Public Procurement, Firm Networks, and the Propagation of Government Demand

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Abstract

Public procurement is one of the largest and most policy-driven sources of demand in the economy. We study the effect of government demand shocks using a novel dataset that links the universe of firm-to-firm transactions in China with administrative tax records and comprehensive bid evaluation data containing the precise scores of all competitors. We implement a quasi-experimental design that compares winning firms to runner-up bidders who lost by narrow scoring margins. We find that contract awards lead to large, persistent increases in firm revenue, profits, and employment, driven by a significant expansion in intermediate input purchases. Crucially, we document that procurement shocks induce both network expansion and competitive displacement: winning firms actively broaden and upgrade their supplier base, driving expansion and reallocation of suppliers. These direct effects generate significant upstream spillovers, as the suppliers of winning firms experience robust growth even without direct government contracts. Aggregating these granular linkages, we show that production networks amplify the aggregate fiscal multiplier, with demand propagating primarily upstream to connected supplier industries.

Keywords **: Public Procurement, Upstream Spillovers, Shock Propagation, Fiscal Policy**

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1 Introduction

Public procurement—government purchasing of goods, services, and infrastructure—represents one of the largest and most policy-driven components of aggregate demand. Beyond its immediate fiscal role, procurement serves as an implicit form of industrial policy: it shapes market opportunities, directs technological upgrading, and determines which firms thrive or fail. In economies where private demand is volatile or capital markets are imperfect, government contracts can play a pivotal role in sustaining firm growth and employment. Yet despite its macroeconomic scale, procurement is ultimately a micro mechanism—transmitted through individual contracts, negotiated among firms, and embedded in production networks(Acemoglu et al., 2012; Carvalho et al., 2021). Understanding how this granular process aggregates into broader economic outcomes remains a central question for both fiscal policy and development economics.

This paper investigates how government procurement affects firms and the economy through the lens of production networks. We ask three interrelated questions. First, how does winning a government procurement contract influence a firm's performance and its linkages with suppliers and customers? Second, to what extent do these direct firm-level shocks propagate along supply chains, shaping the behavior and outcomes of upstream and downstream firms? Third, how do these micro-level adjustments accumulate to generate macroeconomic effects on sectoral employment and aggregate activity? By connecting these levels of analysis, we aim to bridge the microeconomic evidence on firm responses with the macroeconomic literature on fiscal multipliers(Ramey, 2011; Barattieri, Cacciatore, and Traum, 2023).

Our empirical analysis leverages rich and unique administrative data from China, where the rapid expansion of public procurement since the mid-2000s has created one of the world's largest and most diverse markets for government contracting. We combine three groups of administrative datasets: (i) records of public procurement bids and awards, (ii) firm-to-firm transaction data derived from value-added tax (VAT) invoices, and (iii) firm registration

information, annual reports, and tax filings containing balance-sheet and income-statement data. Together, these datasets provide a comprehensive view of the production network, covering the near-universe of formal firms and their input–output relationships. This integrated database enables us to trace, at high frequency and with causal precision, how procurement contracts are allocated, how they affect the firms that win them, and how these effects propagate throughout the economy.

The paper proceeds in three steps. First, we identify the direct effects of government procurement on firms that win contracts. Exploiting within-project variation in bidding outcomes, we compare winning and losing firms within the same procurement competition using an event-study and difference-in-differences framework. This design isolates the causal impact of winning from time-varying project or market conditions. We find that contract awards lead to sharp and persistent improvements in firm performance: operating revenue and profits rise by around 25–30 percent in the year of contract acquisition, and employment expands by roughly 5 percent, indicating substantial job creation. These gains are driven primarily by expansion on the supply side. Winning firms broaden their supplier base, purchase more from manufacturing producers, and increase overall productivity—evidence consistent with public procurement acting as a demand-driven growth catalyst that stimulates both firm-level performance and employment.

Second, we examine indirect effects operating through supply-chain linkages. By tracking all upstream and downstream transactions of winning firms, we measure how procurement-induced demand shocks transmit across the production network. Using purchase-weighted and sales-weighted performance indices, we find that the suppliers of winning firms experience significant revenue and profit gains even when they do not themselves receive government contracts. Part of this effect reflects buyers' active re-sorting toward more productive suppliers, while another part stems from genuine performance improvements among incumbent suppliers exposed to higher demand. The magnitude of these spillovers indicates that public procurement can generate sizable multiplier effects through firm-to-firm linkages.

Finally, we aggregate these micro-level responses to assess macroeconomic propagation. Combining sector-level procurement growth with input–output linkages, we estimate local-projection models of employment responses to procurement spending shocks. The results reveal that fiscal demand primarily transmits downstream—stimulating employment growth in supplier industries connected to procurement recipients—while upstream client sectors show weaker or delayed responses. The propagation of government demand through production networks thus provides a tangible micro-foundation for fiscal multipliers in developing economies.

Taken together, our findings demonstrate that public procurement functions as a powerful industrial policy instrument: it not only fosters growth among directly supported firms but also amplifies these effects through supply-chain networks, contributing to broader economic expansion. By combining granular firm-level identification with sectoral propagation analysis, the paper bridges the gap between micro-based evaluations of government programs and macroeconomic assessments of fiscal stimulus.

This paper relates to three main strands of literature. First, we add to the growing literature on industrial policy and demand-side interventions that aim to stimulate firm growth. A large body of work examines how access to new markets—particularly through exporting or participation in multinational production chains—affects firm performance and upgrading (Atkin, Khandelwal, and Osman, 2014; Alfaro-Urena, Manelici, and Vasquez, 2022). In contrast, relatively little is known about how domestic public demand shapes firm dynamics. A notable exception is Ferraz, Finan, and Szerman (2015), who exploit Brazilian procurement data to show that government purchases significantly boost firm revenues, employment, and survival. More recent work from developing economies, such as Mensah, Wankuru, and Kirui (2024), provides complementary evidence that winning public contracts enhances firm performance in Kenya. Our study extends this literature by combining micro-level causal identification of procurement winners with network-wide analysis of how these shocks propagate through supply chains and contribute to aggregate employment.

Second, our work connects to the literature on the propagation of shocks through production networks. Seminal theoretical contributions (Acemoglu et al., 2012; Acemoglu, Ozdaglar, and Tahbaz-Salehi, 2017; Baqaee and Farhi, 2019) show that firm- and sector-level disturbances can generate large aggregate fluctuations through input–output linkages. Empirically, a growing set of studies has documented how specific shocks—such as natural disasters, financial disruptions, or trade reforms—spread across firms and industries via supply-chain connections (Boehm, Flaaen, and Pandalai-Nayar, 2019; Carvalho et al., 2021; Dhyne et al., 2021; Demir et al., 2024). We bring this framework to the context of fiscal policy by tracing the transmission of government procurement shocks within the production network, providing the first micro-to-macro evidence on how public demand stimulates not only direct contractors but also their suppliers and downstream partners.

Third, our paper bridges the micro and macro perspectives on fiscal policy. The literature on fiscal multipliers has traditionally relied on aggregate or regional variation in government spending (Ramey, 2011; Barattieri, Cacciatore, and Traum, 2023), leaving open questions about the underlying micro mechanisms. These studies identify how total output or employment responds to public expenditure shocks, but they cannot directly observe how such shocks reach individual firms or diffuse across industries. We address this gap by identifying procurement-induced demand shocks at the firm level and tracking how they propagate through production linkages to affect sectoral and aggregate employment. This micro-to-macro approach allows us to quantify how much of the fiscal response arises from direct recipients of government contracts versus their trading partners, and to distinguish the roles of upstream and downstream propagation in amplifying government demand. By doing so, the paper offers new evidence on the network-based transmission of fiscal policy and provides a structural bridge between firm-level responses and macroeconomic multipliers.

The paper proceeds as follows. Section 3 describes the data and background of public procurement policy in China. Section 4 presents the results of directly winning public procurement contracts on firm annual performances, upstream purchasing activities, and

downstream selling activities. Section 5 provides the method and measurements of the total ratio of public procurement contracts to sales. Section 6 provides evidence of the impact of public procurement contracts through network propagation on firm revenues. Section 7 concludes.

2 Institutional Background and Market Patterns

Public procurement is one of the largest components of China's government spending—about 10 percent of total government expenditure in recent years—and a major channel through which the state interacts with private firms. The system combines a unified legal framework with decentralized implementation, producing substantial variation in procurement practices across regions and sectors.

This section outlines the institutional architecture of China's procurement system and documents descriptive patterns using national and provincial contract-level data. Together, these analyses provide the context for our empirical work by showing how procurement is organized, who participates, and how its scale and composition determine firm-level exposure to government demand.

2.1 The Institutional Architecture of Public Procurement in China

China's public procurement framework constitutes a pivotal instrument for industrial policy, facilitating government demand for goods, services, and infrastructure while promoting market efficiency and competitiveness. This framework operates under two complementary legal regimes: the Government Procurement Law (GPL) (Standing Committee of the National People's Congress, 2003) and the Tendering and Bidding Law (TBL) (Standing Committee of the National People's Congress, 2000).

Legal Frameworks. The GPL, enacted in 2003 and administered by the Ministry of Finance (MOF), governs the procurement of goods, services, and small-to-medium construc-

tion projects financed by fiscal budgets. This law emphasizes procedural transparency, fiscal oversight, and standardized bidding procedures for government agencies and institutions. It mandates competitive tendering methods, particularly for contracts exceeding predefined budget thresholds, to ensure fairness and cost efficiency.

In contrast, the TBL, established in 2000 and overseen by the National Development and Reform Commission (NDRC), regulates large-scale capital-intensive projects such as infrastructure development, railways, and highways. The TBL focuses heavily on technical standards and project feasibility, often involving state-owned enterprises (SOEs) as key participants. While both laws aim to enhance competition and accountability, differences in scope and application have occasionally introduced regulatory inconsistencies, prompting calls for reform to streamline governance and improve transparency.

Governance and Decentralization. Procurement operations in China are primarily decentralized, with significant responsibilities delegated to subnational governments. Provincial and municipal finance bureaus manage budget allocations, organize bidding processes, and oversee contract supervision through local e-procurement platforms. While national regulations provide overarching guidance, local governments retain substantial discretion over critical operational details, such as determining thresholds for open bidding, designing specific evaluation criteria, and conducting day-to-day oversight. This decentralized structure reflects the fiscal autonomy embedded within China's governance system and accounts for over 95% of total procurement value.

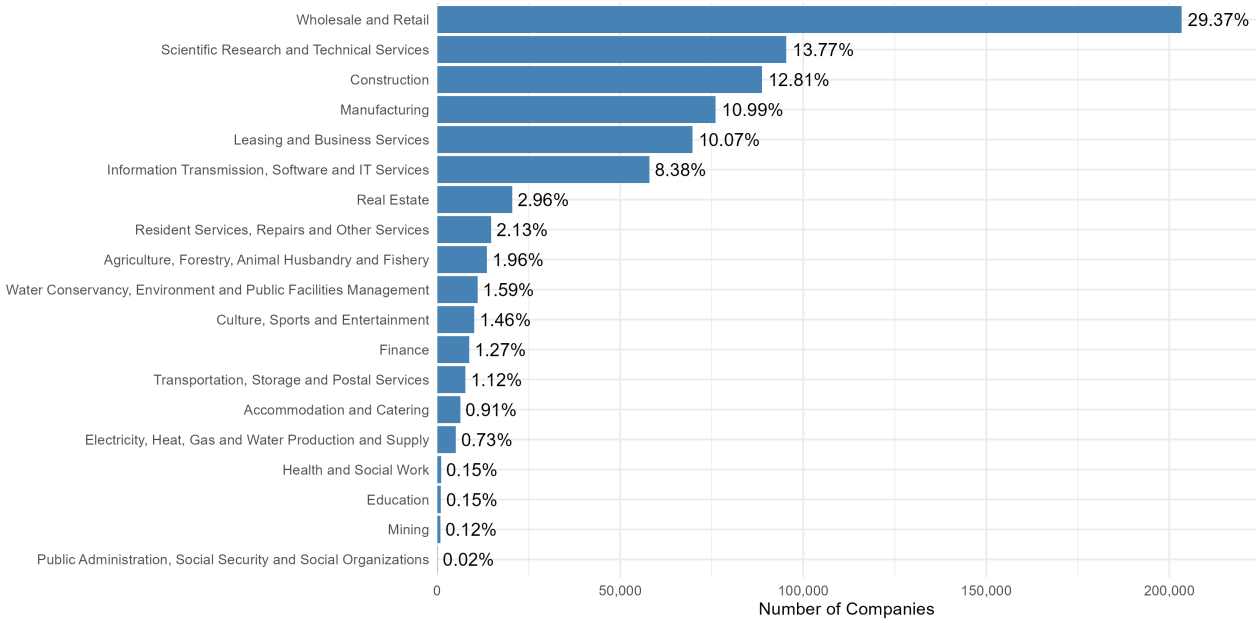
Institutional Reforms and Data Integration. Recognizing the need for greater transparency, the Chinese government has implemented several institutional reforms over the past decades. A significant milestone occurred in 2016 with the establishment of the China Government Procurement Network (CGPN), which consolidates procurement data from local e-procurement systems into a unified national platform. This centralized database not only standardizes contract publication and supplier identification but also enhances public access to contract-level data. By creating a consistent framework for monitoring and analysis,

the CGPN has improved transparency and accountability across the procurement process, enabling the identification of broader market patterns and instances of systemic inefficiencies.

2.2 Market Patterns

To understand how government procurement operates in practice, we document key market patterns in China's public procurement system using contract-level data from the China Government Procurement Network (CGPN) between 2013 and 2020. We describe the scale and composition of procurement activity, characterize the main buyers and suppliers, and examine how procurement contracts intersect with firm-to-firm production networks. These descriptive facts provide context for our empirical analysis and clarify how procurement generates heterogeneous firm-level demand shocks.

Figure 1: Industry Distribution: Annual Report Sample



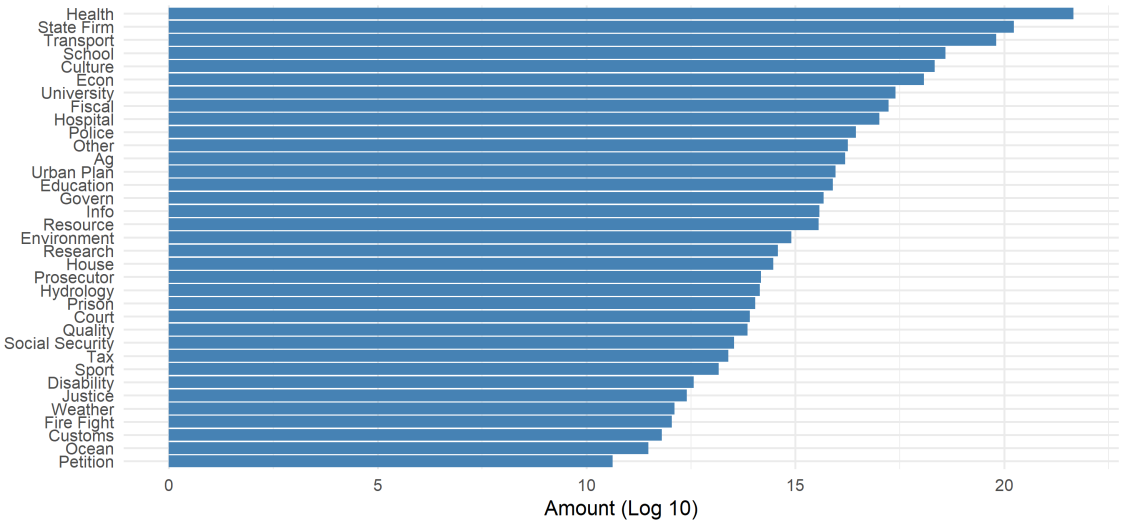
Notes: The figure shows the industry distribution of firms that appear as winning suppliers in public procurement contracts. Industries are classified based on firms' primary registered industry in annual firm reports. Percentages indicate the share of suppliers by count within each industry. The sample covers procurement winners recorded in the China Government Procurement Network (CGPN) between 2013 and 2020.

