standard errors are clustered, including two-way and one-way clustering at the municipality, MicroRegion, and MesoRegion levels.

**Continuous vs. Discrete Treatment.** Our instrumented transfer approach differs from standard RDD implementations. Table A.7 presents results using threshold dummy variables rather than instrumented transfers, yielding comparable estimates.

**Distributional Assumptions.** Table A.8 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 (e.g., from auctions with a small number of participants).

**Bandwidth.** Table A.9 replaces the optimal bandwidth from Calonico et al. (2014) with fixed rule-of-thumb bandwidths ($\pm$2%, $\pm$4%, and $\pm$10% of the population around each threshold). The estimated elasticities remain significant across all choices. Our findings are therefore not driven by the particular observations included in the sample by the bandwidth selection algorithm.

## A.III A Credit Supply Shock to SMEs

In Internet Appendix Table A.18, we exploit the 2017–2018 reform of the Brazilian Development Bank (*Banco Nacional de Desenvolvimento Econômico e Social*, BNDES) to study whether our findings on supplier participation extend to different sources of variation in supplier financial constraints. Before the reform, BNDES offered subsidized credit to small and medium-sized enterprises (SMEs) at the Brazilian long-term rate (TJLP),

which was set administratively and ranged from 5% to 7.5% per year. The reform replaced the TJLP with the TLP, a new long-term rate indexed to the five-year government bond yield, raising SME borrowing costs by several percentage points and sharply contracting BNDES credit disbursements to SMEs.

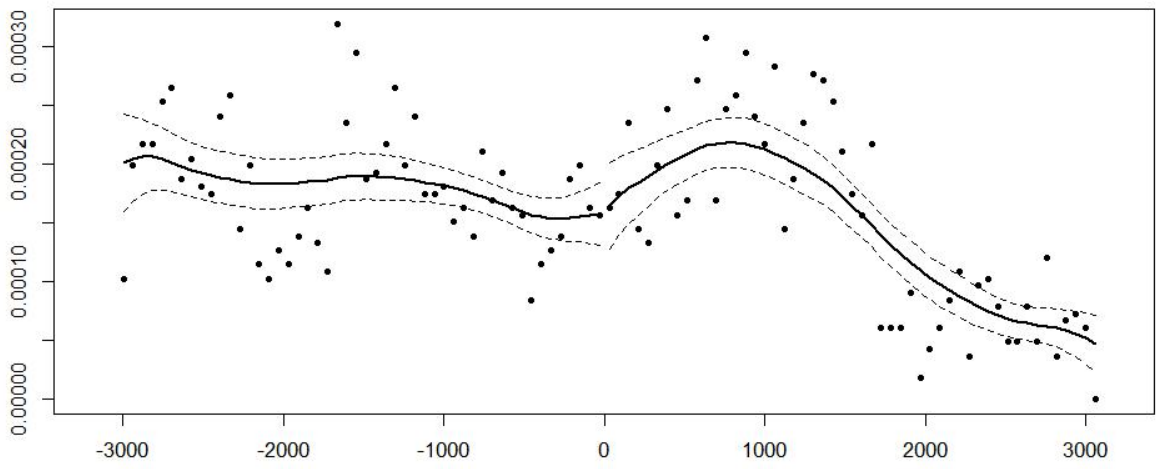
We estimate a difference-in-differences specification that compares procurement participation before (2014–2017) and after (2018–2020) the reform, interacting a post-reform indicator with a standardized measure of each municipality's SME pre-reform reliance on BNDES credit.[A.III.1]

Across three alternative exposure measures (credit volume per capita, number of loans per 10,000 inhabitants, and number of borrowers per 10,000 inhabitants) the DID coefficient is negative in all twelve specifications and statistically significant in 11 of 12, ranging from $-0.017$ to $-0.025$ among the significant estimates. These estimates imply that a one standard deviation increase in BNDES exposure is associated with an approximately 1.4% to 2.5% *decline* in auction participation after the reform, confirming that a credit-supply shock to suppliers translates into lower procurement participation in relatively more affected municipalities. This finding reinforces the mechanism running through suppliers' own financial constraints and demonstrates that the procurement benefits we document are not unique to the FPM program: policies that relax binding financial constraints on either side of the market can affect procurement competition.

[A.III.1] BNDES is the only Brazilian bank that provides granular information on its lending at the local level. The data come from the BNDES Open Data Portal (*Portal de Dados Abertos do BNDES*), available at `https://dadosabertos.bndes.gov.br/dataset/operacoes-financiamento`.

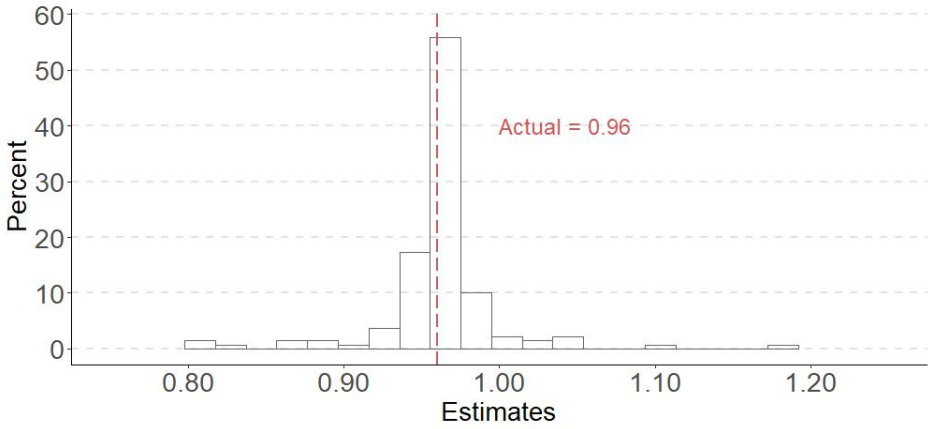
# A.IV Additional Figures and Tables

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



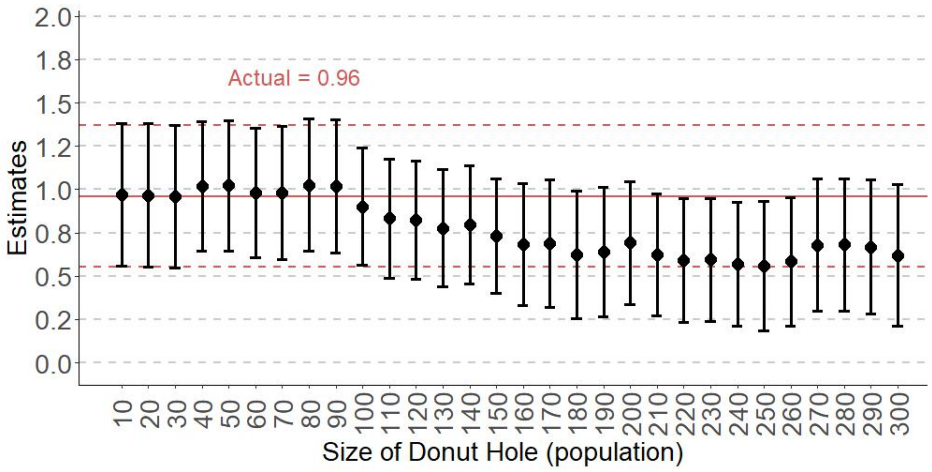

The figure displays estimates of McCrary tests for manipulation of the running variable across the pooled FPM thresholds in our sample.

