When the State Delays Payments: Government Liquidity Shock and Firm Behavior in China

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Abstract

We show that governments use commercial arrears as an alternative margin of adjustment to manage rollover risk, transmitting public-sector liquidity stress to the private economy. Using novel counterparty-level data from Chinese state-owned enterprises, we map the directed payment network from local governments to prime contractors and upstream suppliers. Exploiting predetermined local-government debt maturity profiles as an exogenous shock to short-run fiscal pressure, we find that governments delay payments to contractors, who in turn pass through roughly one-third of the resulting liquidity shortfall to their suppliers. This trade-credit propagation tightens financing constraints for upstream private SMEs, leading to lower profitability and higher firm exit. Furthermore, these corporate disruptions generate real economic spillovers, persistently depressing local wage income and household durable consumption.

Keywords: Commercial Arrears, Government Liquidity, Rollover Risk, Trade Credit, SMEs
JEL Classification: G32, H63, H74, L14

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1. Introduction

Governments can borrow without issuing debt. When a government delays payment for delivered goods or completed projects, it effectively borrows from its suppliers at zero stated interest—a form of financing that bypasses bond markets, escapes fiscal rules, and leaves no immediate trace on the official balance sheet. These commercial arrears are economically equivalent to short-term borrowing, yet they are far less transparent than bonds or bank loans and are only weakly disciplined by accounting conventions (Milesi-Ferretti, 2004). When refinancing conditions tighten and visible borrowing becomes costly or constrained, shifting toward payment delays becomes an attractive margin of short-run fiscal adjustment—one that can propagate silently through the private economy long before it appears in any official statistic.

We study this *government arrears channel* in China and ask how short-run local-government liquidity stress translates into delayed payments and propagates through trade-credit links to the broader private sector. China is a natural laboratory for three reasons. First, local governments are among the largest buyers and project owners in the economy, making their payment behavior consequential for private firms. Second, implementation is frequently intermediated by state-owned enterprises (SOEs) and local government financing vehicles (LGFVs) that serve as prime contractors and project platforms—we refer to these collectively as *public entities*. These public entities connect government demand to upstream private suppliers through trade credit, creating a multi-layer transmission chain. Third, Chinese annual reports disclose the identities and balances of major counterparties in accounts-receivable and accounts-payable footnotes, enabling us to observe bilateral debtor–creditor balances and to map a directed payment network from governments through public entities to private suppliers. This counterparty-level disclosure is rare internationally and is the foundation of our measurement strategy.

The transmission mechanism we study operates as follows. When a local government faces short-run liquidity pressure—because a large share of its outstanding bonds mature within the year and refinancing is costly—it delays settlement with public entities that have completed contracted work. These public entities record higher accounts receivable ($AR^{gov}_{i,j,t}$) and, facing their own working-capital shortfall, respond by stretching payables to their upstream private suppliers ($AP_{i,k,t}$). The shock thereby propagates upstream in the production network to SMEs that have no direct contractual relationship with the government. This propagation logic is consistent with classic theories of trade credit as relational finance and in-kind enforcement (Petersen and Rajan, 1997a; Burkart and Ellingsen, 2004a) and with modern evidence on network-based shock transmission (Acemoglu et al., 2012a;

Barrot and Sauvagnat, 2016).

Our results support each step of this transmission chain. In government–public-entity dyads, unpaid balances rise when the debtor government faces higher maturity-wall pressure (GovPressure$_{c,t}$), and the estimates remain stable with pair fixed effects and firm$\times$year fixed effects. In supplier dyads, IV estimates imply a pass-through elasticity of 0.31–0.35: a RMB 1 increase in government-induced receivables at a public entity raises payables to its suppliers by roughly 31–35 cents. Aggregating government-related receivables across covered entities yields a conservative lower bound of about RMB 11 trillion in 2024. Beyond intermediary firms, higher production-network exposure (Exposure$_{s,t}$) predicts tighter SME financing constraints, more trade-credit delinquency, lower profitability, weaker expectations, lower entry, and higher exit. Household panel evidence from CFPS (2016–2022) shows lower wage income and disproportionate cuts in durable consumption in more exposed counties, consistent with spillovers from firm-side liquidity stress to local welfare outcomes.

Our first contribution is measurement. We build a new dataset that links city-year fiscal accounts and bond-level maturity schedules (2015–2024) to audited financial statements of listed and bond-issuing SOEs/LGFVs. The key feature is counterparty-level footnote disclosure: firms report identities and balances of major debtors and creditors in A/R, A/P, O/R, and O/P. We use these disclosures to recover bilateral debtor–creditor links and map a directed payment network from governments to public entities and upstream suppliers.