Between 2013 and 2020, the CGPN recorded more than 8.6 million procurement con-

tracts, accounting for roughly 10 percent of total fiscal expenditure annually. Procurement activity is highly decentralized: over 95 percent of contract value originates from subnational governments—provincial, municipal, and county agencies—reflecting fiscal autonomy within China's public finance system and generating substantial regional variation in firms' exposure to government demand.

On the demand side, shown in Figure 2, a wide range of public institutions procure goods and services. Educational and health institutions—such as schools, universities, and hospitals—account for nearly half of all contracts by count but a smaller share of total value, reflecting frequent, routine purchases. In contrast, construction, transportation, and infrastructure agencies issue fewer but substantially larger contracts, corresponding to capital-intensive investment projects. Together, these patterns highlight the coexistence of high-frequency, low-value operational demand and low-frequency, high-value investment demand.

Figure 2: Total Amount of Public Procurement Contracts by Government Type



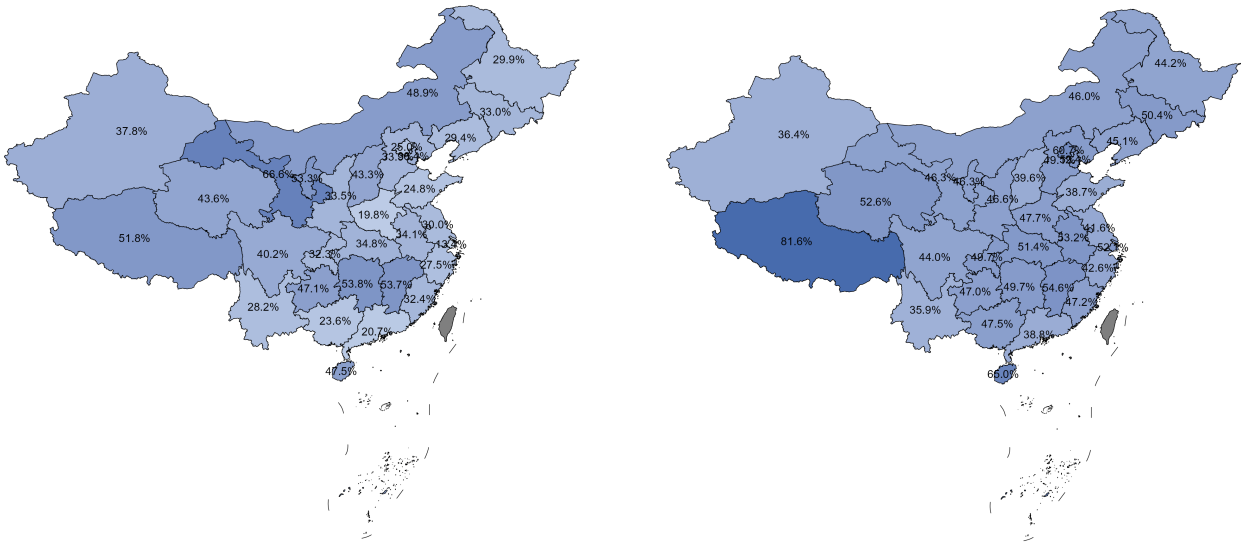
Notes: The figure shows the total value of public procurement contracts by type of government purchasing entity. Government types are classified based on the institutional affiliation of the contracting authority as reported in procurement announcements. Contract amounts are aggregated over the sample period 2013–2020 and plotted on a logarithmic scale. Data are drawn from the China Government Procurement Network (CGPN).

On the supply side, approximately 760,000 distinct firms appear as winning suppliers over this period, spanning nearly all major sectors. While most suppliers are small and

medium-sized private firms, a limited number of large enterprises—often state-affiliated—capture a disproportionate share of total procurement value. By industry, shown in Figure 1, wholesale and retail trade accounts for around 30 percent of suppliers by count, followed by construction, manufacturing, and professional and technical services.

Geographically, supplier participation is concentrated in economically advanced regions such as Guangdong, Shandong, Henan, Beijing, and Hebei, which together account for more than one-third of total contract value. This spatial distribution broadly mirrors underlying patterns of economic activity and firm density.

Figure 3: Cross-Province Transaction Amount Share



(a) Public Procurement (b) Trade

Notes: The maps report, for each province, the share of total transaction value that occurs with firms located in other provinces. Panel (a) restricts transactions to public procurement–related supplier–buyer links, while Panel (b) reports the corresponding measure for all firm-to-firm transactions based on VAT invoice data. Transaction shares are calculated using transaction amounts aggregated over the sample period 2013–2020. Darker shading indicates a higher degree of interprovincial integration.

To assess how procurement-induced demand shocks interact with production networks, we link procurement suppliers to the VAT-based firm transaction data and summarize cross-province transaction shares—the fraction of transaction value occurring between firms located in different provinces. Two facts emerge. First, cross-province integration is generally lower for procurement-related transactions than for overall trade. Coastal municipalities

and advanced provinces exhibit high interprovincial connectivity in both datasets, but procurement flows are typically more localized. Second, there is substantial provincial heterogeneity: some interior provinces display procurement integration comparable to or exceeding their general trade shares, while others show more localized procurement despite high trade connectivity.

These patterns indicate that public procurement constitutes a large but unevenly distributed source of firm-level demand, with limited interprovincial integration relative to general trade. The combined procurement–VAT dataset therefore provides a natural setting to study both the direct effects of procurement awards on winning firms and the indirect propagation of government demand shocks through production networks, which we analyze in the following sections.

2.3 Bid Winners, Runners-Up, and Observable Scoring Margins

A distinctive feature of the public procurement system in the focal Chinese province used for our auction-level analysis is the public disclosure of detailed evaluation outcomes for all qualifying bidders, rather than only for the winning firm. Procurement announcements typically report whether bidders pass qualification and compliance reviews, along with disaggregated scores for technical quality, business or service criteria, and price. These components are then aggregated into a total score that determines the final ranking. This institutional feature generates unusually rich micro-level information on competition within each procurement project and plays a central role in our empirical strategy.

Figure 4 presents an illustrative example from a provincial procurement auction. The table reports four bidders evaluated under a multi-dimensional scoring rule. Three bidders pass both the qualification and compliance reviews and receive numerical scores, while one bidder is eliminated at the qualification stage and receives no further evaluation. Among the remaining candidates, the winning firm ranks first with a total score of 89.64, followed by two runner-up firms with scores of 75.26 and 69.33, respectively.

Figure 4: Example Auction Results: Comparison Between Winner and Competing Firms

Bidder	Qualification Review	Compliance Review	Technical Score	Business Score	Price Score	Total Score	Ranking
Guangdong Provincial Radio & Television Network Co., Ltd. Yunfu Branch	Passed	Passed	46.67	13	29.97	89.64	1
Guangdong Huanke Technology Development Co., Ltd.	Passed	Passed	43.33	2	29.93	75.26	2
Xinxing County Integrated Energy Information Technology Consulting Service Center	Passed	Passed	37.33	2	30	69.33	3
Guangdong Shengmei Special Equipment Co., Ltd.	Failed	–	–	–	–	–	

Notes: The example is retrieved from the Provincial public procurement platform on December 21, 2021. For more details about this contract award notice, please see Appendix Figure A1.

Two features of the scoring structure are noteworthy. First, final rankings are driven by the aggregation of multiple components rather than by price alone. In this example, price scores are tightly clustered—ranging from 29.93 to 30—suggesting limited dispersion in bid prices among qualified firms. In contrast, technical and business scores exhibit substantially larger variation and account for most of the differences in total scores. The winning bidder outperforms its closest competitor by more than three points in the technical dimension alone, highlighting the central role of non-price criteria in determining contract allocation.

Second, the data make transparent the sharp distinction between winning firms and runner-up candidates. While all three qualified bidders meet formal eligibility requirements, the margin between the winner and the second-ranked firm is economically meaningful. Such margins are common in China's procurement data and imply that contract allocation often hinges on relatively small differences in composite scores rather than on large price undercutting. This feature is particularly relevant for understanding firm behavior, as it suggests that winning and losing bidders within the same auction are ex ante comparable along many observable dimensions yet face discrete differences in post-auction outcomes.

The systematic publication of winner–runner-up comparisons is unusual by international standards and provides a natural benchmark for evaluating firm-level responses to procurement outcomes. In our analysis, we exploit this structure by comparing firms that win procurement contracts with firms that lose within the same project. Because bidders

are evaluated under identical rules, face the same buyer, and compete for the same contract, differences in subsequent firm performance can be credibly attributed to winning the government demand shock rather than to underlying heterogeneity across firms or projects.

More broadly, these scoring records illuminate how public procurement allocates demand within production networks. Winning firms secure a discrete increase in guaranteed demand, while runner-up firms—despite often having similar prices and passing all formal reviews—receive no such boost. This institutional discontinuity underlies the identification strategy used in the paper and motivates our focus on contract awards as quasi-experimental demand shocks. By observing how winners and competitors diverge after the auction, and how these shocks propagate to their suppliers and customers, we can trace the microeconomic transmission of government demand through firm-to-firm linkages.

3 Data

3.1 Procurement Contract Data

We use two complementary sources of public procurement data: one at the national level and the other from a single province. The two datasets serve distinct analytical purposes. The national dataset provides comprehensive coverage for macro-level analysis and propagation exercises, while the provincial dataset offers detailed micro-level information on competition structures, allowing for causal identification.

The national procurement data are obtained from the China Government Procurement Network (CGPN), the official platform for disclosing public procurement information in China. As the transparency and scale of government procurement have expanded, data from this platform have become a crucial resource for academic and policy research, supporting studies on topics such as corporate innovation, poverty alleviation, and government-business relations (Beraja, Yang, and Yuchtman, 2023; Wei, Yuan, and Jiameng, 2025). Our analysis leverages a comprehensive dataset of contract announcements systematically collected from

this source, providing a robust empirical foundation to examine the dynamics of China's procurement market as governed by the Government Procurement Law (GPL, 2003).

The CGPN dataset contains 8,635,518 contract announcements covering the period 2013–2020. These records were compiled by scraping publicly available notices and parsing their content to extract key fields. The final structured dataset includes 24 variables per contract, encompassing information on procuring entities, suppliers, contract amounts, procurement types, and dates. This rich coverage enables detailed statistical analysis of procurement patterns—such as distributions across provinces and industries—and forms the basis for our national-level analysis of fiscal propagation.

The provincial procurement dataset is a comprehensive record of all publicly disclosed procurement activities from one province in China, spanning 2006 to January 2021. Building this dataset required addressing two major challenges arising from inconsistent reporting formats. First, the absence of standardized firm identifiers necessitated the development of a string-matching algorithm to link bidder names to unique firms in the official national registry. Second, the heterogeneity in scoring and evaluation formats required parsing thousands of tender documents to extract and standardize competition criteria and weights. The resulting database integrates information from four sources—procurement plans, public announcements, auction outcomes, including all bidders, prices, and scores, and contract quality checks. Owing to its detailed coverage of bidding and competition processes, this provincial dataset serves as the primary source for identifying the causal effects of procurement contracts on firm outcomes.

3.2 Firm-to-Firm Transaction Data and Supply Chain Linkage

To construct a detailed map of supply chain activity, we use comprehensive transaction-level data from China's value-added tax (VAT) system. This dataset provides unmatched scale and granularity, covering all firm-to-firm transactions among approximately 16 million VAT-paying firms from 2014 to 2018, representing more than 16 billion transaction links.

For 2017-2018, the data are exceptionally rich, containing the exact date, transaction value, product code, detailed product description, and unit price for each invoice.

The VAT records are linked to the national firm registry and the public procurement datasets described above. This linkage enables us to identify which firms in the VAT network are participants in government contracts—either as direct contractors or as their upstream or downstream trading partners. This integration allows for a precise characterization of how public procurement affects firms' supply chain positions and how fiscal demand propagates through inter-firm transactions to the broader economy.

One limitation of the VAT data is that it covers only firms that meet the statutory VAT registration threshold and therefore excludes the smallest non-VAT-paying enterprises.[1] While these micro firms constitute a large share of business counts, they account for a small fraction of aggregate sales and input transactions. As a result, the VAT dataset remains the most comprehensive and reliable source available for describing China's production network and tracing supply chain linkages at scale.

3.3 Firm Data

Administrative firm registration data. To construct an integrated firm-level database, we leverage a comprehensive repository of more than 280 million official Chinese business registration records. This dataset serves as the critical bridge that enables the linkage between procurement contracts and other administrative sources. A key challenge in our analysis is that the public procurement data do not contain standardized firm identifiers, making direct linkage impossible.

We address this by matching firm names and related attributes from the procurement records to entities in the national business registry. Through iterative string-matching and

[1] During most of our sample period, VAT registration applied only to small-scale taxpayers with monthly sales exceeding RMB 20,000 before May 2016 and RMB 30,000 (or RMB 90,000 quarterly) thereafter, according to the 2016 State Administration of Taxation Announcement No. 23. These thresholds primarily affected self-employed and micro businesses under the "small-scale taxpayer" regime. Such firms account for a large share of business counts but less than about 5% of total turnover.

normalization procedures, we assign a unique, persistent firm identifier to each supplier and procuring agency. This identifier serves as the master key for merging the procurement data with additional administrative datasets, including the value-added tax (VAT) transaction records and firm-level financial statements. This integration transforms multiple fragmented datasets into a unified panel, providing the foundation for analyzing the propagation of procurement shocks across firms and their supply chains.

Universe firm income tax settlement data 2014-2018. We supplement the transaction-level VAT records with administrative firm-level revenue data derived from annual Corporate Income Tax (CIT) filings in China, collected under the Provisional Regulations on Enterprise Income Tax and related rules. In this system, firms prepay CIT quarterly and reconcile at year-end through a "final settlement": taxpayers compute annual taxable income and total liability, net quarterly prepayments, and determine balances payable or refundable (refunds may be issued or credited to the next year). Coverage includes enterprises recognized by tax authorities as subject to audit-based assessment—with complete, standardized accounts—including wholly foreign-owned and joint-venture firms; filing is mandatory regardless of profits, losses, or tax-holiday status. By law, firms submit the CIT return and schedules together with year-end financial statements and a Certified Public Accountant audit report within four months after fiscal year-end, and settle any remaining tax within five months; extensions can be granted upon written application and approval. Consequently, the revenue measures analyzed here come from audited financial statements attached to the annual CIT filing and reflect reconciled, post-settlement values on a standardized reporting timeline.

We also cross-validate the Firm Income Tax Settlement Data (2014-2018) against findings from a longer-period universe firm inspection.

Firm inspection 2010-2020. According to the Chinese government regulation, local SAIC offices require all firms to report their financial information annually for the purposes of an inspection procedure to ensure that firms are operating normally and running

businesses legally. Failure to report the information to SAIC for two consecutive years would result in the cancellation of the firm's license to operate. SAIC collected this information manually in the early years of the system, and the government began to collect the data digitally after 2010. The inspection information includes firm's assets, liabilities, total sales, total profit, net profit, and total taxes.

Our SAIC dataset has two unique features. First, it tracks the firm registration and performance for a very long period; second, our firm registration data contains unique identifiers for the main shareholders and legal representatives of each firm, which allows us to trace the entrepreneurial history and extract basic demographic information.

The dataset includes a rich set of variables such as employments, wage bills, revenues, profits, assets, liabilities, and equity, reported according to the national tax accounting framework. Because submission of the income tax return is mandatory for all VAT-registered and most registered enterprises, coverage is exceptionally broad, encompassing both manufacturing and service firms of all ownership types.