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



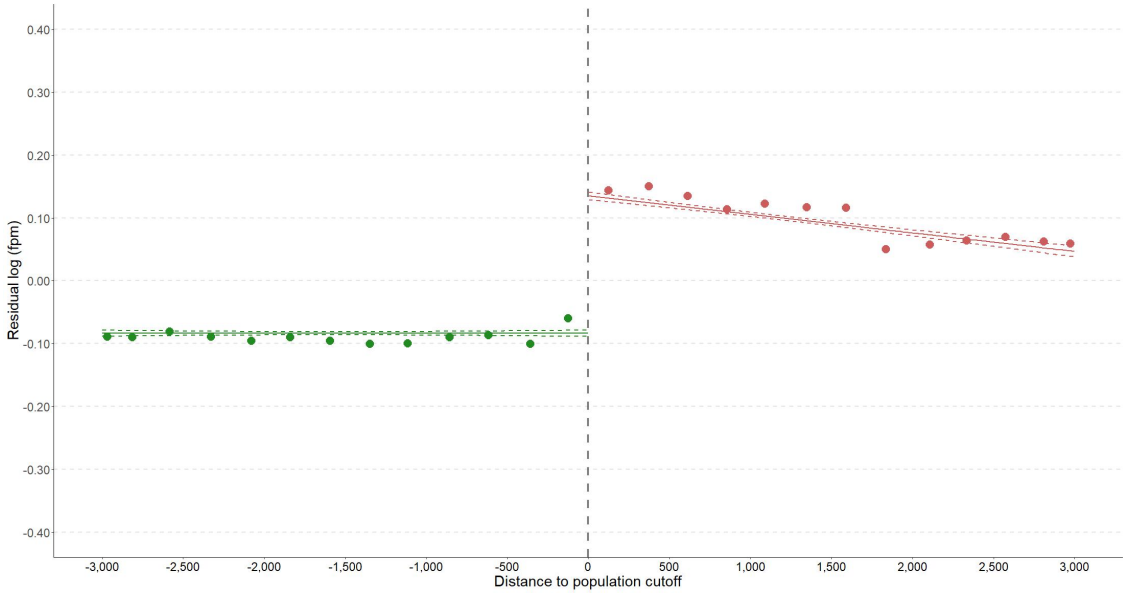

The figure shows the distribution of our estimates of the coefficient $\beta$ from our two-stage RD preferred specification (Table 2, Column IV) after we remove one municipality at a time from the sample. The vertical dashed dotted line is the coefficient reported in Column IV of Table 2.

Figure A.3: Robustness: Donut Regression Discontinuity



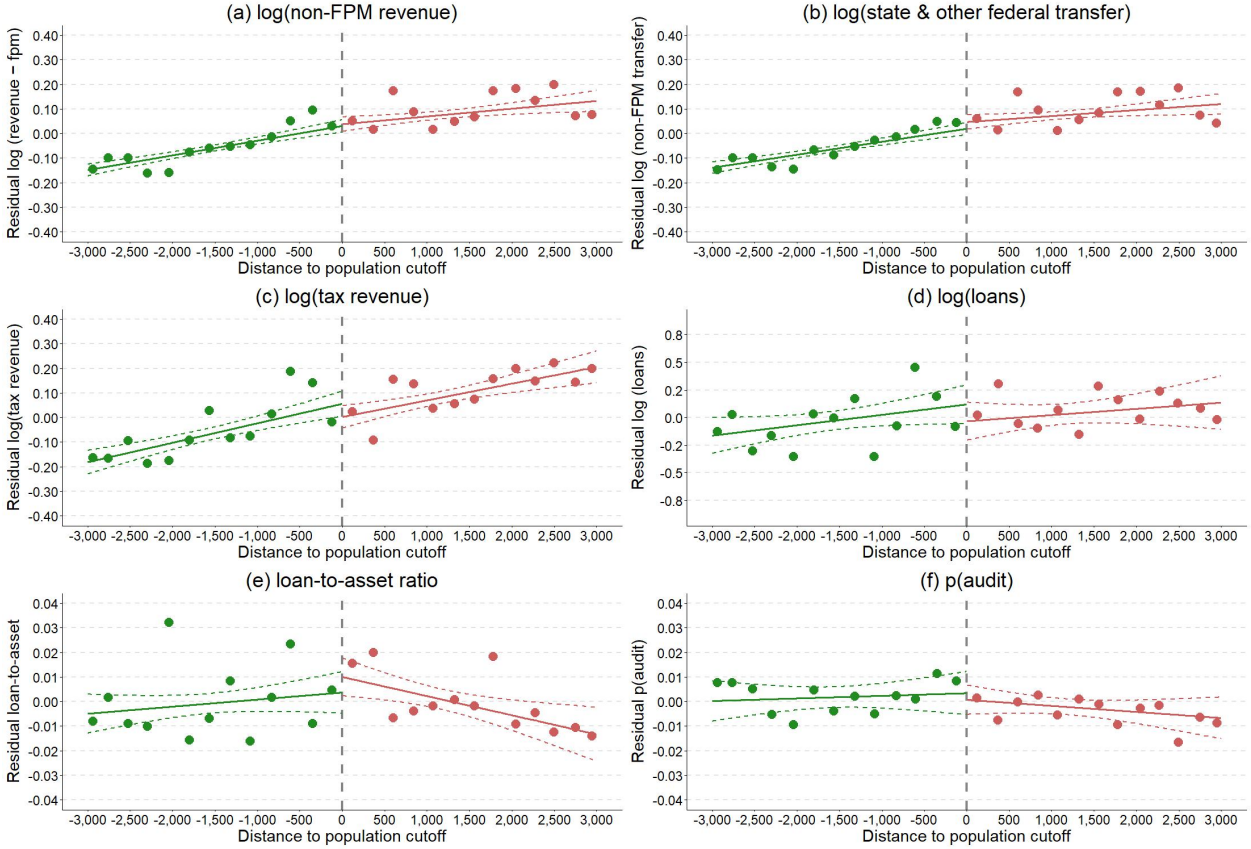

The figure reports point estimates and associated 95% confidence intervals from our two-stage RD preferred specification (Table 2, Column IV), estimated after removing observations within small neighborhoods of each population threshold. The size of these "donut holes," reported on the horizontal axis, ranges from 10 to 300 residents. The solid red line is the coefficient reported in Table 2 Column IV, and the dashed red lines are its associated 95% confidence intervals.