Our second contribution is identification. We measure liquidity stress with a *maturity-wall index* (GovPressure$_{c,t}$), the ratio of principal due within one year to realized fiscal revenue. Because maturity composition is largely predetermined by past issuance choices, this measure isolates rollover pressure from contemporaneous local demand conditions. We combine this variation with within-pair and within-firm-year designs in government–public-entity dyads, then use predicted government receivables as an instrument for pass-through to supplier payables.

Our third contribution is incidence. We show that the shock propagates beyond firms directly contracting with the state: SMEs more exposed through production networks face tighter financing and weaker performance, and households in exposed counties experience lower wage income and stronger precautionary adjustment.

Relation to the literature. The paper speaks to three literatures. First, it contributes to work on off-balance-sheet fiscal adjustment under constraints (Milesi-Ferretti, 2004) by making payment arrears observable at the counterparty level. Second, it extends rollover-risk logic from firms and financial intermediaries (Diamond, 1991a; He and Xiong, 2012a; Brunnermeier and Oehmke, 2013) to local governments, showing that maturity pressure

can be managed through delayed commercial settlement rather than only through explicit debt issuance. Third, it links trade-credit and production-network transmission (Petersen and Rajan, 1997a; Burkart and Ellingsen, 2004a; Acemoglu et al., 2012a; Barrot and Sauvagnat, 2016) to a public-finance origin shock, documenting propagation from government liquidity stress to SME and household outcomes.

The remainder of the paper is organized as follows. Section 2 describes the institutional background. Section 3 presents a parsimonious framework. Section 4 introduces the data and stylized facts. Section 5 estimates dyadic transmission and pass-through to suppliers. Section 6 studies SME incidence using the production-network exposure design. Section 7 documents household spillovers. Section 8 concludes.

2. Institutional Background

This section provides institutional context for why short-run fiscal stress at Chinese local governments can manifest as delayed payments to firms, and why such delays can propagate widely through supply-chain credit relationships. China's setting combines three features that jointly motivate our focus on the government arrears channel: a local public finance system with persistent vertical fiscal imbalance and heavy reliance on volatile, quasi-fiscal resources; a project-delivery regime in which governments act not only as regulators and tax collectors but also as large *trading counterparties* through procurement and public investment; and a multi-tier contracting structure—particularly in construction and infrastructure—that turns government payment delays into networked working-capital shocks for upstream private firms. Together, these features motivate our measurement and dyadic identification strategy in Section 5.

2.1 Local public finance and the mechanics of liquidity stress

China's fiscal system assigns local governments broad expenditure responsibilities—including basic public services, social spending co-financing, and a large share of public investment—while the post-1994 tax-sharing arrangements concentrate major revenue sources at the center and rely on transfers and shared taxes to fund local mandates (Montinola et al., 1995; Jin et al., 2005). A direct implication is a persistent *funding gap*: local governments are structurally pushed to reconcile high expenditure commitments with comparatively limited and cyclically sensitive own-source revenues.

In formal fiscal accounts, the core "on-budget" resource base is the general public budget (tax revenues plus transfers), while a large portion of local fiscal capacity has historically been tied to land-related revenues booked in government funds and other quasi-

fiscal arrangements.[1] These revenue sources are procyclical and closely linked to the real estate cycle, making local cash inflows particularly volatile during housing-market downturns (Holmes, 2019; Hendy et al., 2024).

Since the mid-2010s, local government borrowing has been formally routed through quota-managed local government bonds, often described as "opening the front door" (permitting on-budget bond issuance) while "closing the back door" (restricting new off-balance-sheet borrowing) (Holmes, 2019). Nonetheless, local government financing vehicles (LGFVs)—state-owned investment companies established and controlled by local governments—remain central to infrastructure delivery and financing, reflecting both historical borrowing constraints and the continuing mismatch between mandated spending and stable revenues (Clarke, 2016; Hendy et al., 2024). These institutional arrangements complicate the measurement of local fiscal positions: headline "official" debt captures quota-managed bonds but often misses a broader set of implicit obligations intermediated through corporatized platforms, contingent commitments, and unpaid bills.