We link these financial records to the unified firm identifiers established from the registration and VAT datasets, producing a balanced firm-level panel that tracks each company's financial and employment outcomes over time. These data provide the basis for evaluating the direct impact of public procurement contracts on firm performance—such as revenue, and profitability—and for tracing the propagation of procurement-induced shocks through the broader production network.

Firm Productivity Data. To measure firm productivity and related performance indicators, we use The National Tax Survey Data 2007-2020 contains hundreds of specific data points for each enterprise, drawn from their annual reports and tax filings. The survey includes a massive number of enterprises. For instance, the 2007 dataset contained over 300,000 firms, while the datasets from 2008 to 2016 each cover approximately 600,000 to 700,000 enterprises annually. It contains rich information on a) Value-Added Tax (VAT)

and VAT export rebates; b) Corporate Income Tax returns; c) Other Major Taxes such as consumption tax, business tax, property tax, and land use tax; d) Corporate Financial Statements, providing a full picture of a firm's financial health; e) Specialized Data, such as information related to environmental protection fees and taxes.

4 Firm-Level Impacts of Public Procurement

Public procurement represents one of the most direct channels through which fiscal policy interacts with the real economy. When a firm wins a government contract, the resulting inflow of public demand can act as a sudden, exogenous shock to its production capacity, employment, and financial position. Understanding how firmboth the DID and event-study estimations show no statistically significant results, we report only the graphical representations for completeness.both the DID and event-study estimations show no statistically significant results, we report only the graphical representations for completeness.s respond to such demand shocks is critical for assessing both the microeconomic effects of procurement and its aggregate implications for fiscal transmission.

This section begins by quantifying the direct impacts of winning a procurement contract on firm outcomes. Specifically, we examine how an award affects firm performance, measured by output, employment, and profits. These analyses provide the foundation for understanding how procurement-induced shocks propagate through supply chains and contribute to broader economic activity.

4.1 Empirical Strategy

We construct a procurement-centered panel at the firm–project–time level to identify the causal effects of contract awards. For each procurement project p, we observe all participating bidders, including both winners and non-winners, and expand the unit of observation to project $p \times$ firm $i \times$ period t, stacking these project–firm panels from January 2014 to

December 2018. For analyses of firms' accounting performance, we merge this panel with annual income tax settlement data and tax-report data. For transaction-based analyses, we link the same project–firm panel to a firm–month and firm-year dataset of purchasing and selling transactions derived from VAT records.

For each firm i in project p, we define event time relative to the period in which the firm first wins a public procurement contract. To avoid confounding effects from repeated exposure, we focus on the first winning event for each firm. The control group consists of firms that bid in the same project but did not win, providing a natural counterfactual for estimating causal impacts.

We then estimate how winning a procurement contract affects firms' outcomes using a difference-in-differences framework. The underlying logic is straightforward: within each procurement project, all participating firms compete for the same contract under identical rules, timing, and buyer demand. This setup allows us to compare the post-award performance of winning firms to that of losing bidders who serve as close counterfactuals. The assumption is that, absent the award, both groups would have followed parallel trends in key outcomes such as output, employment, and profits. In this context, the procurement award functions as a plausibly exogenous demand shock that differentially affects only the winners.

Formally, we estimate:

$$y_{ipt} = \beta \left(Winner_{ip} \times After_{Tp} \right) + \delta \, Winner_{ip} + \alpha_i + \alpha_p + \alpha_t + \alpha_{Tp} + \epsilon_{ipt}, \tag{1}$$

where y_{ipt} denotes a firm-level outcome related to performance, purchasing, or sales. The term $Winner_{ip}$ indicates whether firm i won project p, and $After_{Tp}$ is an indicator for relative time within the project p. The coefficient β captures the average treatment effect of winning a procurement contract. Firm fixed effects (α_i) absorb all time-invariant firm characteristics such as productivity or management quality; project fixed effects (α_p) account for unobserved heterogeneity across tenders; and time fixed effects (α_t) control for macroeconomic and

seasonal fluctuations common to all firms.

The validity of this design hinges on a parallel-trends assumption—that winners and non-winners within a given project would have exhibited similar dynamics in the absence of the contract. This assumption is plausible in our setting because all bidders face identical project specifications, procurement criteria, and timing, and the competitive bidding process reduces concerns that short-term firm shocks drive the award outcome. The identification thus relies on within-project contrasts in the timing of fiscal demand exposure.

To trace the dynamic adjustment path, we also estimate an event-study specification:

$$y_{ipt} = \sum_{j=J_{\min}, j\neq -1}^{J_{\max}} \gamma_j \, \mathbb{1}\{Time\text{-}to\text{-}Win_{ip} = j\} + \alpha_i + \alpha_p + \alpha_t + \epsilon_{ipt}. \tag{2}$$

Here, γ_j captures the change in outcome y_{ipt} relative to the year (or quarter) of the contract award, with $j = -1$ as the reference period. The estimated coefficients provide two pieces of information: (i) whether pre-trends are flat, which serves as a validity test for the DiD design, and (ii) whether post-award effects persist, fade, or amplify over time. We estimate Equation 2 at annual frequency for accounting outcomes ($J_{\min} = -3$, $J_{\max} = 3$) and at quarterly frequency for transaction outcomes ($J_{\min} = -4$, $J_{\max} = 4$).[2]

4.2 Firm Performance: Output, Employment, and Profits

We begin by assessing how public procurement contracts affect firms' real and financial performance. Using the empirical strategy outlined in the previous section, we estimate how outcomes evolve before and after a firm's first contract win. The dependent variable y_{ipt} represents firm i's performance measure in year t associated with project p. We focus on three key outcomes that capture different dimensions of firm activity: operating revenue, total profit, and employment.

Figure 5 summarizes the estimated dynamic effects from the event-study model. Panel (a)

[2] All outcome variables are winsorized at the 5th and 95th percentiles to mitigate the influence of reporting errors or extreme outliers.

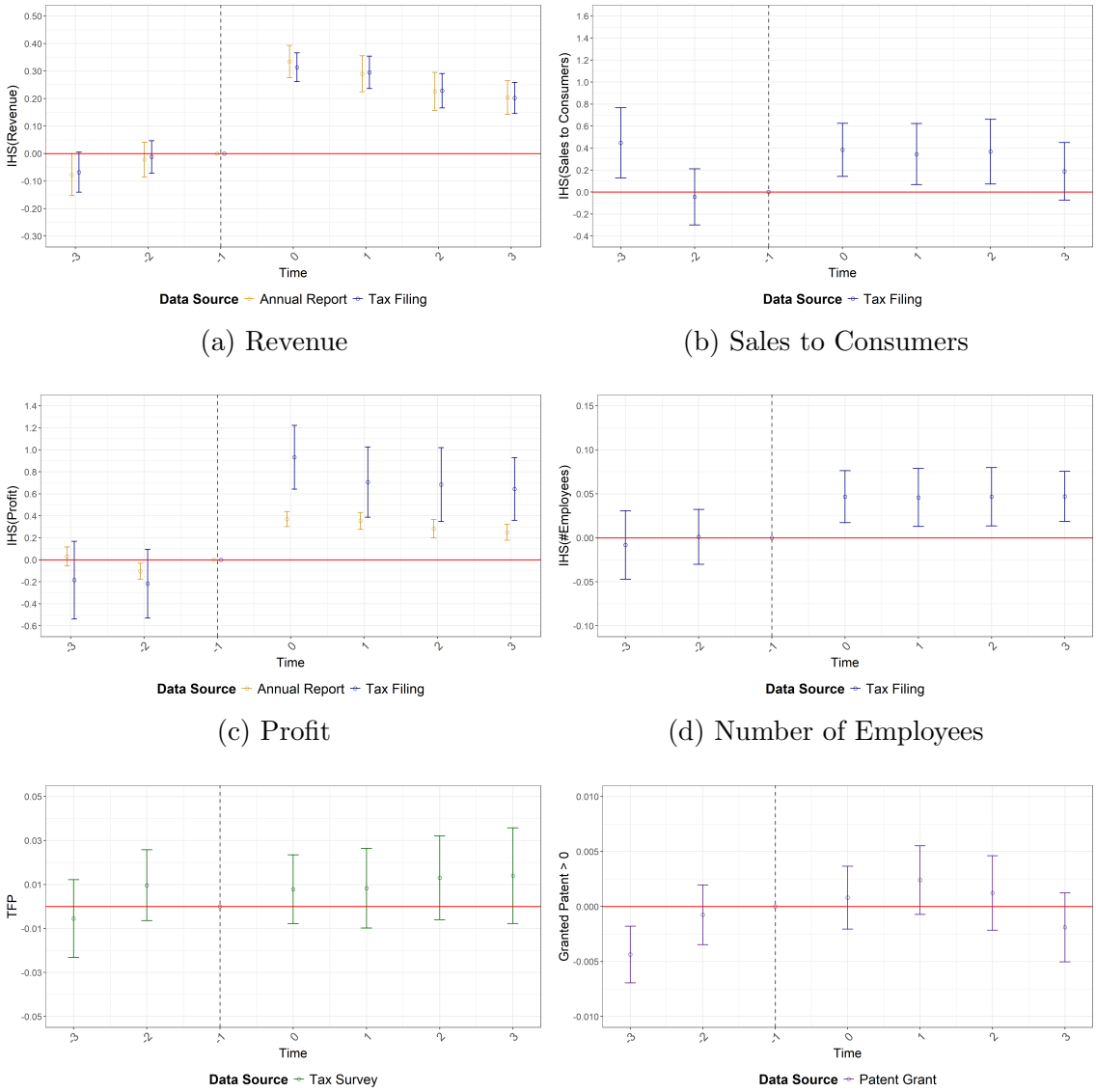
shows a sharp increase in operating revenue in the year of the contract award, rising by roughly 31% in the Tax Filing data and 33% in the Annual Report data. This consistency across two independent administrative sources underscores the robustness of the results. The revenue effect gradually declines over the following two to three years, suggesting that procurement generates a substantial but transitory boost in firm sales. This pattern is consistent with the nature of most public procurement projects, which are time-limited and tied to specific government contracts rather than recurring orders.

Panel (b) further reports the dynamic response of firms' sales to final consumers, constructed as operating revenue reported in the tax filing data minus total business-to-business sales recorded in the VAT transaction data. In contrast to the persistent increase in total operating revenue, sales to consumers exhibit a more short-term response following the contract award. Consumer-facing sales increase by about 38% in the year of the contract award and gradually diminish over the subsequent years, fading by the third year after the award. Taken together, the evidence indicates that the persistent effects of government procurement are more likely to arise from adjustments in firms' production networks than only from lasting increases in consumer demand.

Panel (c) turns to profitability. Because approximately 21% of firm year observations report negative profits, we use the inverse hyperbolic sine transformation and focus on the sign and persistence of the estimated effects rather than their precise magnitudes. We find a positive and statistically significant response in the first post award year across both the tax filing and annual report data. The effect remains positive in subsequent years in the tax data, suggesting that procurement exposure is associated with sustained improvements in profitability beyond the immediate contract period.

Panel (d) examines employment responses. The number of employees increases by about 4% in the year of the award, suggesting that firms expand capacity to fulfill government contracts. The increase remains broadly stable over the next three years, indicating that firms maintain a larger workforce even after the project's completion. Together, these findings sug-

Figure 5: Direct Effects of Winning Public Contract on Firm Performance



(a) Revenue

(b) Sales to Consumers

(c) Profit

(d) Number of Employees

(e) TFP

(f) Indicator for Any New Granted Patent

Notes: The event-study specification includes fixed effects for public procurement project, firm, calendar year, and event time (year relative to the award). Standard errors are clustered at the firm level. Blue, yellow, green, and purple bars represent firm performance measures based on the Tax Filing, Annual Report, Tax Survey, and Patent Grant data, respectively. For the Tax Survey data, we include city and sector fixed effects instead of firm fixed effects,due to the survey sample is not balanced across years.

gest that public procurement serves as a meaningful fiscal stimulus at the firm level—raising output and profits in the short run and strengthening employment in the medium term.

Panels (e) and (f) examine total factor productivity (TFP) and innovation, measured

by whether a firm obtains any new granted patent in a given year. The estimates for both outcomes are close to zero and statistically insignificant, suggesting no clear evidence that public procurement improves firms' production efficiency or innovation outcomes.

Overall, the results provide clear evidence that procurement contracts have tangible effects on firm performance. The close alignment of estimates across two independent datasets—one based on official tax filings and the other on annual reports—further reinforces the credibility of the findings. This dual-source validation reduces concerns about measurement errors and confirms that procurement-induced demand translates into real production and income gains among suppliers.

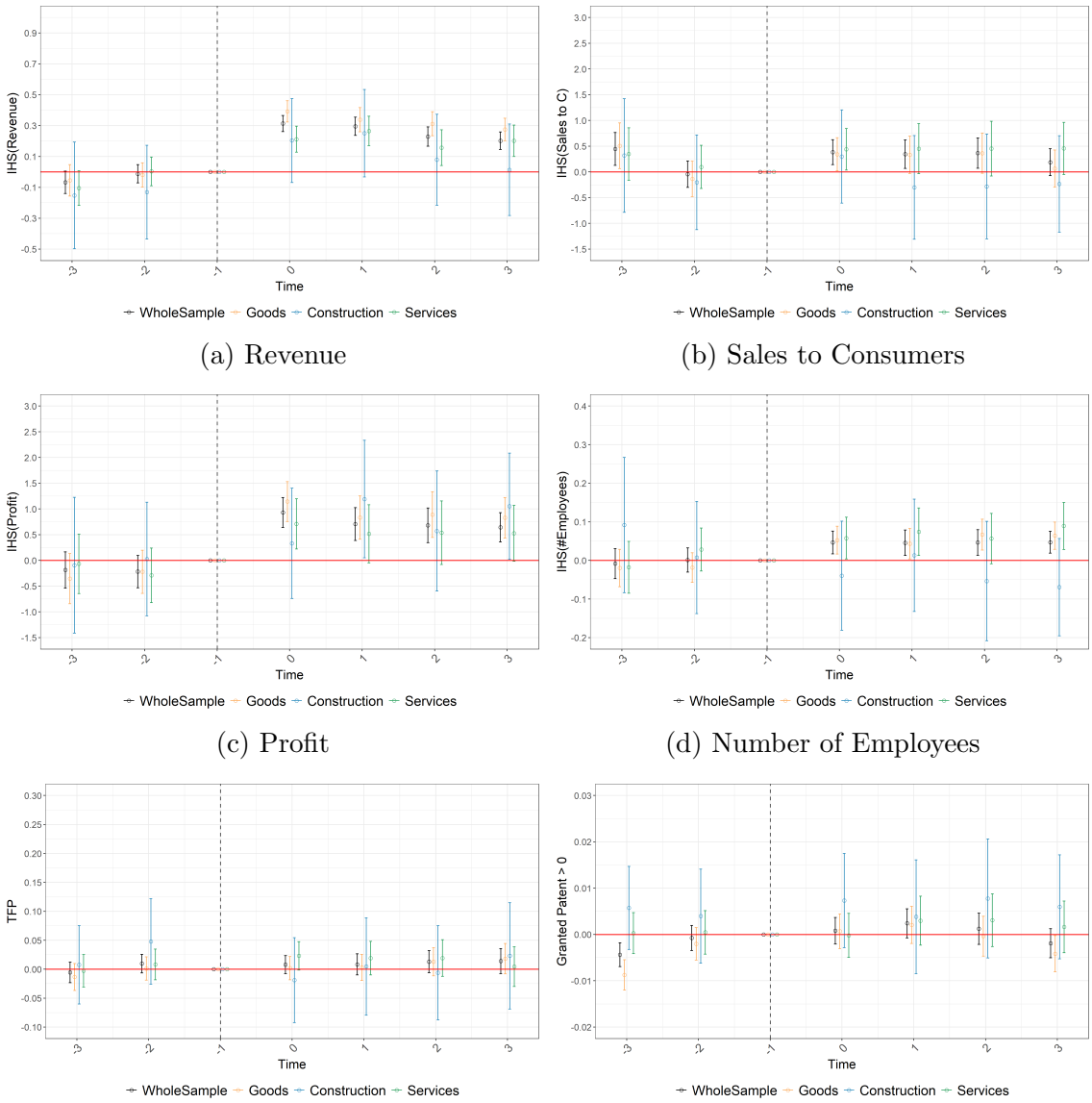
4.3 Heterogeneity in Firm-level Impacts

We explore heterogeneity in the direct and upstream effects of government procurement along two dimensions: the content of the procurement project and the type of procuring entity. This decomposition sheds light on whether the magnitude, timing, and persistence of firm-level responses and upstream spillovers vary systematically with the nature of procurement demand.