Figure A.4: RD Plot for Federal Transfers



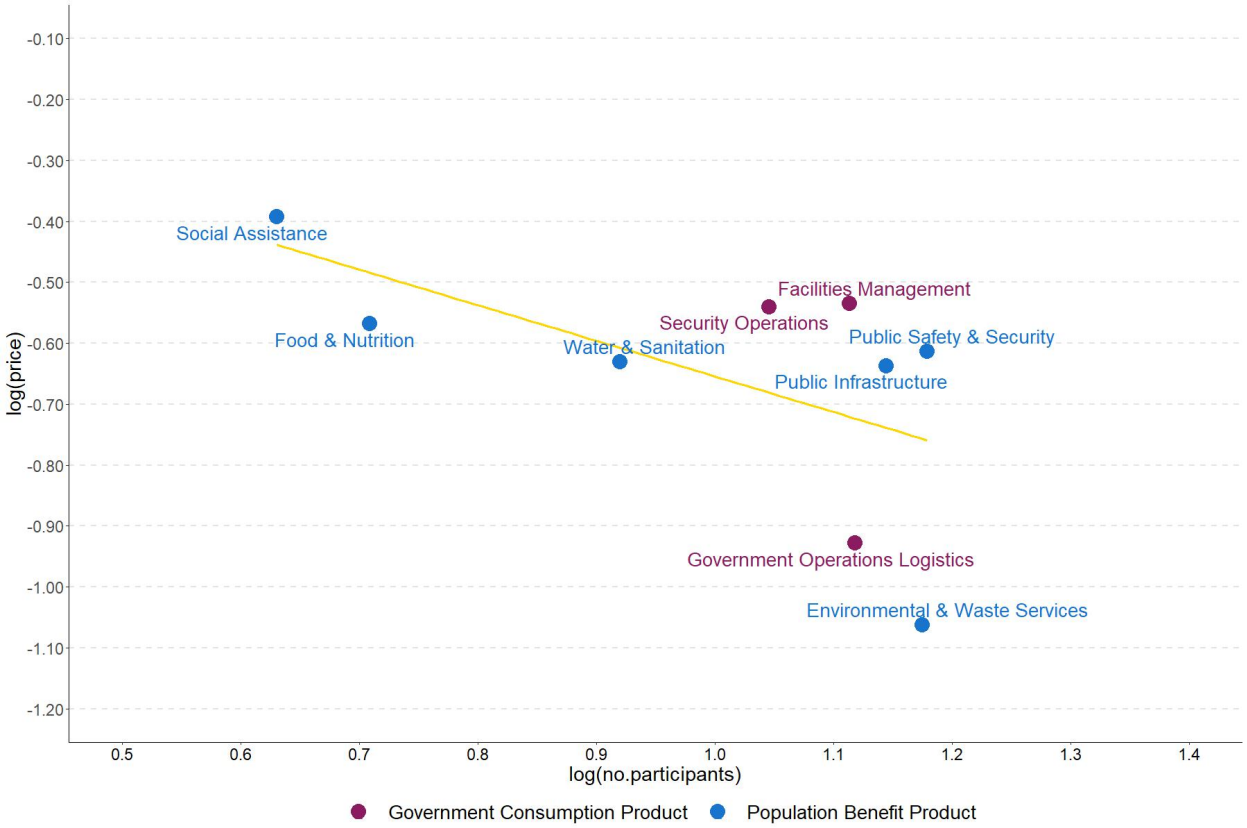

This figure provides visual validation for the first stage of our two-stage RD by showing the discontinuity in FPM transfers around the pooled thresholds in our sample. We follow the same procedure as in Figure 4, with the exception that we plot residual FPM transfers (as opposed to procurement participants) as functions of municipalities' distance to the nearest population cutoff. Because FPM is a municipality-year variable, residual log(FPM) is the difference between log FPM transfers and the average (log) FPM transfer at the MesoRegion-cutoff-year level.

Figure A.5: Covariate Balance: Municipal Revenues, Borrowing, and Audits




This figure presents the estimates of covariate balance tests for non-FPM sources of municipal revenues, for municipal borrowing, and for the probability of being audited. 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 at the cutoff-year-MesoRegion level. 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 at the MesoRegion-cutoff-year level. In Panel (c), residual log tax revenues are the difference between (log-transformed) local tax revenues and their average at the MesoRegion-cutoff-year level. In Panel (d), residual log loans is the difference between (log-transformed) municipal loan amounts and their average at the MesoRegion-cutoff-year level. In Panel (e), the residual loan-to-asset ratio is the difference between the loan-to-asset ratio and the averaged loan-to-asset ratio at the MesoRegion-cutoff-year level. In Panel (f), residual probability of being audited (p(audit)) is the difference between p(audit) and the average p(audit) at the MesoRegion-cutoff-year level. The procedure used to construct this figure is otherwise identical to that we use to construct Figure 4.

Figure A.6: Competition Effects and Price Effects




This figure presents a scatter plot of the estimated competition and 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.13, and estimates in tabular form in Table A.14. The sample period is 2014-2020.