A central distinction for our analysis is between *solvency* and *liquidity*. Even when a local government is expected to remain solvent, its short-run cash flow can be constrained by rigid expenditure items (e.g., wages and basic public services), volatility in land-related and other cyclically sensitive revenues, and maturity pressure on outstanding obligations. Under such conditions, delaying payments to contractors and affiliated public entities becomes an administratively feasible margin of adjustment. Relative to a formal default on bonds or bank debt, postponing commercial payments is less visible, typically less tightly regulated, and can be accumulated as a de facto short-term borrowing instrument. This is the institutional foundation of what we call the *government arrears channel*: the state smooths cash outflows by forcing firms to extend involuntary trade credit.

Crucially, these liabilities are not fully reflected in standard debt statistics. While explicit local government debt is subject to quota management and market scrutiny, overdue commercial payables and project settlements can remain "off balance sheet" from the government's accounting perspective—even as they appear as accounts receivable on firms' balance sheets. This wedge between fiscal statistics and corporate accounts is exactly what allows arrears to build up without an immediate increase in reported government debt, and motivates our use of firm-level receivables disclosures to proxy for payment arrears in Section 4.2.1.

[1] China's modern "four-budget" framework distinguishes the general public budget, government fund budget, state capital operating budget, and social security fund budget. In practice, many economically meaningful liabilities and cash-flow commitments remain outside the narrow "general budget" concept used in standard fiscal statistics, especially when mediated through corporatized entities and project platforms.

2.2 Government as a trading counterparty

In China, local governments interact with firms not only through taxation and regulation, but also as major purchasers of goods and services and as owners of large-scale investment projects. Government procurement is legally defined to cover the compensated acquisition of goods, construction, and related services via contract (PRC, 2015). In sectors such as infrastructure and public works, the state is therefore a pivotal downstream demander, and payment terms embedded in procurement and project contracts become macro-relevant for firm liquidity.

A defining feature of the Chinese setting is that many SMEs do not directly undertake government projects. Capacity constraints, qualification requirements, compliance costs, and bid-evaluation practices (including documentation, bonding, and performance guarantees) tend to favor larger, more established contractors. Government procurement regulations also explicitly condition subcontracting on purchaser approval and maintain the prime contractor's responsibility for contract performance (PRC, 2015). These institutional frictions channel a large fraction of public projects through qualified prime contractors—commonly SOEs and LGFVs—which serve as general contractors, project implementation platforms, and financing vehicles (Hendy et al., 2024). We refer to SOEs and LGFVs acting in this prime-contractor role collectively as *public entities*.

Once a prime contractor is awarded a public contract, project execution frequently proceeds through multiple tiers of subcontracting and supplier relationships: the prime contractor subcontracts specialized tasks (e.g., engineering, installation, materials) to subcontractors, who may further subcontract to smaller firms and crews. This layered structure implies that the government's effective payment obligation is distributed over a network rather than a single firm. Delays at the top of the chain can therefore cascade downstream and upstream: if the government postpones progress payments or final settlements, prime contractors experience a working-capital shortfall and may respond by stretching payments to subcontractors and suppliers, propagating liquidity pressure through trade credit.

Figure 6 provides a stylized visualization of this network logic: a focal public entity sits between government departments (as receivable-side debtors) and upstream private suppliers (as payable-side creditors), with directed edges representing trade-credit exposures. The figure illustrates the empirical object of interest in this paper: a *multi-layer receivables–payables network* in which public entities may buffer or amplify local fiscal stress. Section 5 operationalizes this concept by tracing (i) government-to-public-entity receivables and (ii) public-entity-to-supplier payables within disclosed bilateral relationships.

2.3 From debt-maturity liquidity shocks to firm dynamics

A core empirical challenge is that overall local fiscal pressure is partly endogenous: revenue shortfalls and spending needs co-move with local economic conditions, potentially confounding the relationship between government payment behavior and firm outcomes. We therefore distinguish broad fiscal stress from *maturity-driven liquidity pressure*. Debt maturity structure generates a "liquidity wall" component: near-term obligations coming due are largely determined by past borrowing and refinancing decisions, and thus can vary substantially across cities even conditional on contemporaneous economic conditions. This logic is consistent with canonical theories of maturity and rollover risk (Diamond, 1991b; He and Xiong, 2012b; Acharya et al., 2011). In our setting, the key institutional point is that governments generally avoid explicit default on formal debt and instead adjust cash outflows on margins that are easier to delay—including payments to contractors and public platforms. This makes maturity pressure a natural trigger for arrears accumulation.