Differences across procurement content are illustrated in Figures 6 and 10, which report event-study estimates separately for goods, construction, and services contracts. Among these categories, goods procurement is associated with relatively stronger increases in operating revenue and profits. These effects emerge shortly after contract award and fade gradually over time. Services procurement, in contrast, displays more pronounced responses along the employment margin and generates clearer and more persistent upstream spillovers, including sustained increases in purchasing amounts and the number of suppliers. This pattern is consistent with the labor-intensive and coordination-heavy nature of service provision, which relies more heavily on fragmented input sourcing and subcontracting relationships.

Construction projects, by comparison, exhibit weaker and less systematic responses across both firm performance and upstream outcomes. Although point estimates are often

Figure 6: Effects on Firm Performance: Different Types of Procurement Project



(a) Revenue

(b) Sales to Consumers

(c) Profit

(d) Number of Employees

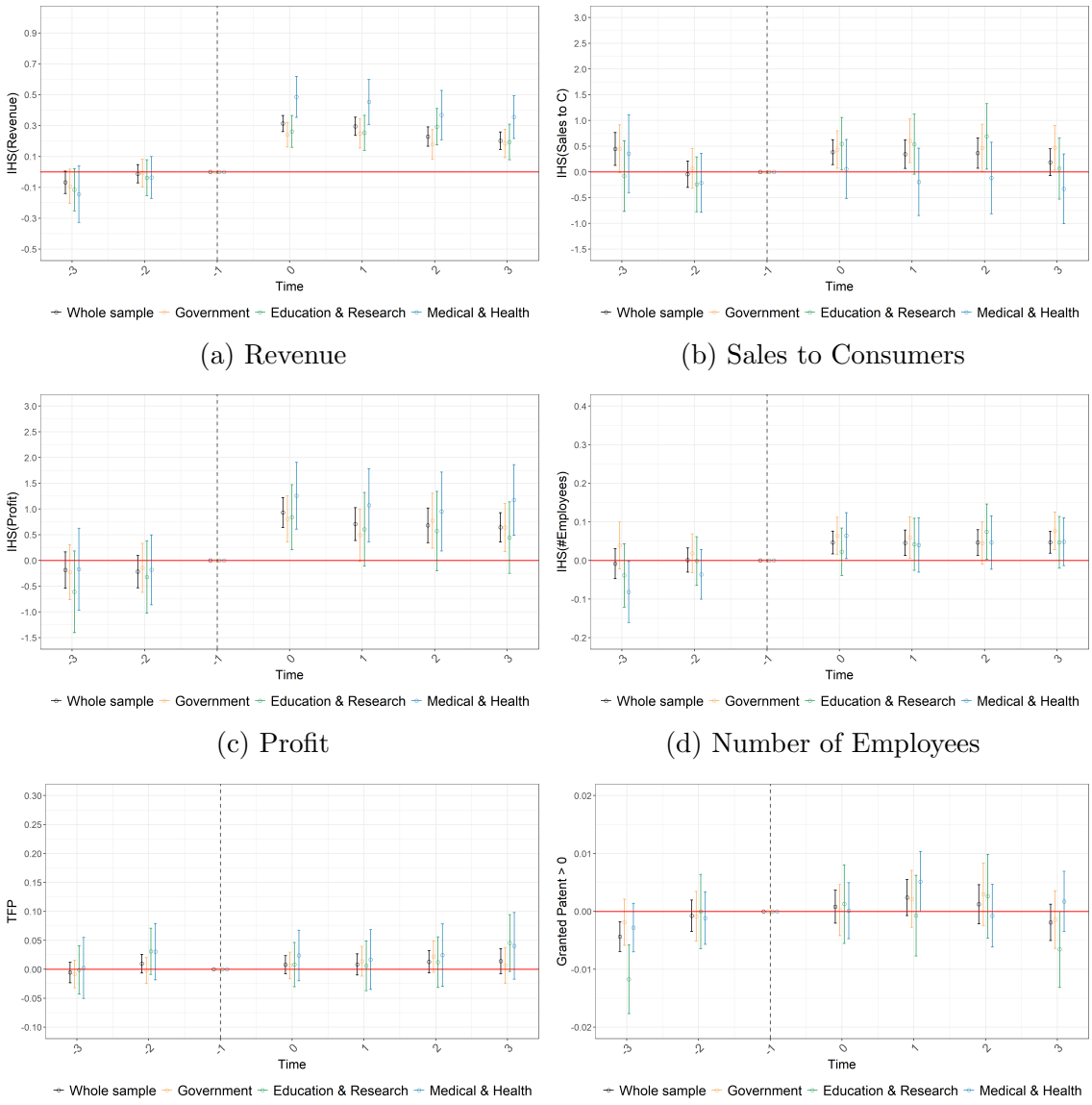
(e) TFP

(f) Indicator for Any New Granted Patent

Notes: The event-study specification includes fixed effects for public procurement project, firm, calendar year, and event time (year relative to the award). Standard errors are clustered at the firm level. Black lines correspond to the full sample. Yellow, blue, and green lines correspond to goods, construction, and services procurement projects, respectively. For the Tax Survey data, we include city and sector fixed effects instead of firm fixed effects,due to the survey sample is not balanced across years.

positive, they are generally imprecise and statistically indistinguishable from zero throughout the post-award period. This muted response likely reflects the lumpy and project-specific nature of construction activity, where procurement contracts may substitute for other projects

Figure 7: Effects on Firm Performance: Different Types of Procuring Entities



(a) Revenue

(b) Sales to Consumers

(c) Profit

(d) Number of Employees

(e) TFP

(f) Indicator for Any New Granted Patent

Notes: The event-study specification includes fixed effects for public procurement project, firm, calendar year, and event time (year relative to the award). Standard errors are clustered at the firm level. Black lines correspond to the full sample. Yellow, blue, and green lines correspond to procurement projects conducted by government entities, medical and health institutions, and education and research institutions, respectively. For the Tax Survey data, we include city and sector fixed effects instead of firm fixed effects,due to the survey sample is not balanced across years.

rather than inducing net expansions in firm activity or supplier networks.

A complementary source of heterogeneity arises from differences in the type of procuring entity. Figures 7 and 11 present event-study estimates for procurement conducted by gov-

ernment agencies, education and research institutions, and medical and health institutions.

Across outcomes, procurement by medical and health institutions stands out as generating the largest and most persistent firm-level responses, particularly in operating revenue, profitability, and innovation. These gains are accompanied by pronounced upstream spillovers, including sustained increases in purchasing activity and supplier linkages. Notably, the stronger revenue effects are not driven by higher sales to final consumers. Instead, they coincide with improved profitability and expanded input sourcing, suggesting that medical and health procurement activates production through complex supply chains rather than through retail-oriented demand.

Procurement by education and research institutions also leads to meaningful upstream expansion, especially along the supplier-count margin, consistent with their reliance on specialized inputs and project-based sourcing. In contrast, procurement by general government agencies produces more modest and short-lived effects across both firm performance and upstream outcomes, with estimates typically smaller and less persistent than those observed for medical and health procurement.

The heterogeneity patterns documented above are robust to alternative samples and identification checks. In Appendix Figure A3, we show that restricting the analysis to high-amount procurement contracts yields qualitatively similar dynamics for both firm-level outcomes and upstream purchasing responses. In addition, when limiting the sample to projects predicted to be competitively allocated based on corruption-risk measures from Chen (2023), shown in Appendix Figure A5, the direct firm-level effects are also similar. These robustness exercises suggest that the heterogeneous responses documented here reflect real differences in production structure and input dependence across project and buyer types, rather than being driven by low-value contracts or preferential allocation.

4.4 Past Procurement Experience and Current Participation

To understand why government procurement generates persistent effects on firms' performance, purchasing, and sales, we examine whether firms' success in procurement themselves exhibit persistence over time. We estimate firm–month–level regressions relating firms' current bidding and winning behavior to their prior procurement experience. Specifically, we regress indicators for whether a firm bids for or wins any government procurement contract in a given month on indicators for whether the firm has ever won a procurement contract within the past three years, one year, or six months.

Table 1: Past Procurement Experience and Current Bidding and Winning

	Winning			Bidding		
	(1)	(2)	(3)	(4)	(5)	(6)
Ever Won (Past Three Years)	0.002***			0.011***		
	(0.000)			(0.000)		
Ever Bid (Past Three Years)	0.020***			0.051***		
	(0.000)			(0.001)		
Ever Won (Past One Year)		0.006***			0.035***	
		(0.000)			(0.000)	
Ever Bid (Past One Year)		0.036***			0.066***	
		(0.001)			(0.001)	
Ever Won (Past Six Months)			0.010***			0.055***
			(0.000)			(0.001)
Ever Bid (Past Six Months)			0.042***			0.062***
			(0.001)			(0.001)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Calendar Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Mean of dependent variable	0.012	0.012	0.012	0.040	0.040	0.040
Observations	10,035,515	10,035,515	10,035,515	10,035,515	10,035,515	10,035,515

Notes: This table reports firm–month–level regressions examining how past government procurement experience affects firms' current bidding and winning behavior. The dependent variables are indicators for whether a firm bids for or wins any government procurement contract in a given month. The key independent variables are indicators for whether the firm has ever bid for or won a government procurement contract within the past 3 years, 1 year, or 6 months prior to the current month. All regressions include firm fixed effects and calendar time fixed effects. Standard errors are clustered at the firm level.

Table 1 documents substantial persistence in firms' participation and success in government procurement markets. Firms with prior procurement experience are significantly more likely to both bid for and win government contracts in subsequent months.

Past bidding experience exhibits particularly large effects on firms' current participation. Coefficients are generally larger for shorter lookback windows, indicating that more recent procurement experience is more strongly associated with current outcomes. For example, firms that have bid within the past six months are about 6.2 percentage points more likely to bid again in a given month, relative to a baseline bidding probability of 4.0 percent. Similarly, firms that have won a procurement contract within the past six months are about 4.2 percentage points more likely to bid again, compared to a mean monthly winning probability of 1.2 percent.

4.5 Public Procurement versus Private Demand Shocks

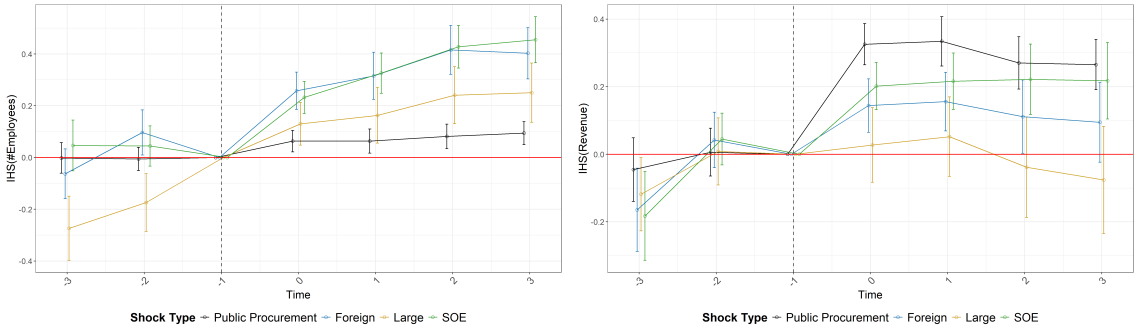
To put the magnitude of procurement-induced firm responses into perspective, we benchmark them against other economically salient demand shocks that arise from firms' integration into major production networks. Specifically, we compare the effects of winning a public procurement contract to those associated with becoming a supplier to state-owned enterprises, multinational corporations, and large domestic firms.

A central challenge in making such comparisons is that procurement awards and private supply-chain relationships are selected through very different processes. To ensure comparability, we adopt a unified event-study framework that mirrors the procurement design as closely as possible. For each shock type, we construct competition-based comparison groups in which only one firm receives the treatment.

For public procurement, the treated firm is the contract winner, while the control firms are runner-up bidders who narrowly lost the same auction. For private supply-chain shocks, we identify settings in which a single firm begins supplying a large buyer, such as SOE, MNC, or large domestic firm, and we compare it to other firms competing for the same buyer relationship but not selected. This design aligns treated and control firms along observable market opportunities and demand conditions, allowing the dynamic responses to be interpreted on a comparable scale.

All outcomes are normalized to the year prior to treatment, and the event-study coefficients trace relative changes over time in employment and revenue.

Figure 8: Benchmarking Procurement Shocks against Supply-Chain Entry to Large Buyers



(a) Number of Employees (b) Revenue

Notes: The event-study specification includes fixed effects for public procurement project, firm, calendar month, and month relative to the event time. Standard errors are clustered at the firm level.

Figure 8a compares employment dynamics across shock types. Winning a public procurement contract leads to a modest but persistent increase in employment, on the order of 5% over the medium term. In contrast, integration into private production networks, particularly through SOEs and foreign firms, generates substantially larger employment expansions. Employment rises by more than 30% within two to three years for firms supplying SOEs or MNCs, while supplying large domestic firms produces intermediate effects.

These differences reflect the distinct nature of the underlying demand shocks. Procurement contracts are typically project-based and time-limited, leading firms to expand capacity cautiously. By contrast, supplying large private buyers often entails long-term, repeat transactions that justify sustained workforce expansion.

Figure 8b presents analogous patterns for operating revenue. Public procurement generates an immediate and sizable revenue increase—around 20–25% in the award year—followed by gradual attenuation. Revenue gains associated with SOE and foreign buyer relationships are similarly large on impact but display greater persistence over time. Firms supplying large domestic buyers again lie between these extremes.

Notably, the revenue response to procurement is comparable in magnitude to entry

into major private supply chains in the short run, underscoring that public procurement constitutes a quantitatively meaningful demand shock. The key difference lies in persistence: private buyer relationships tend to anchor firms more durably within production networks.

Taken together, these comparisons highlight that public procurement shocks are economically large, though structurally distinct from private supply-chain integration. Procurement operates as a powerful but temporary demand impulse, while relationships with SOEs, multinationals, and large firms function more like long-term network attachments. The fact that procurement-induced employment and revenue responses are nontrivial even relative to these private benchmarks reinforces the interpretation of public procurement as a significant channel through which fiscal policy affects firm behavior.

Importantly, this exercise is not intended to establish causal rankings across shock types. Instead, it provides an economically intuitive scale against which the effects of procurement can be evaluated, helping to contextualize the magnitude of the firm-level and network responses documented throughout the paper.

5 Indirect Effects: Spillovers Along the Supply Chain

The previous section establishes that winning a public procurement contract generates substantial direct effects on recipient firms, leading to sharp increases in output, employment, and employment. These firm-level responses confirm that procurement contracts operate as meaningful demand shocks at the micro level. However, focusing exclusively on contract winners provides only a partial view of the economic impact of public procurement.