Table A.1: Federal Transfers, Bond Access, and Receivables-Financing Haircuts Across Countries

| | Federal Transfers (% of total revenue) | Can Issue Bonds? | Banks Accept Gov. Receivables? | Typical Haircut[a] | Sub-national Level |
|---|---|---|---|---|---|
| | I | II | III | IV | V |
| **Brazil** | 31.9% | No | Yes | ≥30% (federal buyer) | local |
| Australia | 19.5% (2021) | No | Yes | ≥15% (commercial) | local |
| United States | 27.5% (2021) | Yes | Yes | ≥15% (commercial) | state & local |
| China | 43.0% (2021) | Provinces only[b] | Rarely[b] | n/a[b] | state & local |
| India | 45.3% (2018) | Yes | Yes | ≈3% (TReDS) | state |
| Argentina | 47.7% (2020)[d] | Yes | Yes | ≥25% (commercial) | provincial |
| Germany | 48.5% (2020) | Yes[c] | Yes | ≥10% (commercial) | local |
| Mexico | 71.5% (2021) | Yes[c] | Yes | ≈3% (NAFIN) | local |
| Turkey | 75.2% (2020) | Yes[c] | Yes | ≥20% (commercial) | local |

This table summarizes the sub-national government's share of revenue from federal transfers (Column I), whether the subnational government can issue bonds (Column II), whether banks accept supplier receivables (Column III) and the typical haircut applied (Column IV), as well as the sub-national tier of government to which the figures refer (Column V). Data are for recent years (2018–2021). *Federal-transfer sources:* ABS (Australia, 2021); U.S. Census Bureau (2021); Tesouro Nacional/STN (Brazil, 2021); Ministry of Finance (China, 2021); OECD SNG-WOFI (India, 2018); Ministerio del Interior (Argentina, 2020); OECD SNG-WOFI (Germany, 2020); INEGI EFIPEM (Mexico, 2021); OECD SNG-WOFI (Turkey, 2020).

[a] Typical haircut: the share of invoice face value retained by the financier when a supplier discounts a government receivable (100% minus the advance rate). A lower haircut indicates a lower supplier financing cost. Three benchmark types are reported. *Federal buyer* (Brazil): benchmark for receivables where the federal government is the obligor, used as the closest available proxy where sub-national-specific rates are not published. Brazil's AntecipaGov platform (Ministry of Management and Innovation; Normative Instruction 53/2020, updated by IN 82/2025) caps supplier advances at 70% of contract value, implying a haircut of at least 30%. *Commercial* (Australia, US, Argentina, Germany, Turkey): general bilateral commercial-factoring band, where the bank advances roughly 70–90% upfront and holds the balance as a credit-risk reserve released at maturity. *Sources:* United States, OCC Comptroller's Handbook (Asset-Based Lending) (common advance rates of 70–85%, up to 90% for business-to-business accounts); Germany, Deutscher Factoring-Verband; Turkey and Australia, FCI country statistics; Argentina, Banco Provincia eCheq rate (25% TNA). *Platform* (India TReDS; Mexico NAFIN Cadenas Productivas): federal development-bank reverse-factoring platforms where invoices are purchased outright without recourse. The figure is the supplier's true discount cost rather than a withheld reserve.

[b] China: provinces issue bonds under National People's Congress quotas, but municipalities and counties cannot and rely on local government financing vehicles (LGFVs). Banks can but rarely accept sub-national government supplier receivables due to LGFV repayment risk.

[c] Legally permitted but rarely used in practice: German municipalities mostly rely on subsidised development-bank loans (e.g., KfW) rather than *Kommunalanleihen*; in Turkey, Istanbul has been the dominant issuer; in Mexico, issuance is concentrated in Mexico City.

[d] For Argentina, the figure recombines *Coparticipación* shared taxes (classified under Argentine accounting as "tax revenue") with federal block grants, consistent with the World Bank (2015) PFM Report on the Province of Buenos Aires.

Table A.2: Selected Procurement Items

| Rank | Item Description | Unit | % of Auction Value |
|---|---|---|---|
| 1 | Gasoline (regular) | liter | 55.026% |
| 2 | Diesel (regular) | liter | 21.276% |
| 3 | Diesel S10 | liter | 6.638% |
| 4 | Calcium hydroxide (liquid) | kg | 1.949% |
| 5 | Ferric aluminum sulfate (water treatment) | liter | 1.559% |
| 6 | Simvastatin (10 mg) | pill | 1.058% |
| 7 | Weed clearing (mechanical) | $m^2$ | 0.783% |
| 8 | Cobblestone paving | $m^2$ | 0.615% |
| 9 | Calculator paper roll (57 mm) | pack | 0.518% |
| 10 | Losartan potassium (50 mg) | pill | 0.466% |
| 11 | Advertising agency (service) | service | 0.448% |
| 11 | Patient transport (service) | lot | 0.448% |
| 12 | General services | service | 0.398% |
| 13 | Losartan potassium (25 mg) | pill | 0.363% |
| 14 | Metformin HCl (850 mg) | pill | 0.345% |
| 15 | Sweet corn (canned) | liter | 0.324% |
| 16 | Cephalexin (500 mg) | pill | 0.302% |
| 17 | Fluosilicic acid (water treatment) | liter | 0.301% |
| 18 | Cinacalcet HCl (30 mg) | pill | 0.280% |
| 19 | Enalapril maleate (20 mg) | pill | 0.276% |
| 20 | Sodium valproate (250 mg) | pill | 0.265% |
| 21 | Simvastatin (40 mg) | pill | 0.225% |
| 22 | Hydrochlorothiazide (25 mg) | pill | 0.156% |
| 23 | Fluoxetine (20 mg) | pill | 0.155% |
| 24 | Methylphenidate HCl (40 mg) | pill | 0.151% |
| 25 | Metoprolol succinate (50 mg) | pill | 0.140% |
| 26 | Chlorine gas (900 kg cylinder) | kg | 0.136% |
| 27 | Gliclazide (30 mg) | pill | 0.121% |
| 28 | Whole milk (UHT) | liter | 0.117% |
| 29 | Watermelon | kg | 0.114% |
| 30 | Clomipramine HCl (25 mg) | pill | 0.113% |
| 30 | Weed clearing (manual) | $m^2$ | 0.113% |
| 31 | Pineapple | unit | 0.108% |
| 32 | Amoxicillin+clavulanate (500+125 mg) | pill | 0.101% |
| 33 | Nortriptyline HCl (25 mg) | pill | 0.091% |
| 34 | Chayote (fresh) | kg | 0.088% |
| 35 | Apple (Gala) | kg | 0.078% |
| 35 | Biperiden HCl (2 mg) | pill | 0.078% |
| 36 | Asphalt emulsion (RL-1C) | kg | 0.072% |
| 37 | Nortriptyline HCl (50 mg) | pill | 0.070% |
| 38 | Accounting consultancy (service) | service | 0.069% |
| 39 | Levothyroxine sodium (50 mcg) | pill | 0.068% |
| 40 | Beef (boneless) | kg | 0.066% |

This table presents items commonly found in our public procurement sample, along with their units. Items are ranked by their share of total auction value. The sample period is 2014–2020.