When the state delays payments, exposed firms experience an increase in receivables and a tightening of internal liquidity. For financially constrained firms, such working-capital shocks can directly reduce investment and employment, increase reliance on costly external finance, and raise exit risk. A large corporate finance literature emphasizes that trade credit is both a financing margin and a propagation mechanism: suppliers extend credit when bank finance is scarce, and payment delays can transmit distress along supply chains (Petersen and Rajan, 1997b; Cuñat, 2007; Jacobson and von Schedvin, 2015). From a broader network perspective, input-output and credit linkages can amplify idiosyncratic or sectoral shocks into more aggregate consequences (Acemoglu et al., 2012b; Carvalho, 2014; Acemoglu et al., 2015).

In the Chinese institutional environment, the layered subcontracting system implies that many SMEs are indirectly exposed to government liquidity conditions, even if they never contract with the state directly. A liquidity shock originating from a city's maturity wall can therefore propagate through (i) delayed payments from government units to public entities, and then (ii) delayed payments from these intermediaries to upstream private firms. This motivates both our measurement choices—using government-related receivables and dyadic trade-credit links—and our downstream incidence analysis on SMEs and market dynamics (Section 6).

The institutional structure yields three predictions that guide the empirical analysis:

1. **Government-to-public transmission.** Increases in maturity-driven liquidity pressure predict higher government-related receivables among public entities.

2. **Public-to-private propagation.** Public entities facing higher government-related re-

ceivables lengthen payables to their suppliers, with stronger patterns for suppliers that are smaller or more financially constrained.

3. **Real incidence on SMEs.** More exposed locations and upstream industries face tighter financing constraints and weaker real outcomes, including lower investment, lower employment, and lower survival.

We implement these tests using city-year maturity pressure (Section 4.2.2), firm and dyadic receivables/payables disclosures, and SME survey outcomes (Sections 5 and 6).

3. Theoretical Framework

This section develops a parsimonious model linking short-run local-government liquidity stress to (i) delayed commercial payments to government-facing public entities and (ii) the propagation of these delays upstream through trade-credit networks, inducing real adjustments by upstream firms. The model maps directly to our measurement strategy based on (a) government debt maturity pressure, (b) dyadic receivables/payables relationships from footnote counterparty disclosures, and (c) upstream SME outcomes. In the empirical sections, the model-internal pressure ratio Λ_{jt} is proxied by $\text{GovPressure}_{c,t}$, our city-year maturity-pressure measure constructed from bond-level maturity schedules and final accounts (Section 4).

3.1 Environment and Timing

Time is discrete, indexed by $t = 1, 2, \ldots$. There is a set of local government units $\mathcal{J}$, a set of government-facing public entities $\mathcal{I}$ (SOEs and LGFVs acting as prime contractors), and a set of upstream suppliers $\mathcal{K}$ (typically private firms and SMEs). A public entity $i \in \mathcal{I}$ is connected downstream to government units $j \in \mathcal{J}$ through public procurement and project contracting, and upstream to suppliers $k \in \mathcal{K}$ through intermediate-input purchases. Subscripts follow the convention: c indexes cities, i indexes public entities, j indexes government units, k indexes suppliers, and t indexes years.

Within each period t, the following sequence of events occurs:

1. **Government liquidity state.** Each government j faces a predetermined near-term liquidity pressure Λ_{jt} (defined below).

2. **Project settlement due.** For each (i, j) link, a contractual settlement amount $q_{ijt} \geq 0$ becomes due at the end of period t.[2]

[2]In the data, q_{ijt} is not directly observed, but the model requires only that q_{ijt} is predetermined

3. **Payment timing decisions.** Government j chooses a delayed-payment rate $\delta_{jt} \in [0, 1]$ applied to all contemporaneous settlements it owes. Public entities then choose how to meet their own liquidity needs, including whether to stretch payables to suppliers.

4. **Production and real adjustment.** Suppliers choose real activity (investment/employment) subject to working-capital constraints shaped by upstream payment delays.

Let M_{jt} denote the principal amount maturing within the next 12 months (including both explicit local-government bonds and affiliated quasi-fiscal obligations), and let R_{jt} be realized fiscal revenue. Short-run liquidity stress is summarized by the ratio

$$\Lambda_{jt} \equiv \frac{M_{jt}}{R_{jt}}. \tag{1}$$

In the empirical sections, Λ_{jt} is proxied by $\text{GovPressure}_{c,t}$, our city-year maturity-pressure measure described in Section 4.