In this section, we examine how procurement-induced demand shocks propagate upstream through production networks. When winning firms expand production to fulfill government contracts, they must adjust their input sourcing, potentially reorganizing supplier relationships and transmitting demand to upstream firms. We study this propagation in three steps: first, by documenting how procurement winners adjust their purchasing behav-

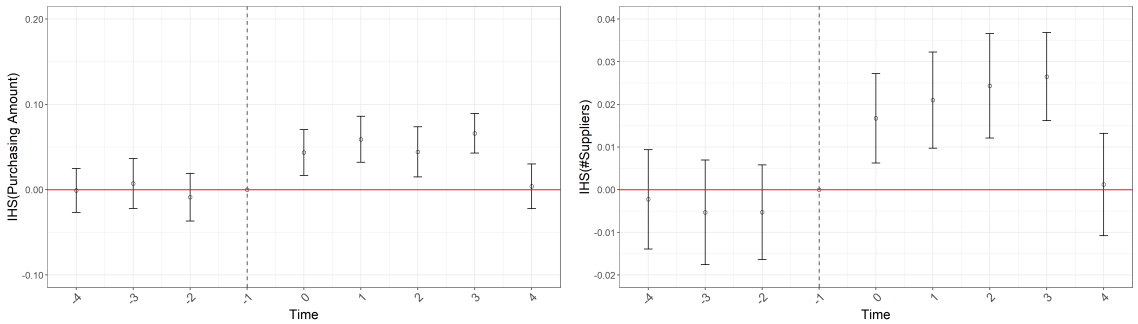
ior; second, by assessing how these adjustments reshape the composition of their supplier base; and third, by quantifying performance responses among upstream firms exposed to buyers' procurement wins.

5.1 Upstream Purchasing Responses to Procurement Wins

When a firm wins a government procurement contract, it must expand production capacity to meet the contracted demand. Doing so requires additional intermediate inputs and coordination with upstream suppliers, generating a direct channel through which procurement-induced demand shocks can propagate through production networks. In this subsection, we document how winning firms adjust their purchasing behavior following contract awards, providing the first step in understanding upstream propagation.

We begin by examining how winning a public procurement contract affects firms' aggregate input purchases and the breadth of their supplier base. In the event-study specification described in Equation 1, the outcome variable y_{ipt} now captures either the logarithm of quarterly purchasing amounts or the logarithm of the number of distinct suppliers. These measures correspond, respectively, to the intensive and extensive margins of upstream expansion.

Figure 9: Upstream Effects of Winning Public Contracts



(a) Purchasing Amount (b) Number of Suppliers

Notes: The event-study specification includes fixed effects for procurement project, firm, calendar quarter, and event quarter. Standard errors are clustered at the firm level.

Figure 9 summarizes the main results. Panel (a) shows that total input purchases increase sharply following contract award, rising by approximately 4–7% in the first three quarters after the event. The effect is strongest immediately after the award and gradually dissipates by the fourth quarter, indicating a pronounced but transitory expansion in upstream demand. This pattern is consistent with front-loaded input procurement as firms ramp up production to meet project-specific requirements.

Panel (b) documents changes in the number of suppliers, capturing firms' in-degree within the production network. We find a modest but statistically significant increase of around 2%, suggesting that procurement wins lead firms to temporarily broaden their supplier base. Taken together, these results indicate that procurement contracts induce both deeper engagement with existing suppliers and limited expansion along the extensive margin, activating upstream firms through increased input demand.

We next examine whether upstream purchasing responses vary across different types of procurement projects. Figure 10 reports event-study estimates separately for goods, construction, and services contracts.

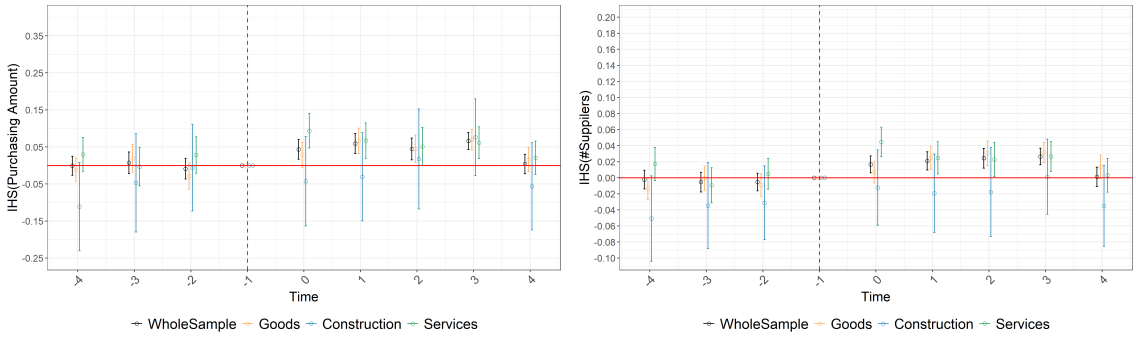
The expansion in purchasing amounts is strongest for construction and services projects, which typically involve complex production processes and rely heavily on subcontracting and intermediate inputs. These projects also exhibit larger increases in the number of suppliers, consistent with greater coordination needs and more fragmented supply chains. By contrast, goods procurement shows more muted responses along both margins, reflecting the more standardized nature of inputs and production.

This heterogeneity highlights that the strength of upstream propagation depends on the nature of the procurement project itself. Projects that are more input-intensive and less standardized generate larger and more diversified upstream demand shocks.

We then explore heterogeneity across types of procuring entities. Figure 11 compares upstream responses for contracts awarded by government agencies, medical and health institutions, and education and research institutions.

We find that procurement conducted by medical and health institutions generates the largest and most persistent increases in both purchasing amounts and supplier counts. Education and research institutions also induce significant upstream expansion, while procurement by general government agencies shows comparatively smaller effects. These differences likely reflect variation in project scale, technical requirements, and the degree of input specialization across procuring entities.

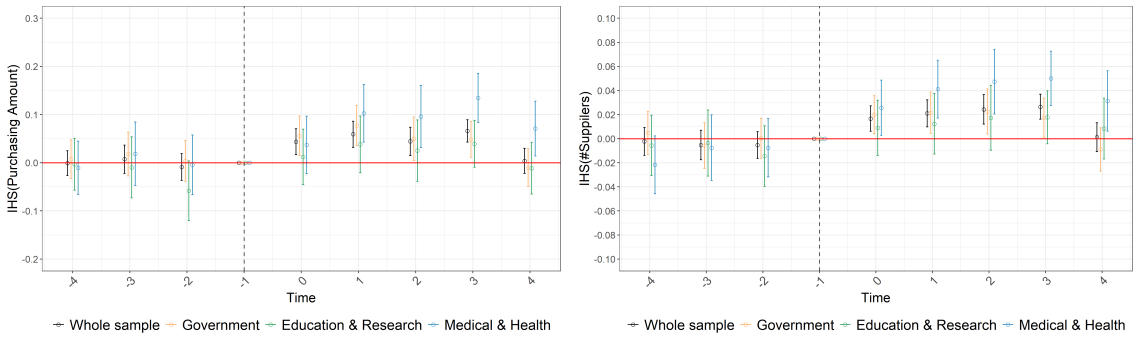
Figure 10: Upstream Effects: Different Types of Procurement Project



(a) Purchasing Amount (b) Number of Suppliers

Notes: The event-study specification includes fixed effects for procurement project, firm, calendar month, and event month. Standard errors are clustered at the firm level. Black lines correspond to the full sample. Yellow, blue, and green lines correspond to goods, construction, and services procurement projects, respectively.

Figure 11: Upstream Effects: Different Types of Procuring Entities



(a) Purchasing Amount (b) Number of Suppliers

Notes: The event-study specification includes fixed effects for procurement project, firm, calendar time, and event time. Standard errors are clustered at the firm level. Black lines correspond to the full sample. Yellow, blue, and green lines correspond to procurement projects conducted by government entities, medical and health institutions, and education and research institutions, respectively.

The evidence in this subsection establishes that procurement wins lead firms to expand upstream input sourcing along both the intensive and extensive margins, though the magnitude and persistence of these responses vary across project and buyer types. These buyer-side adjustments provide the necessary conditions for upstream propagation: procurement-induced demand shocks first manifest as changes in winners' purchasing behavior, which then reshape supplier relationships and transmit demand to upstream firms.

5.2 Supplier Selection versus Incumbent Supplier Performance

The expansion in purchasing activity documented in the previous subsection shows that procurement wins generate sizable upstream demand. An immediate implication is that suppliers connected to winning firms may experience improved average outcomes. However, such improvements can arise through two distinct mechanisms. First, incumbent suppliers may grow as a result of increased orders from winning buyers. Second, buyers may actively reconfigure their supply chains, reallocating purchases toward larger or more productive suppliers. Distinguishing between these channels is crucial for interpreting upstream propagation and for assessing whether procurement shocks translate into broad-based supplier growth or primarily operate through supplier selection.

To examine this distinction, we adopt a buyer-centered approach that summarizes the performance of upstream firms supplying to procurement winners. Specifically, we estimate Equation 3, where the dependent variable captures the purchase-weighted average performance of all suppliers connected to firm i at time t:

$$\text{Weighted Performance}_{ipt} = \beta\,(\text{Winner}_{ip} \times \text{After}_{tp}) + \delta\,\text{Winner}_{ip} + \alpha_i + \alpha_p + \alpha_t + \epsilon_{ipt} \quad (3)$$

The outcome variable $\text{Weighted Performance}_{ipt}$ aggregates supplier outcomes using transaction-level purchase shares, so that suppliers accounting for a larger fraction of a buyer's inputs

receive greater weight. Formally, for buyer i in year t,

$$\text{Weighted Performance}_{it} = \sum_j \frac{\text{Purchase}_{ijt}}{\text{Total Purchase}_{it}} \times \text{Performance}_{jt} \tag{4}$$

where Purchase_{ijt} denotes buyer i's purchases from supplier j, and Performance_{jt} measures supplier j's outcome in year t.

This construction summarizes the average performance of the supplier portfolio from the buyer's perspective, weighting suppliers by their economic importance in the input mix. Changes in the weighted average can therefore arise either because incumbent suppliers improve their own performance or because buyers reallocate purchases toward different, higher-performing suppliers. The coefficient β captures the net upstream response to procurement-induced demand shocks through both channels.

To isolate the role of supplier selection, we construct an alternative performance index that fixes suppliers' outcomes at their pre-treatment levels. Specifically, we replace contemporaneous supplier performance with performance measured in the baseline year 2014:

$$\text{Weighted Baseline Performance}_{it} = \sum_j \frac{\text{Purchase}_{ijt}}{\text{Total Purchase}_{it}} \times \text{Performance}_{j,2014} \tag{5}$$

By holding supplier performance constant at its 2014 value, this measure captures changes in the composition of suppliers rather than changes in suppliers' own productivity. Comparing estimates based on contemporaneous and baseline-weighted performance therefore allows us to assess whether improvements in average upstream outcomes are driven primarily by buyer re-sorting or by within-supplier growth.

We begin by estimating the effect of buyers' procurement wins on the average performance of their upstream suppliers using Equation 3. Table 2 reports the results.

In Panel A, where the dependent variables are constructed using suppliers' contemporaneous performance, we find that a buyer's contract win is associated with a 5.3% increase in suppliers' revenue, while the effects on profit and employment are positive but statistically

insignificant. The estimated effect on weighted supplier TFP is close to zero and statistically insignificant, indicating no clear evidence of improvements in suppliers' productivity in the short run. In contrast, Column (5) shows that procurement wins are associated with a statistically significant increase in the likelihood that at least one supplier obtains a new patent.

In Panel B, we replace suppliers' contemporaneous outcomes with their fixed 2014 performance levels to capture changes in the composition of suppliers rather than changes in suppliers' own outcomes. The estimated effects remain positive and statistically significant across revenue, profit, and employment, with magnitudes around 5%. The effect on weighted TFP remains close to zero and statistically insignificant. Meanwhile, the innovation effect remains positive and statistically significant, with a magnitude similar to that in Panel A.

These results indicate that the upstream expansion documented in the previous subsection operates largely through supplier reallocation. While procurement wins are associated with higher revenue among connected suppliers in the short run, there is limited evidence of contemporaneous improvements in suppliers' profitability, employment, or productivity. In contrast, baseline estimates reveal significant increases across all performance measures, indicating that winning firms shift input purchases toward suppliers that were ex ante larger and more profitable, and toward supplier networks with a higher likelihood of innovation. The contrast between contemporaneous and baseline results suggests that changes in the composition of suppliers, rather than immediate performance gains among incumbent suppliers, account for most of the observed improvement in average upstream outcomes following procurement wins.

Additional evidence in support of supplier reallocation is provided by Figure 12, which traces the evolution of supplier overlap between winning and losing firms within the same procurement project. Following contract allocation, the number of shared suppliers declines steadily, indicating that winners and runners-up increasingly rely on distinct sets of upstream partners. This pattern suggests that procurement wins are accompanied by active recon-

Table 2: Indirect Effect: Measured by Weighted Suppliers' Performance

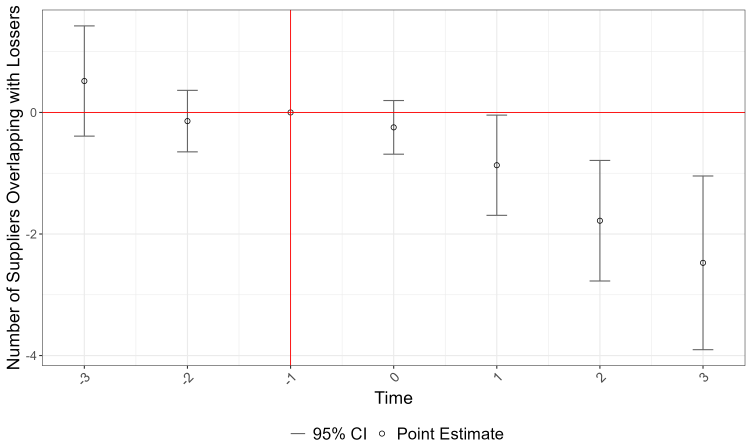
	IHS(Revenue) (1)	IHS(Profit) (2)	IHS(#Employees) (3)	TFP (4)	Any Supplier Has New Patent (5)
Panel A: Suppliers' current performance					
After* Winner	0.053***	0.145	0.020	-0.000	0.013***
	(0.015)	(0.091)	(0.013)	(0.006)	(0.003)
Firm FE	Yes	Yes	Yes	Yes	Yes
Calendar Time FE	Yes	Yes	Yes	Yes	Yes
Relative Time FE	Yes	Yes	Yes	Yes	Yes
Procurement Project FE	Yes	Yes	Yes	Yes	Yes
Observations	437,918	437,918	430,357	179,309	451,995
Panel B: Suppliers' baseline performance					
After* Winner	0.052***	0.287***	0.053***	-0.003	0.013***
	(0.015)	(0.084)	(0.013)	(0.006)	(0.003)
Firm FE	Yes	Yes	Yes	Yes	Yes
Calendar Time FE	Yes	Yes	Yes	Yes	Yes
Relative Time FE	Yes	Yes	Yes	Yes	Yes
Procurement Project FE	Yes	Yes	Yes	Yes	Yes
Observations	428,774	428,774	390,391	164,024	451,995

Notes: The dependent variables in Columns (1)-(3) are the inverse hyperbolic sine transformations of weighted averages of suppliers' operating revenue, total profit, and number of employees. Column (4) reports total factor productivity (TFP), constructed as a weighted average across suppliers. Column (5) reports an indicator equal to one if any supplier in the corresponding supplier set obtains a new granted patent in a given year, capturing the extensive margin of innovation among suppliers. Panel A uses suppliers' current performance as weights, while Panel B fixes suppliers' performance at the baseline year (2014). All specifications include fixed effects for public procurement project, firm, calendar year, and year relative to the event time. Standard errors are clustered at the firm level.

figuration of buyer–supplier relationships, consistent with buyers shifting input purchases toward different suppliers rather than expanding uniformly along pre-existing links.