Table A.3: Two-stage RDD: First Stage Estimates

| | Log FPM transfer | | | |
|---|---|---|---|---|
| | I | II | III | IV |
| Log FPM transfer by law | 0.8204*** | 0.8913*** | 0.8861*** | 0.9229*** |
| | (0.0533) | (0.0307) | (0.0332) | (0.0267) |
| Full Sample | 10,816,510 | 10,816,510 | 10,816,510 | 10,816,510 |
| Effective Sample Size | 1,507,083 | 1,507,083 | 1,507,083 | 1,507,083 |
| R2 | 0.99599 | 0.99906 | 0.99916 | 0.99948 |
| First-stage F | 237.21 | 841.13 | 711.56 | 1,196.6 |
| Bandwidth | Optimal | Optimal | Optimal | Optimal |
| Item FE | Yes | | | |
| Cutoff-Year FE | Yes | | | |
| MesoRegion FE | Yes | Yes | | |
| Item-Cutoff-Year FE | | Yes | Yes | Yes |
| MesoRegion-Cutoff FE | | | Yes | |
| MesoRegion-Cutoff-Year FE | | | | Yes |

This table reports the first stage results of the main Regression Discontinuity specification in Equation 2. 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: Within-municipality & Within-winner Analysis

| | log(# participants) | |
|---|---|---|
| | I | II |
| Log FPM transfer | 0.7034*** | 0.5358*** |
| | (0.2284) | (0.1566) |
| Full Sample | 10,816,510 | 10,816,510 |
| Effective Sample Size | 1,507,083 | 1,507,083 |
| R2 | 0.90924 | 0.97085 |
| Bandwidth | Optimal | Optimal |
| Item-Cutoff-Year FE | Yes | Yes |
| MesoRegion-Cutoff-Year FE | Yes | Yes |
| Municipality-Cutoff FE | Yes | |
| Winner-Cutoff-Year FE | | Yes |

This table reports the results of a robustness test on our preferred specifications (Table 2, Column IV), comparing changes in the number of auction participants as the same municipality (winning supplier) crosses an FPM cutoff over time with the inclusion of municipality $\times$ cutoff (winning supplier $\times$ cutoff $\times$ year) 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.5: Robustness: Polynomial Order and Kernel Weight

| | log(# participants) | | | | |
|---|---|---|---|---|---|
| | I | II | III | IV | V |
| | Polynomial Order | | | Kernel Weight | |
| | Zero | Quadratic | Cubic | Triangular | Epanechnikov |
| Log FPM transfer | 0.7744*** | 1.312*** | 1.549*** | 1.322*** | 1.296*** |
| | (0.1838) | (0.2669) | (0.3335) | (0.2232) | (0.2168) |
| Full Sample | 10,816,510 | 10,816,510 | 10,816,510 | 10,816,510 | 10,816,510 |
| Effective Sample Size | 1,507,083 | 1,507,083 | 1,507,083 | 1,507,083 | 1,507,083 |
| R2 | 0.90189 | 0.90213 | 0.90214 | 0.91564 | 0.91144 |
| Bandwidth | Optimal | Optimal | Optimal | Optimal | Optimal |
| Item-Cutoff-Year FE | Yes | Yes | Yes | Yes | Yes |
| MesoRegion-Cutoff-Year FE | Yes | Yes | Yes | Yes | Yes |

This table reports the results of a robustness test on our preferred specification (Table 2, Column IV), where we vary the RD polynomial order (Columns I-III) and kernel weight (Columns IV-V). 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.6: Robustness: Clustering

| | log(# participants) | | |
|---|---|---|---|
| | I | II | III |
| | **Panel A: Municipality Clustering** | | |
| Log FPM transfer | 0.9600** | 0.9600*** | 0.9600*** |
| | (0.3044) | (0.2520) | (0.3406) |
| SE Clustering | Municipality, Year | Municipality-Year | Municipality |
| | **Panel B: MicroRegion Clustering** | | |
| Log FPM transfer | 0.9600** | 0.9600*** | 0.9600** |
| | (0.3195) | (0.2882) | (0.3989) |
| SE Clustering | MicroRegion, Year | MicroRegion-Year | MicroRegion |
| | **Panel C: MesoRegion Clustering** | | |
| Log FPM transfer | 0.9600** | 0.9600*** | 0.9600* |
| | (0.3285) | (0.3350) | (0.4643) |
| SE Clustering | MesoRegion, Year | MesoRegion-Year | MesoRegion |
| Full Sample | 10,816,510 | 10,816,510 | 10,816,510 |
| Effective Sample Size | 1,507,083 | 1,507,083 | 1,507,083 |
| Bandwidth | Optimal | Optimal | Optimal |
| Item-Cutoff-Year FE | Yes | Yes | Yes |
| MesoRegion-Cutoff-Year FE | Yes | Yes | Yes |

This table reports the results of a robustness test on our preferred specifications (Table 2, Column IV), where we vary the level of geographic unit clustering. In Panel A, we cluster standard errors at the municipality level: municipality and year (Column I), municipality-year (Column II), and municipality alone (Column III). In Panel B, we cluster standard errors at the MicroRegion level: MicroRegion and year (Column I), MicroRegion-year (Column II), and MicroRegion (Column III). In Panel C, we cluster standard errors at the MesoRegion level: MesoRegion and year (Column I), MesoRegion-year (Column II), and MesoRegion alone (Column III). The fixed effects used in Panels A and B are the same as those used in Panel C. 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.7: Robustness: Single-stage Regression Discontinuity

| | log(# participants) | | | |
|---|---|---|---|---|
| | I | II | III | IV |
| Above Threshold | 0.0712* | 0.1200*** | 0.1225*** | 0.2276*** |
| | (0.0366) | (0.0430) | (0.0448) | (0.0546) |
| Full Sample | 10,816,510 | 10,816,510 | 10,816,510 | 10,816,510 |
| Effective Sample Size | 1,507,083 | 1,507,083 | 1,507,083 | 1,507,083 |
| R2 | 0.62084 | 0.89207 | 0.89583 | 0.90214 |
| Bandwidth | Optimal | Optimal | Optimal | Optimal |
| Item FE | Yes | | | |
| Cutoff-Year FE | Yes | | | |
| MesoRegion FE | Yes | Yes | | |
| Item-Cutoff-Year FE | | Yes | Yes | Yes |
| MesoRegion-Cutoff FE | | | Yes | |
| MesoRegion-Cutoff-Year FE | | | | Yes |

This table reports the results of a robustness test to our baseline results in Table 2, 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. 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.8: Robustness: Poisson Regressions

| | # participants | | | |
|---|---|---|---|---|
| | I | II | III | IV |
| Above Threshold | 0.0712* | 0.1416*** | 0.1307*** | 0.2336*** |
| | (0.0366) | (0.0435) | (0.0454) | (0.0537) |
| Full Sample | 10,816,510 | 10,816,510 | 10,816,510 | 10,816,510 |
| Effective Sample Size | 1,507,083 | 1,507,083 | 1,507,083 | 1,507,083 |
| R2 | 0.61122 | 0.89051 | 0.89580 | 0.90779 |
| Bandwidth | Optimal | Optimal | Optimal | Optimal |
| Item FE | Yes | | | |
| Cutoff-Year FE | Yes | | | |
| MesoRegion FE | Yes | Yes | | |
| Item-Cutoff-Year FE | | Yes | Yes | Yes |
| MesoRegion-Cutoff FE | | | Yes | |
| MesoRegion-Cutoff-Year FE | | | | Yes |

This table reports the results of a robustness tests on our single-stage estimates from Table A.7, 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.7. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. The sample period is 2014-2020.