While these patterns point to substantial supplier reallocation, they do not rule out the possibility that some incumbent suppliers experience genuine performance improvements following procurement wins. The buyer-weighted measures above necessarily combine changes in supplier composition with changes in suppliers' own outcomes. To directly assess whether upstream firms themselves grow in response to procurement-induced demand—holding buyer–supplier relationships fixed—we next turn to a supplier-centered analysis that exploits variation in suppliers' exposure to buyers' procurement wins.

Figure 12: Number of Suppliers Overlapping between Winner and Losser



Notes: This figure presents an event–study analysis restricted to winning firms. The outcome variable measures the number of suppliers overlapping with losing firms within the same public procurement project. The regression includes firm, year, and procurement project fixed effects. Standard errors are clustered at the firm level.

5.3 Exposure to Procurement Demand

We now shift perspective from buyers to their upstream suppliers to examine whether procurement-induced demand shocks generate genuine performance responses among incumbent suppliers, holding buyer–supplier relationships fixed. The key idea is that a supplier's exposure to public procurement depends on the extent to which its pre-existing customers subsequently win government contracts. This approach allows us to isolate indirect effects operating through production networks from changes driven by supplier reallocation.

Following Autor, Dorn, and Hanson (2013), we construct a continuous exposure measure based on each supplier's baseline sales composition:

$$\text{Exposure}_{jt} = \sum_{i} \frac{\text{Sales Amount}_{ij,\, t_{\text{baseline}}}}{\text{Total Sales Amount to Potential Winners}_{j,\, t_{\text{baseline}}}} \times \text{Win}_{it}. \tag{6}$$

The numerator captures supplier j's baseline sales to buyer i during 2014–2015, while the denominator sums baseline sales to all buyers that ever participated in procurement competitions over 2014–2018. The exposure index therefore increases when a supplier's economically important buyers are awarded procurement contracts, reflecting greater indirect exposure to

public demand shocks.

We then estimate the following supplier-year specification:

$$y_{jt} = \beta \, \text{Exposure}_{jt} + \gamma \, \text{OwnWin}_{jt} + \alpha_j + \alpha_t + \varepsilon_{jt}, \tag{7}$$

where y_{jt} denotes supplier j's outcome in year t—operating revenue, profit, employment, or total factor productivity. The indicator OwnWin_{jt} controls for suppliers' direct procurement wins. Firm and year fixed effects absorb time-invariant supplier characteristics and aggregate shocks. In this framework, β captures how procurement-induced demand propagates upstream through pre-existing buyer–supplier linkages.

Table 3 reports the estimated effects. Suppliers with greater exposure to procurement-winning buyers experience modest but statistically significant increases in revenue and employment. Specifically, a one-unit increase in exposure is associated with a 1.5% increase in operating revenue and a 1.6% increase in employment. In contrast, the estimated effect on profit is negative and statistically insignificant, indicating no clear short-run profitability gains among incumbent suppliers. We also find a positive and statistically significant increase in TFP, suggesting that exposure to procurement demand may be associated with improvements in production efficiency or capacity utilization, though this result should be interpreted cautiously given the different fixed-effect structure in the TFP specification.

The coefficients on OwnWinjt are substantially larger across all outcomes, confirming that direct procurement awards generate much stronger firm-level responses than indirect exposure through buyers. Relative to these direct effects, the indirect spillovers captured by Exposurejt are economically smaller, accounting for roughly 5–20% of the magnitude of direct procurement impacts, depending on the outcome. These results indicate that procurement-induced demand does propagate upstream, but with attenuated intensity compared to direct beneficiaries.

To examine how upstream spillovers vary across different segments of the production

Table 3: Indirect Effect: Suppliers' Performance Change

	IHS(Revenue) (1)	IHS(Profit) (2)	IHS(#Employees) (3)	TFP (4)	Has New Granted Patent (5)
Exposure	0.015*	-0.020	0.016***	0.035**	-0.000
	(0.009)	(0.024)	(0.002)	(0.015)	(0.000)
Own Win	0.203***	1.354***	0.070***	0.131***	0.007***
	(0.040)	(0.122)	(0.012)	(0.045)	(0.002)
Calendar Time FE	Yes	Yes	Yes	Yes	Yes
City FE				Yes	
Industry FE				Yes	
Firm FE	Yes	Yes	Yes		Yes
Observations	3,147,867	3,147,867	2,826,741	30,327	6,157,415

Notes: The dependent variables in Columns (1)–(5) are the inverse hyperbolic sine transformations of suppliers' operating revenue, total profit, number of employees, and TFP, as well as an indicator for whether the firm obtains any new granted patent in a given year (Column (5)). The key independent variable *Exposure* measures the dependence-weighted share of a supplier's buyers that win government procurement contracts in a given year. *Own Win* is an indicator equal to one if the supplier itself wins a procurement contract in that year. All specifications in Columns (1)–(3) and (5) include firm and calendar year fixed effects, and standard errors are clustered at the firm level. In Column (4), because the TFP data are calculated from tax survey data in which the set of sampled firms varies across years, including firm fixed effects would drop most observations. We therefore control for city and industry fixed effects instead of firm fixed effects in that specification.

network, we construct industry-specific exposure measures by interacting buyers' winning status with their industry classification in Equation 6. This allows procurement shocks originating from different downstream sectors to have differential impacts on suppliers while holding each supplier's total baseline sales fixed.

Table 4 reports heterogeneous effects for suppliers in wholesale and retail, construction, and manufacturing. Two patterns emerge. First, spillovers are strongest for suppliers connected to wholesale and retail buyers. In this sector, exposure is associated with significant increases in revenue and employment, while effects on profit and TFP are small and statistically insignificant. This pattern is consistent with trade-oriented supply chains in which increased order volumes translate primarily into scale expansion rather than immediate efficiency gains.

Second, suppliers linked to construction buyers also experience positive spillovers in revenue and employment, though the estimates are less precisely measured and show no

Table 4: Heterogeneous Spillovers by Industry of Contractors

	IHS(Revenue) (1)	IHS(Profit) (2)	IHS(#Employees) (3)	TFP (4)	Has New Granted Patent (5)
Panel A: Wholesale and Retail					
Exposure	0.062***	0.015	0.014***	0.011	-0.001**
	(0.012)	(0.059)	(0.004)	(0.028)	(0.001)
Own Win	0.197***	1.328***	0.060***	0.040	0.009***
	(0.030)	(0.150)	(0.015)	(0.050)	(0.003)
Calendar Time FE	Yes	Yes	Yes	Yes	Yes
City FE				Yes	
Industry FE				Yes	
Firm FE	Yes	Yes	Yes		Yes
Observations	947,400	947,400	847,693	12,861	1,828,212
Panel B: Construction					
Exposure	0.097***	0.016	0.009*	-0.064	0.000
	(0.030)	(0.061)	(0.005)	(0.039)	(0.001)
Own Win	-0.061	0.681***	0.068***	0.097	0.008*
	(0.081)	(0.217)	(0.024)	(0.070)	(0.004)
Calendar Time FE	Yes	Yes	Yes	Yes	Yes
City FE				Yes	
Industry FE				Yes	
Firm FE	Yes	Yes	Yes		Yes
Observations	653,826	653,826	585,493	9064	1,309,138
Panel C: Manufacturing					
Exposure	-0.018**	-0.061	0.024***	-0.015	-0.000
	(0.006)	(0.042)	(0.003)	(0.026)	(0.000)
Own Win	0.126***	1.128***	0.053***	0.171***	0.011***
	(0.028)	(0.171)	(0.019)	(0.047)	(0.003)
Calendar Time FE	Yes	Yes	Yes	Yes	Yes
City FE				Yes	
Industry FE				Yes	
Firm FE	Yes	Yes	Yes		Yes
Observations	1,451,665	1,451,665	1,296,194	16,091	2,856,150

Notes: Panels A, B, and C report results for suppliers exposed to public procurement shocks originating from buyers in the wholesale and retail, construction, and manufacturing industries, respectively. The dependent variables in Columns (1)–(5) are the inverse hyperbolic sine transformations of suppliers' operating revenue, total profit, number of employees, and TFP, as well as an indicator for whether the firm obtains any new granted patent in a given year (Column (5)). The key independent variable *Exposure* measures the dependence-weighted share of a supplier's buyers within the corresponding buyer industry that win government procurement contracts in a given year, while *Own Win* indicates whether the supplier itself wins a procurement contract in that year. A supplier may appear in more than one panel if it transacts with buyers from multiple industries. All specifications in Columns (1)–(3) and (5) include firm and calendar year fixed effects, with standard errors clustered at the firm level. In Column (4), because TFP is constructed from tax survey data in which the set of sampled firms varies across years, including firm fixed effects would drop most observations. We therefore control for city and industry fixed effects instead.

consistent effects on profit or productivity. Given the project-based nature of construction activity, these results suggest that procurement demand generates episodic upstream expansions without persistent profitability or efficiency improvements.

By contrast, suppliers connected to manufacturing buyers exhibit a different pattern. Exposure is associated with a small but statistically significant decline in revenue, alongside positive effects on employment and no significant changes in profit or TFP. This asymmetry is consistent with the position of manufacturing firms higher up the value chain, where procurement-induced demand may lead to labor-intensive adjustments or internal reallocation rather than expansion of upstream sourcing. It may also reflect substitution across input suppliers as manufacturing buyers reorganize production in response to procurement wins.

The supplier-level evidence indicates that procurement-induced demand shocks do propagate upstream through production networks, but primarily through modest scale effects rather than immediate profitability gains. These indirect effects are heterogeneous across supplier industries and substantially smaller than the direct impacts of winning procurement contracts. Combined with the earlier evidence on supplier reallocation, the results suggest that public procurement reshapes production networks through a combination of buyer-side reorganization and limited, uneven spillovers to incumbent upstream firms.

The heterogeneity in upstream spillovers documented above is likewise robust to alternative samples and identification checks. Appendix Figure A2 shows that restricting attention to high-amount procurement contracts produces qualitatively similar patterns in suppliers' purchasing responses and supplier network expansion. In addition, when limiting the analysis to projects predicted to be competitively allocated based on the corruption-risk measures of Chen (2023), the estimated upstream spillovers remain stable and closely aligned with those in the full sample, as reported in Appendix Table A4. These robustness exercises indicate that the heterogeneity in supply-chain propagation reflects genuine differences in production structure, input intensity, and network dependence across project types and

procuring entities. The observed variation in upstream spillovers is therefore unlikely to be driven by low-value contracts or preferential allocation, and instead points to real differences in how procurement-induced demand shocks transmit through production networks.

6 Aggregate Effects of Procurement Spending Shocks

The previous sections established that public procurement contracts generate sizable direct effects for winning firms and measurable spillovers along their supply chains. We now ask whether these micro-level dynamics translate into macroeconomic consequences: do procurement spending shocks in one sector stimulate employment in other sectors through production linkages?

This section connects the micro evidence to aggregate outcomes by examining how sectoral government procurement shocks propagate through the economy's input–output network. Using annual data aggregated at the sector level, we estimate the extent to which fiscal demand originating from public procurement in one sector diffuses to related upstream and downstream industries, thereby amplifying its overall employment impact.

6.1 Sectoral Demand Shock Specification

Constructing Sectoral Procurement Shocks. Following Barattieri, Cacciatore, and Traum (2023), we first isolate unanticipated changes in procurement spending by industry. Specifically, we estimate:

$$g_{it}^{G} = \alpha_i + \gamma_t + \beta\, g_{i,t-1}^{G} + \phi\, g_{i,t-1}^{L} + \nu_{it}, \tag{8}$$

where g_{it}^{G} is the annual growth rate of real government procurement spending in industry i, and $g_{i,t-1}^{L}$ is the lagged employment growth rate. The sector and year fixed effects, α_i and

γ_t, absorb persistent structural differences and common macro shocks.[3] The residual $\hat{\nu}_{it}$ represents the idiosyncratic component of procurement spending—interpreted as an exogenous fiscal demand shock at the industry level.[4]

These shocks capture unpredicted deviations in industry-level procurement spending that are plausibly unrelated to contemporaneous employment trends, serving as a source of quasi-exogenous fiscal variation for tracing aggregate propagation.

Exposure to Upstream and Downstream Shocks. Industries are interconnected through complex production networks: a procurement shock in one industry can raise demand for its suppliers' goods, i.e. upstream propagation, and increase input availability for its clients, i.e. downstream propagation. To quantify these channels, we follow Acemoglu, Akcigit, and Kerr (2016) and construct exposure-weighted shocks based on the economy's Leontief inverse, which encodes both direct and indirect inter-industry linkages.

We define upstream exposure as:

$$\nu_{jt}^{\text{up}} = \sum_{k} \left(\tilde{\omega}_{jk} - \mathbf{1}_{k=j}\right) \hat{\nu}_{kt}, \tag{9}$$

where $\tilde{\omega}_{jk}$ measures the fraction of industry j's output demanded by client industry k, and $\mathbf{1}_{k=j}$ excludes own-industry shocks. Similarly, we define downstream exposure as:

$$\nu_{jt}^{\text{down}} = \sum_{k} \left(\omega_{kj} - \mathbf{1}_{k=j}\right) \hat{\nu}_{kt}, \tag{10}$$

where ω_{kj} is the share of industry j's inputs sourced from supplier industry k. Both sets of network weights are derived from VAT transaction records in 2015, which provide a detailed

[3] Industries are defined at the three-digit level of China's national industrial classification (GB/T 4754–2011), yielding 422 categories after restricting the sample to observations with matched employment and value-added data.

[4] All nominal values are deflated using sector-specific price indices before computing growth rates. For any variable X_{it}, we define $g_{it}^X = (X_{it} - X_{i,t-1})/X_{i,t-1}$, which measures the simple year-on-year growth ratio. For tradable and goods-producing industries, we use the Producer Price Index; for services, the Consumer Price Index (CPI). Both indices are normalized to the previous year = 100.

and representative snapshot of inter-industry trade flows in China.

These two exposure measures,ν_{jt}^{up} and ν_{jt}^{down}, capture how fiscal shocks originating in one industry propagate through the production network to affect others.

Local Projection Framework Having identified industry-level procurement shocks and their network-propagated counterparts, we next estimate their dynamic effects on employment using a local-projection framework. For horizons $h \in \{0, \ldots, H\}$, we estimate:

$$g_{j,t+h}^{L} = \alpha_{hj} + \gamma_{ht} + \beta_h^{\text{own}} \hat{\nu}_{jt} + \beta_h^{\text{up}} \nu_{jt}^{\text{up}} + \beta_h^{\text{down}} \nu_{jt}^{\text{down}} + \varepsilon_{j,t+h}, \tag{11}$$

where $g_{j,t+h}^{L}$ denotes cumulative employment growth in industry j over horizon h. The coefficients β_h^{own}, β_h^{up}, and β_h^{down} measure, respectively, the direct effect of a industry's own procurement shock and the spillover effects transmitted through upstream and downstream linkages.

This approach allows us to trace, in reduced form, how fiscal demand originating from government procurement propagates through production networks and accumulates into aggregate employment changes. In doing so, it bridges the micro-level mechanisms documented earlier, firms expanding their purchases and supplier networks following procurement wins, with the macro-level consequences for sectoral employment and the broader economy.

6.2 Macroeconomic Implications for Employment

Figure 13 plots the estimated impulse responses of sectoral employment to procurement spending shocks, obtained from the local-projection specification in Equation 11. The top panel reports the effects of own-sector shocks, corresponding to the coefficients $\hat{\beta}_h^{\text{own}}$; the middle panel shows responses to upstream supplier shocks, $\hat{\beta}_h^{\text{up}}$; and the bottom panel presents responses to downstream buyer shocks, $\hat{\beta}_h^{\text{down}}$. All impulse responses are shown with 90% confidence intervals.

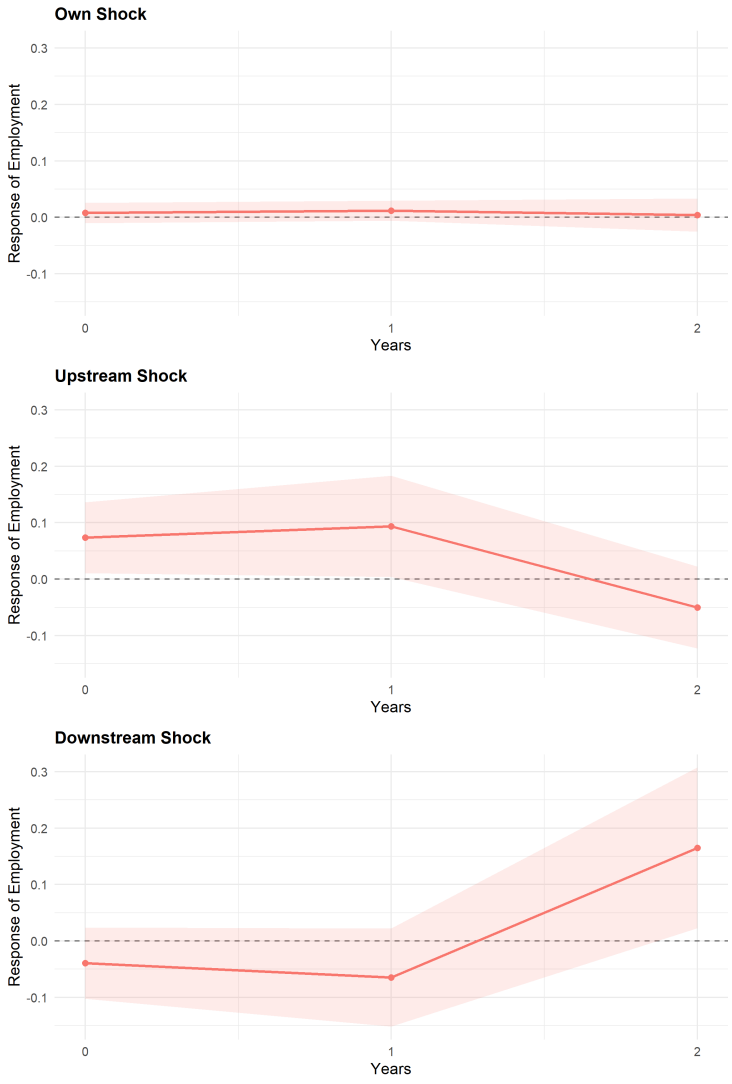
The direct employment response within the shocked sector is small at all horizons. In

contrast, downstream sectors, those that purchase inputs from the shocked industries, exhibit a positive short-run response. Employment in these downstream buyer sectors increases by approximately 7–9 percentage points in the contemporaneous year and the following year before declining thereafter.

Upstream sectors display a different dynamic pattern. Employment in upstream supplier industries initially declines in the first two years following the shock and turns positive at longer horizons. This pattern suggests that adjustments among upstream suppliers may occur with a delay as production and demand propagate through the network. This pattern is broadly consistent with our micro-level evidence in Section 5.3, where we show that suppliers of procurement-winning firms experience improvements in employment and other firm outcomes.

This propagation mechanism underscores the macroeconomic importance of production networks for fiscal policy effectiveness. Input–output linkages amplify and extend the reach of procurement spending across sectors. In the longer run, the aggregate employment multiplier of public demand may depend less on the immediate labor intensity of the contracting sectors and more on the strength of their upstream supplier relationships.

Figure 13: Propagation of Procurement Spending Shocks to Employment



Notes: Each panel plots the estimated impulse responses of sectoral employment to procurement spending shocks, expressed in percentage points. The top panel shows the effects of own-sector shocks (recipient sectors), the middle panel shows the effects of upstream shocks transmitted from supplier sectors, and the bottom panel shows the effects of downstream shocks transmitted from client sectors. Shaded areas represent 90% confidence intervals based on heteroskedasticity-robust standard errors.

7 Conclusion

This paper provides new evidence on how government procurement operates as a demand-driven industrial policy, shaping firm performance and propagating through production networks to influence aggregate outcomes. Using administrative data linking public procure-

ment, tax filings, and firm-to-firm transactions in China, we document three main findings.

First, winning a procurement contract leads to substantial improvements in firm performance. Revenues, profits, and employment rise sharply in the year of contract acquisition, driven by expanded purchases of intermediate inputs and supplier diversification. These results indicate that public procurement stimulates firm growth primarily through demand-side channels, without displacing private activity.

Second, the effects extend beyond direct contract recipients. Firms connected to procurement winners—especially their suppliers—experience measurable gains in sales and profitability, reflecting both re-sorting toward more productive partners and genuine spillover effects. These linkages amplify the impact of fiscal demand and generate positive externalities across the production network.

Third, at the macro level, procurement-induced demand shocks propagate through sectoral input–output linkages, raising employment in supplier industries. This pattern suggests that public procurement not only supports individual firms but also contributes to broader economic expansion by activating downstream production chains.

Together, these findings highlight the importance of viewing public procurement not merely as an administrative instrument for government spending but as a strategic lever of industrial and macroeconomic policy. By tracing its effects from contracts to networks to sectors, the paper bridges the micro foundations of firm dynamics with the macro consequences of fiscal stimulus. Future research should further examine how procurement design—such as targeting, competition, and sectoral composition—can enhance the efficiency and inclusiveness of these demand-side multipliers.

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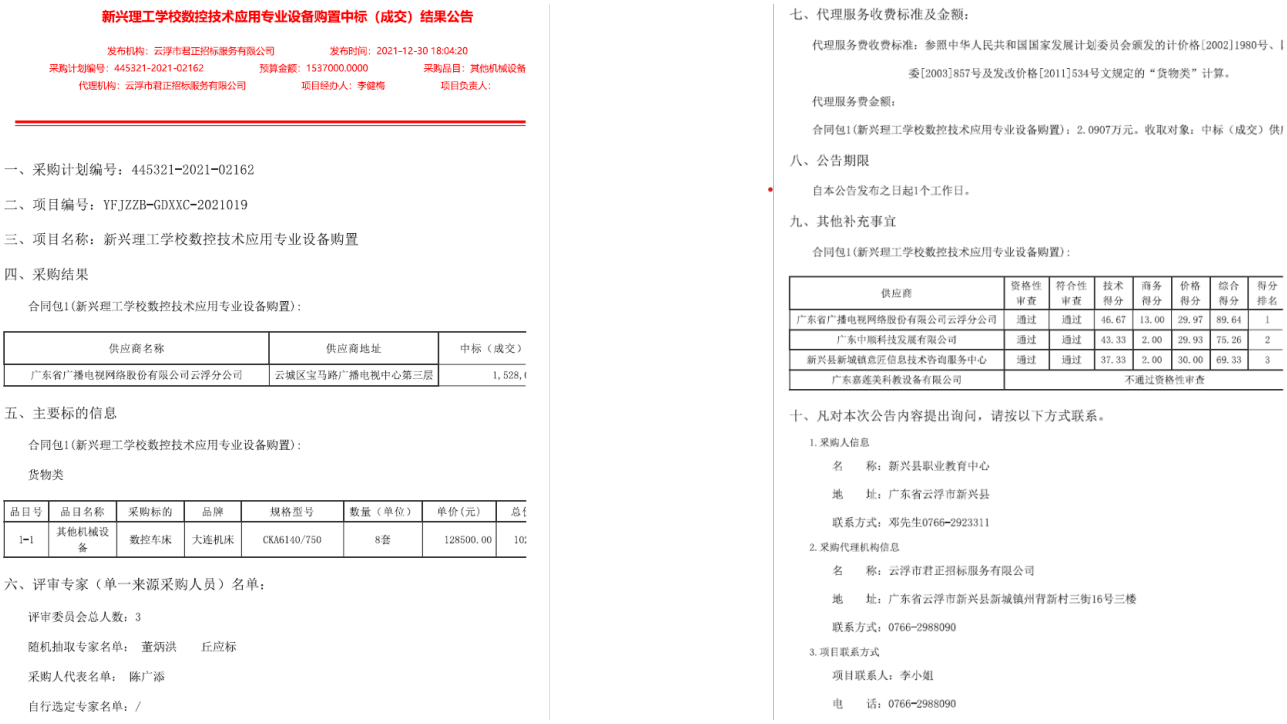
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Appendix A: Supplementary Tables and Figures

Figure A1: An Example of Public Procurement Competition



新兴理工学校数控技术应用专业设备购置中标（成交）结果公告

发布机构：云浮市君正招标服务有限公司　　发布时间：2021-12-30 18:04:20
采购计划编号：445321-2021-02162　　预算金额：1537000.0000　　采购品目：其他机械设备
代理机构：云浮市君正招标服务有限公司　　项目经办人：李健梅　　项目负责人：

一、采购计划编号：445321-2021-02162

二、项目编号：YFJZZB-GDXXC-2021019

三、项目名称：新兴理工学校数控技术应用专业设备购置

四、采购结果

合同包1(新兴理工学校数控技术应用专业设备购置)：

供应商名称	供应商地址	中标（成交）
广东省广播电视网络股份有限公司云浮分公司	云城区宝马路广播电视中心第三层	1,528,(

五、主要标的信息

合同包1(新兴理工学校数控技术应用专业设备购置)：

货物类

品目号	品目名称	采购标的	品牌	规格型号	数量（单位）	单价(元)	总(
1-1	其他机械设备	数控车床	大连机床	CKA6140/750	8套	128500.00	10:

六、评审专家（单一来源采购人员）名单：

评审委员会总人数：3

随机抽取专家名单：　董炳洪　　丘应标

采购人代表名单：　陈广添

自行选定专家名单：/

七、代理服务收费标准及金额：

代理服务费收费标准：参照中华人民共和国国家发展计划委员会颁发的计价格[2002]1980号、[

委[2003]857号及发改价格[2011]534号文规定的“货物类”计算。

代理服务费金额：

合同包1(新兴理工学校数控技术应用专业设备购置)：2.0907万元。收取对象：中标（成交）供[

八、公告期限

自本公告发布之日起1个工作日。

九、其他补充事宜

合同包1(新兴理工学校数控技术应用专业设备购置)：

供应商	资格性审查	符合性审查	技术得分	商务得分	价格得分	综合得分	得分排名
广东省广播电视网络股份有限公司云浮分公司	通过	通过	46.67	13.00	29.97	89.64	1
广东中顺科技发展有限公司	通过	通过	43.33	2.00	29.93	75.26	2
新兴县新城镇意匠信息技术咨询服务中心	通过	通过	37.33	2.00	30.00	69.33	3
广东嘉莲美科教设备有限公司	不通过资格性审查						

十、凡对本次公告内容提出询问，请按以下方式联系。

1.采购人信息

名　　称：新兴县职业教育中心

地　　址：广东省云浮市新兴县

联系方式：邓先生0766-2923311

2.采购代理机构信息

名　　称：云浮市君正招标服务有限公司

地　　址：广东省云浮市新兴县新城镇州背新村三街16号三楼

联系方式：0766-2988090

3.项目联系方式

项目联系人：李小姐

电　　话：0766-2988090

Notes: The example is retrieved from the Provincial public procurement platform on December 21, 2021.

Table A1: Summary Statistics between Winners and 2nds

Variable	Winner	Losing 2nd	P Value
Capital Size	11230.69	7261.99	0.00***
Employee Size	334.2	204.79	0.00***
State Owned	0.04	0.03	0.00***
Registration Year	2004.71	2005.45	0.00***
Foregin Connected	0	0	0.00***
Small Business	0.01	0.01	0.57
Public Listed	0.03	0.02	0.00***
#Corp Member	47.52	29.92	0.00***
Branch	0.02	0.01	0.00***

Figure A2: An Example of Invoice



广东增值税电子普通发票

国家税务总局
广东省税务局

发票代码：[redacted]
发票号码：[redacted]
开票日期：[redacted]
校 验 码：[redacted]

机器编号：667108907347

购买方	名　　称：[redacted] 纳税人识别号：[redacted] 地 址、电 话：[redacted] 开户行及账号：[redacted]	密码区	[redacted]

项目名称	规格型号	单位	数　量	单　价	金　额	税率	税　额
*餐饮服务*餐饮费		单	1	557.425743	557.43	1%	5.57
合　　计					¥557.43		¥5.57

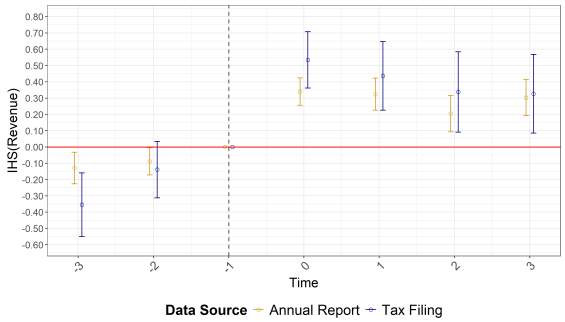
价税合计（大写）	⊗伍佰陆拾叁圆整	（小写）¥563.00

销售方	名　　称：[redacted] 纳税人识别号：[redacted] 地 址、电 话：[redacted] 开户行及账号：[redacted]	备注	[redacted]

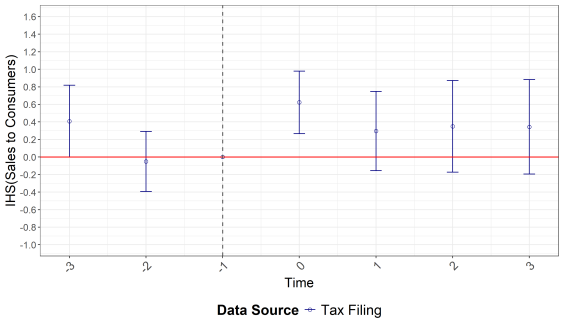
收 款 人：彭枭　　复 核：孙鑫　　开 票 人：彭枭

Robustness Check: High-Value Procurement Contracts

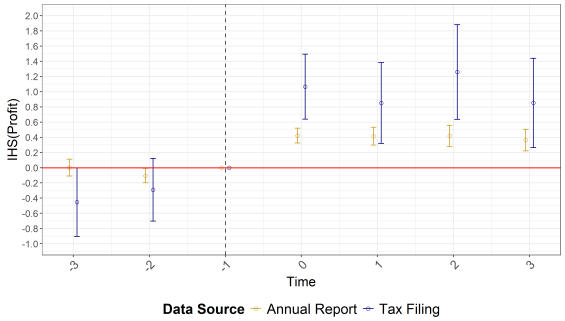
Figure A3: High-amount Procurement: Direct Effects of Winning Public Contract on Firm Performance