Table A.9: Robustness: Rule-of-thumb RD Bandwidth

| | log(# participants) | | |
|---|---|---|---|
| | I | II | III |
| Log FPM transfer | 1.354*** | 1.155*** | 0.4878*** |
| | (0.2882) | (0.2479) | (0.1594) |
| Sample Size | 774,617 | 1,466,971 | 4,228,062 |
| R2 | 0.94150 | 0.91101 | 0.84063 |
| Bandwidth | $\pm$2% | $\pm$4% | $\pm$10% |
| Item-Cutoff-Year FE | Yes | Yes | Yes |
| MesoRegion-Cutoff-Year FE | Yes | Yes | Yes |

This table reports the results of a robustness test on our preferred specification in Table 2 Column IV while using different bandwidth of population distance around each cutoff rather than the optimal bandwidths of Calonico et al. (2014). We restrict the sample to municipalities within $\pm$2%, $\pm$4%, and $\pm$10% of the population cutoffs in Columns I, II, and III, respectively. 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.10: Financial Constraints: Stacked Difference-in-differences

| | log(# participants) | | |
|---|---|---|---|
| | I | II | III |
| $\delta$ Log(fpm) · Post | -0.0944 | -0.1410 | -0.0693 |
| | (0.1767) | (0.1797) | (0.1991) |
| $\delta$ Log(fpm) · Post · High Loan Ratio (Predetermined) | 0.6775** | 0.6804** | 0.6813** |
| | (0.2813) | (0.2783) | (0.3289) |
| Window | $[t-1, t+2]$ | $[t-2, t+3]$ | $[t-3, t+4]$ |
| Effective Sample Size | 2,887,139 | 3,863,738 | 4,601,248 |
| R2 | 0.90407 | 0.90173 | 0.90160 |
| Bandwidth | Optimal | Optimal | Optimal |
| Item-Cutoff-Year-Cohort FE | Yes | Yes | Yes |
| Municipality-Cutoff-Cohort FE | Yes | Yes | Yes |

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 $[t-1, t+2]$ to $[t-3, t+4]$ 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:

$$Y_{i(c)pet} = \alpha_{i(c)pe} + \gamma_{(c)et} + \beta_1 \delta \log(\text{fpm})_{i(c)e} \cdot \text{Post}_{et} + \beta_2 \delta \log(\text{fpm})_{i(c)e} \cdot \text{Post}_{et} \cdot (\text{High Loan Ratio})_{i(c)et-1} + \epsilon_{i(c)pet},$$

where the dependent variable $Y_{i(c)pet}$ is the natural logarithm of the number of procurement participants for item $p$, in municipality $i$, at threshold $c$, in cohort $e$, and in year $t$. $\delta \log(\text{fpm})_{i(c)e}$ is the change in the natural logarithm of the FPM transfer for municipality $i$, at threshold $c$, in cohort $e$. $\text{Post}_{et}$ 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 item-cutoff-year-cohort and municipality-cutoff-cohort fixed effects. Columns I to III use a 2-year, 3-year, 4-year window around each event time $t$. We restrict the sample to match that of Table 2. Therefore, the table shows the effective sample size, determined using the optimal bandwidth selection method from Calonico et al. (2014). Standard errors are two way clustered at the municipality-cohort and item-cohort level and shown in parentheses. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively.

Table A.11: Federal Transfers, Credit Market Development, and Procurement Participation

| | log(# participants) | |
|---|---|---|
| | I | II |
| Log FPM Transfer · More Developed Credit Market | 0.7960*** | |
| | (0.2264) | |
| Log FPM Transfer · Less Developed Credit Market | 1.046*** | |
| | (0.2165) | |
| Log FPM Transfer | | 0.5580* |
| | | (0.3024) |
| Log FPM Transfer · Credit HHI | | 0.6790** |
| | | (0.3068) |
| Equality Test (p-value) | 0.0368 | |
| Full Sample Size | 10,816,510 | 10,816,510 |
| Effective Sample Size | 1,460,104 | 1,460,104 |
| R2 | 0.90372 | 0.90387 |
| Bandwidth | Optimal | Optimal |
| Item-Cutoff-Year FE | Yes | Yes |
| MesoRegion-Cutoff-Year FE | Yes | Yes |

This table reports the heterogeneous effects of federal transfers on the number of auction participants based on the development of the local credit market. The dependent variable is the natural logarithm of the number of auction participants. We measure local credit-market development with the municipality-level Herfindahl–Hirschman Index (HHI) of bank credit, where a bank's credit is its branch-aggregated, monthly-averaged outstanding balance from the Central Bank's ESTBAN statistics for 2013. A higher credit HHI denotes a less developed (thinner) local credit market. In Column I, we rank and group municipalities by their 2013 credit HHI within each cutoff. Less developed credit market is an indicator equal to one for municipalities in the top tercile of the HHI distribution, and equal to zero otherwise. More developed credit markets is an indicator equal to one for municipalities in the bottom two terciles of the HHI distribution, and equal to zero otherwise. We report the effect of Log FPM transfer separately for each group, and p-values for the test of coefficient equality across the two groups in Column I. In Column II, we instead interact Log FPM transfer with the continuous credit HHI. 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.12: Less Constrained Buyers and Subsequent Supplier Growth and Survival

| | Subsequent winning behavior (t+1 to t+5) | | | Survival | | |
|---|---|---|---|---|---|---|
| | p(winning) | log(# contracts) | log(contract value) | p(alive at t+3) | p(alive at t+5) | p(alive at t+10) |
| | I | II | III | IV | V | VI |
| Has above threshold buyer | 0.0711*** | 0.6669*** | 0.6329*** | 0.0052 | 0.0111** | 0.0095*** |
| | (0.0070) | (0.0447) | (0.0410) | (0.0037) | (0.0052) | (0.0036) |
| Sample Size | 76,045 | 41,555 | 41,555 | 60,166 | 39,257 | 81,732 |
| R2 | 0.08439 | 0.08014 | 0.08722 | 0.01378 | 0.01055 | 0.02464 |
| MesoRegion(Buyer)-Cutoff(Buyer)-FirstWinYear FE | Yes | Yes | Yes | Yes | Yes | Yes |