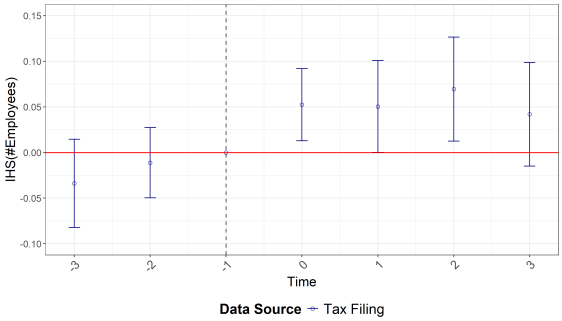
(a) Revenue



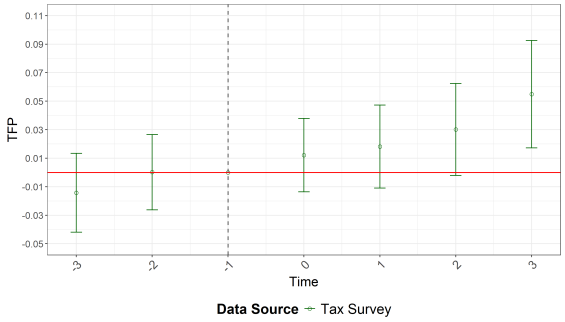
(b) Sales to Consumers



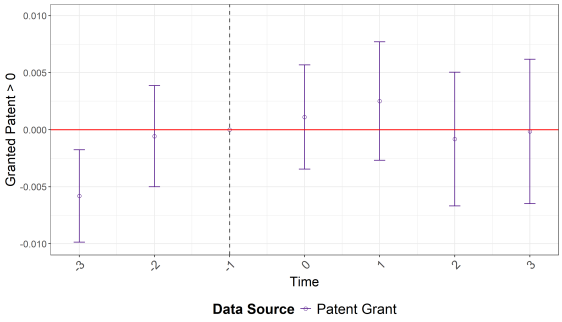
(c) Profit



(d) Number of Employees



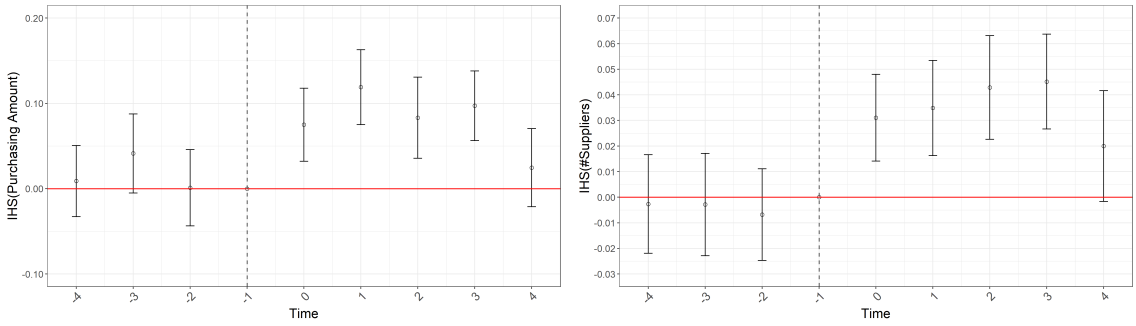
(e) TFP



(f) Indicator for Any New Granted Patent

Notes: The event-study specification includes fixed effects for public procurement project, firm, calendar year, and event time (year relative to the award). Standard errors are clustered at the firm level. Blue, yellow, green, and purple bars represent firm performance measures based on the Tax Filing, Annual Report, Tax Survey, and Patent Grant data, respectively. For the Tax Survey data, we include city and sector fixed effects instead of firm fixed effects,due to the survey sample is not balanced across years.

Figure A4: High-amount Procurement: Direct Effects of Winning Public Contract on Upstream Purchase



(a) Purchasing Amount (b) Number of Suppliers

Notes: The event-study specification includes fixed effects for procurement project, firm, calendar quarter, and event quarter. Standard errors are clustered at the firm level.

Table A2: High-amount Procurement: Effects in Weighted Suppliers' Performance

	IHS(Revenue) (1)	IHS(Profit) (2)	IHS(#Employees) (3)	TFP (4)	Any Supplier Has New Patent (5)
Panel A: Suppliers' current performance					
After* Winner	0.070***	0.159	0.018	-0.000	0.016***
	(0.023)	(0.148)	(0.020)	(0.010)	(0.005)
Firm FE	Yes	Yes	Yes	Yes	Yes
Calendar Time FE	Yes	Yes	Yes	Yes	Yes
Relative Time FE	Yes	Yes	Yes	Yes	Yes
Procurement Project FE	Yes	Yes	Yes	Yes	Yes
Observations	187,477	187,477	184,443	77,032	193,890
Panel B: Suppliers' baseline performance					
After* Winner	0.064***	0.326**	0.045**	0.001	0.011**
	(0.024)	(0.137)	(0.022)	(0.01)	(0.005)
Firm FE	Yes	Yes	Yes	Yes	Yes
Calendar Time FE	Yes	Yes	Yes	Yes	Yes
Relative Time FE	Yes	Yes	Yes	Yes	Yes
Procurement Project FE	Yes	Yes	Yes	Yes	Yes
Observations	183,289	183,289	166,516	70,882	193,890

Notes: The dependent variables in Columns (1)-(3) are the inverse hyperbolic sine transformations of weighted averages of suppliers' operating revenue, total profit, and number of employees. Column (4) reports total factor productivity (TFP), constructed as a weighted average across suppliers. Column (5) reports an indicator equal to one if any supplier in the corresponding supplier set obtains a new granted patent in a given year, capturing the extensive margin of innovation among suppliers. Panel A uses suppliers' current performance as weights, while Panel B fixes suppliers' performance at the baseline year (2014). All specifications include fixed effects for public procurement project, firm, calendar year, and year relative to the event time. Standard errors are clustered at the firm level.

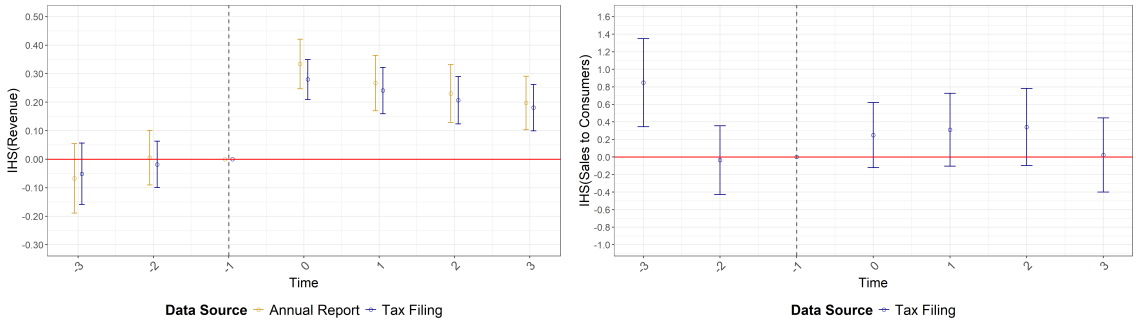
Table A3: High-amount Procurement: Suppliers' Performance Change

	IHS(Revenue) (1)	IHS(Profit) (2)	IHS(#Employees) (3)	TFP (4)	Has New Granted Patent (5)
Exposure	0.022**	-0.021	0.013***	0.031*	-0.000
	(0.011)	(0.028)	(0.002)	(0.016)	(0.000)
Own Win	0.275***	1.283***	0.183***	0.138***	0.010***
	(0.052)	(0.152)	(0.014)	(0.049)	(0.002)
Calendar Time FE	Yes	Yes	Yes	Yes	Yes
City FE				Yes	
Industry FE				Yes	
Firm FE	Yes	Yes	Yes		Yes
Observations	3,147,869	3,147,869	2,826,744	30,327	6,157,430

Notes: The dependent variables in Columns (1)–(5) are the inverse hyperbolic sine transformations of suppliers' operating revenue, total profit, number of employees, and TFP, as well as an indicator for whether the firm obtains any new granted patent in a given year (Column (5)). The key independent variable *Exposure* measures the dependence-weighted share of a supplier's buyers that win government procurement contracts in a given year. *Own Win* is an indicator equal to one if the supplier itself wins a procurement contract in that year. All specifications in Columns (1)–(3) and (5) include firm and calendar year fixed effects, and standard errors are clustered at the firm level. In Column (4), because the TFP data are calculated from tax survey data in which the set of sampled firms varies across years, including firm fixed effects would drop most observations. We therefore control for city and industry fixed effects instead of firm fixed effects in that specification.

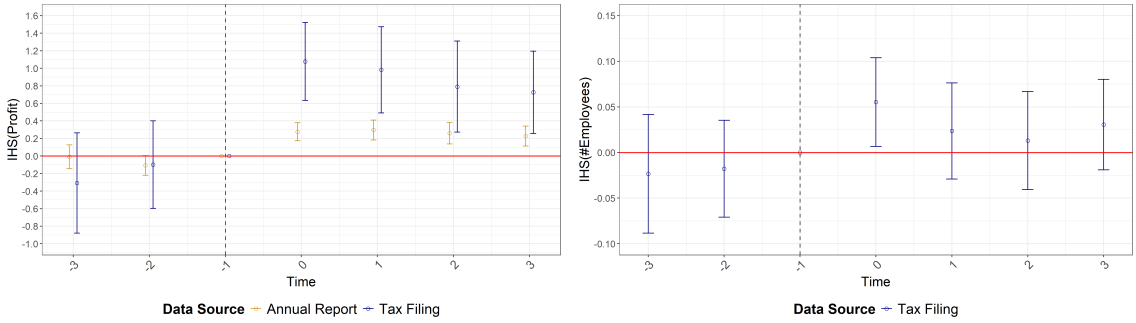
Robustness Check: Non-corrupt Procurement

Figure A5: Non-corrupt Procurement: Direct Effects of Winning Public Contract on Firm Performance



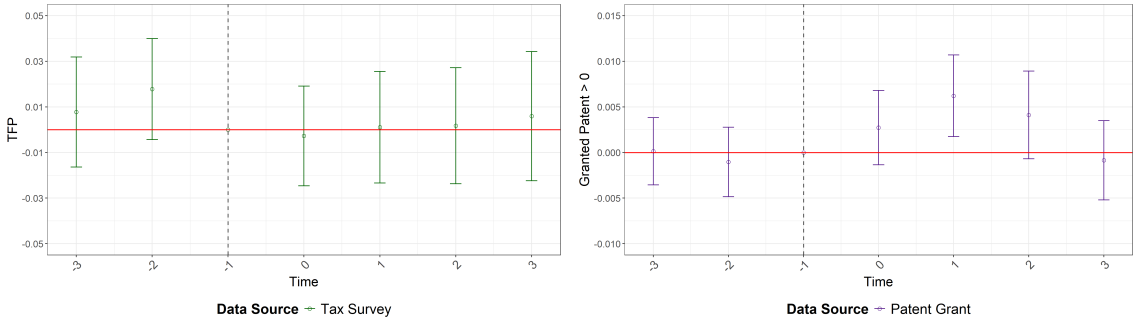
(a) Revenue

(b) Sales to Consumers



(c) Profit

(d) Number of Employees

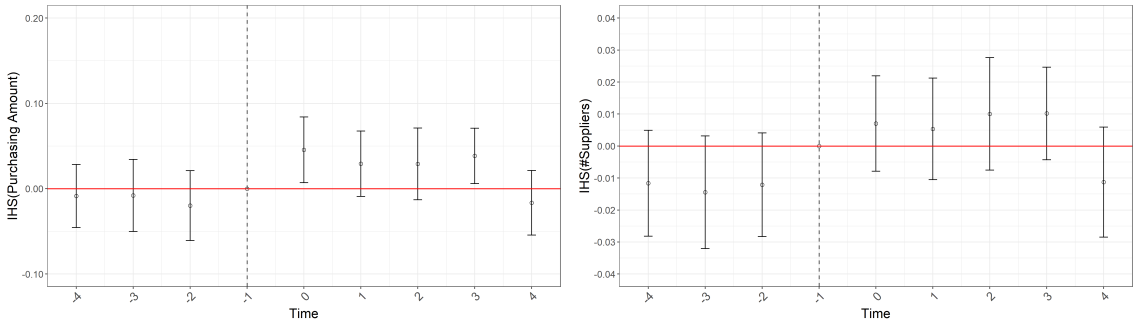


(e) TFP

(f) Indicator for Any New Granted Patent

Notes: The event-study specification includes fixed effects for public procurement project, firm, calendar year, and event time (year relative to the award). Standard errors are clustered at the firm level. Blue, yellow, green, and purple bars represent firm performance measures based on the Tax Filing, Annual Report, Tax Survey, and Patent Grant data, respectively. For the Tax Survey data, we include city and sector fixed effects instead of firm fixed effects,due to the survey sample is not balanced across years.

Figure A6: Non-corrupt Procurement: Direct Effects of Winning Public Contract on Upstream Purchase



(a) Purchasing Amount (b) Number of Suppliers

Notes: The event-study specification includes fixed effects for procurement project, firm, calendar quarter, and event quarter. Standard errors are clustered at the firm level.

Table A4: Noncorrupt Procurement: Effects in Weighted Suppliers' Performance

	IHS(Revenue) (1)	IHS(Profit) (2)	IHS(#Employees) (3)	TFP (4)	Any Supplier Has New Patent (5)
Panel A: Suppliers' current performance					
After* Winner	0.032	0.362**	0.017	-0.003	0.020***
	(0.024)	(0.149)	(0.021)	(0.011)	(0.005)
Firm FE	Yes	Yes	Yes	Yes	Yes
Calendar Time FE	Yes	Yes	Yes	Yes	Yes
Relative Time FE	Yes	Yes	Yes	Yes	Yes
Procurement Project FE	Yes	Yes	Yes	Yes	Yes
Observations	212,127	212,127	208,388	89,906	218,569
Panel B: Suppliers' baseline performance					
After* Winner	0.020	0.460***	0.036*	-0.005	0.016***
	(0.024)	(0.136)	(0.021)	(0.011)	(0.005)
Firm FE	Yes	Yes	Yes	Yes	Yes
Calendar Time FE	Yes	Yes	Yes	Yes	Yes
Relative Time FE	Yes	Yes	Yes	Yes	Yes
Procurement Project FE	Yes	Yes	Yes	Yes	Yes
Observations	207,971	207,971	189,636	82,469	218,569

Notes: The dependent variables in Columns (1)-(3) are the inverse hyperbolic sine transformations of weighted averages of suppliers' operating revenue, total profit, and number of employees. Column (4) reports total factor productivity (TFP), constructed as a weighted average across suppliers. Column (5) reports an indicator equal to one if any supplier in the corresponding supplier set obtains a new granted patent in a given year, capturing the extensive margin of innovation among suppliers. Panel A uses suppliers' current performance as weights, while Panel B fixes suppliers' performance at the baseline year (2014). All specifications include fixed effects for public procurement project, firm, calendar year, and year relative to the event time. Standard errors are clustered at the firm level.

Table A5: Non-corrupt Procurement: Suppliers' Performance Change

	IHS(Revenue) (1)	IHS(Profit) (2)	IHS(#Employees) (3)	TFP (4)	Has New Granted Patent (5)
Exposure	0.019	0.012	0.019***	0.036*	0.000
	(0.011)	(0.030)	(0.002)	(0.019)	(0.000)
Own Win	0.131***	1.465***	0.009	0.157***	0.006**
	(0.048)	(0.149)	(0.016)	(0.057)	(0.002)
Calendar Time FE	Yes	Yes	Yes	Yes	Yes
City FE				Yes	
Industry FE				Yes	
Firm FE	Yes	Yes	Yes		Yes
Observations	3,147,867	3,147,867	2,826,742	30,327	6,157,421

Notes: The dependent variables in Columns (1)–(5) are the inverse hyperbolic sine transformations of suppliers' operating revenue, total profit, number of employees, and TFP, as well as an indicator for whether the firm obtains any new granted patent in a given year (Column (5)). The key independent variable *Exposure* measures the dependence-weighted share of a supplier's buyers that win government procurement contracts in a given year. *Own Win* is an indicator equal to one if the supplier itself wins a procurement contract in that year. All specifications in Columns (1)–(3) and (5) include firm and calendar year fixed effects, and standard errors are clustered at the firm level. In Column (4), because the TFP data are calculated from tax survey data in which the set of sampled firms varies across years, including firm fixed effects would drop most observations. We therefore control for city and industry fixed effects instead of firm fixed effects in that specification.