In this table we ask whether winning from a less financially constrained municipal buyer affects a supplier's growth and survival. The unit of observation is a winning firm, and every firm enters the sample once. For each firm we take the year it first won a procurement contract (its first-winning year) and follow the supplier's subsequent winning and survival outcomes. The independent variable, Has above threshold buyer, equals one if, in that first-winning year, the firm won at least one contract from a municipal buyer that crossed the threshold and received a larger FPM transfer. To assign fixed effects and clustering, we anchor each firm to its largest contract in the first-winning year, the buyer municipality of that contract, its nearest population cutoff, and its MesoRegion together to define the fixed-effect and the clustering levels. We then follow each firm over the years after its first win. Columns I–III measure subsequent winning: Column I is an indicator for winning any contract in the five years after the first win, Column II is the log number of contracts won, and Column III is the log of their total contract value. Columns II and III include only firms that won at least one subsequent contract. Columns IV–VI measure survival: each equals one if the firm has not exited the national firm registry by $t+3$, $t+5$, or $t+10$. All specifications include largest-buyer MesoRegion × cutoff × first-winning-year fixed effects, and standard errors are clustered at the largest first-winning buyer's municipality. ***, **, * denote significance at the 1%, 5%, and 10% level. The sample period is 2014–2020.

Table A.13: 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, including police, fire, and building security |
| | 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 for government offices |
| | IT & Technology | Computers, software, and IT services for government operations |
| | Operational Support Services | Consulting, legal, accounting, events, and specialized administrative services |
| | Facilities Management | Cleaning services and supplies, building maintenance, and security for government buildings |
| | Government Operations Logistics | Government vehicles, heavy equipment, and official travel expenses |
| | Security Operations | Security services, surveillance systems, and building protection for government facilities |

*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.14: Competition Effects and Price Effects

| Product | log(# participants) | log(price) | Δ # participants | Category |
|---|---|---|---|---|
| Education Learning | 0.9317*** | -0.4646 | 3.9727*** | Population Benefit Product |
| Healthcare & Medical | 1.3736*** | -0.2194 | 8.7473*** | Population Benefit Product |
| Food & Nutrition | 0.7089** | -0.5682*** | 2.8134** | Population Benefit Product |
| Water & Sanitation | 0.9199*** | -0.6307*** | 3.8321*** | Population Benefit Product |
| Social Assistance | 0.6304** | -0.3930* | 3.0257** | Population Benefit Product |
| Public Infrastructure | 1.1447*** | -0.6370*** | 4.5039*** | Population Benefit Product |
| Public Safety & Security | 1.1792*** | -0.6140** | 4.7954*** | Population Benefit Product |
| Environmental & Waste Services | 1.1750*** | -1.0631*** | 5.0585*** | Population Benefit Product |
| Recreation & Culture | 0.5547 | -0.3630 | 1.9219 | Population Benefit Product |
| Public Health Services | 1.3487*** | -0.1654 | 8.5734*** | Population Benefit Product |
| Administrative Materials | 0.8371*** | -0.2380 | 3.9675*** | Government Consumption Product |
| IT & Technology | 0.5729 | 0.0385 | 2.2688 | Government Consumption Product |
| Operational Support Services | 0.7944** | -0.4866 | 3.2355** | Government Consumption Product |
| Facilities Management | 1.1133*** | -0.5351** | 4.6957*** | Government Consumption Product |
| Government Operations Logistics | 1.1182* | -0.9281* | 4.4783* | Government Consumption Product |
| Security Operations | 1.0455*** | -0.5401** | 4.2530*** | 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 (Table 2, Column IV). We also report estimates of effective changes (as opposed to elasticities) by multiplying each estimated elasticity by the mean number of auction participants within the corresponding product category.

Table A.15: Procurement Prices Mechanism: Competition

| | log(price) | |
|---|---|---|
| | **Panel A: Controlling for Quantity and Days Until Payment** | |
| | I | II |
| Log FPM transfer | -0.3285** | -0.2932* |
| | (0.1540) | (0.1620) |
| log (quantity) | -0.1815*** | |
| | (0.0104) | |
| log (days until payment) | | 0.0004 |
| | | (0.0068) |
| Full Sample Size | 10,816,510 | 10,816,510 |
| Effective Sample Size | 2,236,064 | 978,809 |
| R2 | 0.96111 | 0.96632 |
| Bandwidth | Optimal | Optimal |
| Item-Cutoff-Year FE | Yes | Yes |
| MesoRegion-Cutoff-Year FE | Yes | Yes |

Table A.15: Procurement Prices Mechanism: Competition (cont.)

| | **Panel B: Auction Participation Fixed Effects** | | | | | |
|---|---|---|---|---|---|---|
| | I | II | III | IV | V | VI |
| Log FPM transfer | -0.1717 | -0.1636 | -0.1616 | -0.0606 | -0.0810 | 0.0341 |
| | (0.1055) | (0.1022) | (0.1002) | (0.0923) | (0.1012) | (0.0816) |
| Full Sample Size | 10,816,510 | 10,816,510 | 10,816,510 | 10,816,510 | 10,816,510 | 10,816,510 |
| Effective Sample Size | 2,236,064 | 2,236,064 | 2,236,064 | 2,236,064 | 2,236,064 | 2,236,064 |
| R2 | 0.96741 | 0.96742 | 0.96748 | 0.96889 | 0.96908 | 0.96956 |
| Bandwidth | Optimal | Optimal | Optimal | Optimal | Optimal | Optimal |
| Item-Cutoff-Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| MesoRegion-Cutoff-Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Winner-Cutoff-Year FE | Yes | Yes | Yes | | | |
| # participants(quartile)-Cutoff-Year FE | Yes | | | | | |
| # participants(quintile)-Cutoff-Year FE | | Yes | | | | |
| # participants(decile)-Cutoff-Year FE | | | Yes | | | |
| Winner-# participants(quartile)-Cutoff-Year FE | | | | Yes | | |
| Winner-# participants(quintile)-Cutoff-Year FE | | | | | Yes | |
| Winner-# participants(decile)-Cutoff-Year FE | | | | | | Yes |

This table reports our estimates of the effects of FPM transfers on procurement prices and examines the mechanisms behind the price reduction. The dependent variable is the natural logarithm of the price. Panel A controls for quantity and days until payment, adding each as a regressor to the baseline specification (Table 9, Column IV). Column I adds the natural logarithm of the purchasing quantity. Column II adds the natural logarithm of the number of days until payment. Panel B controls for the winning firm and the level of competition nonparametrically through fixed effects. Columns I-III add separate fixed effects for the winning firm and for the number of participants, binned into quartiles (Column I), quintiles (Column II), and deciles (Column III), each interacted with the cutoff and year. Columns IV-VI replace these with fixed effects for the winning firm interacted with the bins for number of auction participants: quartiles (Column IV), quintiles (Column V), and deciles (Column VI), together with cutoff and year fixed effects. The procedure we use to construct this table is otherwise identical to that described in Table 9. Standard errors are two-way clustered at the municipality and item level. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. The sample period is 2014–2020.

Table A.16: Federal Transfers and Procurement Prices by Supplier Size

| | log(price) | |
|---|---|---|
| | I | II |
| Log FPM Transfer · Supplier Size = 1 (Micro Firm) | -0.3910** | -0.1115 |
| | (0.1606) | (0.1485) |
| Log FPM Transfer · Supplier Size = 2 (Small Firm) | -0.4033** | -0.2097 |
| | (0.1926) | (0.1681) |
| Log FPM Transfer · Supplier Size = 3 (Large Firm) | -0.5483*** | -0.2712** |
| | (0.1864) | (0.1230) |
| Full Sample Size | 10,816,510 | 10,816,510 |
| Effective Sample Size | 2,227,270 | 2,227,270 |
| R2 | 0.95814 | 0.96702 |
| Bandwidth | Optimal | Optimal |
| SupplierSize-Cutoff-Year FE | Yes | |
| Item-Cutoff-Year FE | Yes | Yes |
| MesoRegion-Cutoff-Year FE | Yes | Yes |
| Winner-Cutoff-Year FE | | Yes |

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

Table A.17: Federal Transfers and Procurement Quality

| | Fraction of delivered goods/services later canceled | Cost Overrun Ratio |
|---|---|---|
| | I | II |
| Log FPM transfer | -0.0002 | 0.0256 |
| | (0.0034) | (0.0232) |
| Full Sample | 126,729 | 126,729 |
| Effective Sample Size | 57,719 | 65,766 |
| R2 | 0.04344 | 0.06966 |
| Bandwidth | Optimal | Optimal |
| Cutoff-Year FE | Yes | Yes |
| MesoRegion-Cutoff-Year FE | Yes | Yes |

This table reports our estimates of the effects of FPM transfers on procurement cancellation and cost overruns. The unit of observation is the procurement-municipality-year level. In Column I, the dependent variable is the fraction of the value of delivered goods/services that is later canceled by the municipality. In Column II, the dependent variable is the cost overrun ratio, defined as the ratio of the supplementary commitments to the original committed value. The procedure we use to construct this table is otherwise identical to that described in Table 2. Standard errors are clustered at the municipality level. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. The sample period is 2014-2020.

Table A.18: SME Credit Access, the BNDES Reform, and Procurement Participation

| | log(# participants) | | | |
|---|---|---|---|---|
| | I | II | III | IV |
| | **Panel A: Credit (thousand BRL) per capita** | | | |
| Post · Exposure | -0.0217*** | -0.0246*** | -0.0191** | -0.0239*** |
| | (0.0076) | (0.0067) | (0.0076) | (0.0067) |
| Sample Size | 10,520,745 | 10,520,745 | 10,520,745 | 10,520,745 |
| R2 | 0.58984 | 0.66870 | 0.80088 | 0.82982 |
| | **Panel B: # loans per 10,000 people** | | | |
| Post · Exposure | -0.0140 | -0.0217*** | -0.0171** | -0.0236*** |
| | (0.0093) | (0.0076) | (0.0083) | (0.0071) |
| Sample Size | 10,520,745 | 10,520,745 | 10,520,745 | 10,520,745 |
| R2 | 0.59168 | 0.66869 | 0.80139 | 0.82981 |
| | **Panel C: # borrowers per 10,000 people** | | | |
| Post · Exposure | -0.0176** | -0.0174** | -0.0224*** | -0.0228*** |
| | (0.0088) | (0.0072) | (0.0078) | (0.0068) |
| Sample Size | 10,520,745 | 10,520,745 | 10,520,745 | 10,520,745 |
| R2 | 0.59318 | 0.66873 | 0.80167 | 0.82981 |
| Item-Year FE | Yes | Yes | Yes | Yes |
| MesoRegion-Year FE | Yes | Yes | Yes | Yes |
| Winner-Year FE | | | Yes | Yes |
| Municipality FE | | Yes | | Yes |

This table reports estimates of the effect of an SME credit-supply shock on auction participation using a difference-in-differences design. We use the 2017–2018 BNDES reform, which replaced subsidized lending with market-rate lending, as a shock to the supply and cost of credit available to SMEs. Municipality-level exposure is the sum of all SME borrowing activity in the municipality over the pre-reform years (2014–2017). To make municipalities of different sizes comparable, we scale exposure by the municipality's pre-reform average population and then standardize it to mean zero and unit variance. We estimate the following equation:

$$Y_{ipt} = \alpha_i + \gamma_{pt} + \theta_{rt} + \phi_{wt} + \beta\,\text{Exposure}_i \cdot \text{Post}_t + \delta\,\text{Exposure}_i + \lambda\,\text{Post}_t + \epsilon_{ipt},$$

where the dependent variable $Y_{ipt}$ is the natural logarithm of the number of auction participants for item $p$, in municipality $i$, and year $t$. $\text{Exposure}_i$ is the standardized pre-reform SME credit exposure of municipality $i$, measured as BNDES SME credit (thousand BRL) per capita in Panel A, the number of SME BNDES loans per 10,000 inhabitants in Panel B, and the number of SME BNDES borrowers per 10,000 inhabitants in Panel C. $\text{Post}_t$ is an indicator equal to one in the post-reform years (2018–2020), and equal to zero otherwise. $\alpha_i$, $\gamma_{pt}$, $\theta_{rt}$, and $\phi_{wt}$ denote municipality, item-year, MesoRegion-year, and winner-year fixed effects, and the fixed effects used in Panels A and B are the same as those used in Panel C. Standard errors are clustered at the municipality level. ***, **, * denote significance at the 1%, 5%, and 10% level, respectively. The sample period is 2014–2020.