3.2 Government Payment Delay under Liquidity Stress

Consider government j in period t. Delaying one unit of payment preserves one unit of liquidity today, whose shadow value we denote $\mu(\Lambda_{jt})$, with $\mu'(\cdot) > 0$. Delaying payments is costly due to enforcement, political and reputational penalties, and efficiency losses in future contracting. Assuming a convex delay cost with parameter $\kappa_j > 0$, government j chooses δ_{jt} to maximize

$$U_{jt}(\delta_{jt}) = \mu(\Lambda_{jt})\, \delta_{jt}\, Q_{jt} - \frac{\kappa_j}{2}\, \delta_{jt}^2\, Q_{jt}, \tag{2}$$

subject to $\delta_{jt} \in [0, 1]$, where $Q_{jt} \equiv \sum_{i \in \mathcal{I}} q_{ijt}$ is the total contemporaneous settlement obligation.

Let a_{ijt} denote the end-of-period unpaid balance owed by government j to public entity i (an arrears stock). Arrears are partially repaid in subsequent periods at an exogenous repayment rate $\pi_j \in (0, 1]$:

$$a_{ijt} = (1 - \pi_j)\, a_{ij,t-1} + \delta_{jt}\, q_{ijt}. \tag{3}$$

Equation (3) maps directly to balance-sheet receivable stocks: for public entity i, the

at the annual frequency relative to short-run liquidity pressure. This motivates within-link designs that absorb time-invariant link scale and focus on payment timing.

government-related receivable balance increases in the contemporaneous delayed fraction and inherits persistence from incomplete repayment.

3.3 Public Entities: Bank Finance versus Stretching Payables

A public entity i experiences a liquidity shortfall equal to the cash it does not receive on time from its debtor governments:

$$x_{it} \;\equiv\; \sum_{j\in\mathcal{J}} \left[(1-\pi_j)\, a_{ij,t-1} + \delta_{jt}\, q_{ijt}\right]. \tag{4}$$

Public entities cover x_{it} through (i) external finance (bank loans or market funding) and (ii) stretching payables to suppliers. Consistent with standard trade-credit models, both margins are costly, with increasing marginal costs capturing collateral constraints and renegotiation or enforcement costs (Petersen and Rajan, 1997b; Cuñat, 2007; Burkart and Ellingsen, 2004b; Kiyotaki and Moore, 1997).

Let $\ell_{it} \geq 0$ denote incremental external finance and $d_{it} \geq 0$ the total amount of payments to suppliers delayed beyond the contractual term.[3] Financing costs are quadratic:

$$C_i(\ell_{it}, d_{it}) \;=\; \frac{\rho_i}{2}\,\ell_{it}^2 \;+\; \frac{\eta_i}{2}\,d_{it}^2, \tag{5}$$

where $\rho_i > 0$ indexes tightness of external finance and $\eta_i > 0$ indexes the marginal cost of stretching payables (e.g., penalties, reputation loss, supplier retaliation).

Public entity i chooses (ℓ_{it}, d_{it}) to minimize financing costs subject to meeting the liquidity need:

$$\min_{\ell_{it}\geq 0,\; d_{it}\geq 0} \; C_i(\ell_{it}, d_{it}) \quad \text{s.t.} \quad \ell_{it} + d_{it} \;\geq\; x_{it}. \tag{6}$$

Let $m_{it} \equiv \sum_{k\in\mathcal{K}} m_{ikt}$ be the value of intermediate purchases by i from upstream suppliers during period t, and define input shares $\omega_{ik} \equiv m_{ikt}/m_{it}$, with $\sum_k \omega_{ik} = 1$. Delayed payments are allocated proportionally across suppliers:

$$d_{ikt} \;=\; \omega_{ik}\, d_{it}. \tag{7}$$

This proportionality is a tractable benchmark; empirically, we allow for rich heterogeneity across (i,k) links via link fixed effects and interact exposure with supplier characteristics (size, bargaining power, enforcement).

Let p_{ikt} denote the end-of-period unpaid balance owed by public entity i to supplier k

[3] In the empirical application, the stock counterpart of d_{it} corresponds to accounts payable balances (and other payables) disclosed in financial statements.

(a payables stock). Analogous to government arrears, payables are partially repaid over time at rate $\pi_i^S \in (0, 1]$:

$$p_{ikt} \;=\; (1 - \pi_i^S)\, p_{ik,t-1} \;+\; d_{ikt}. \tag{8}$$

Equation (8) provides the balance-sheet mapping for our dyadic supplier links: increases in the flow of delayed payments d_{ikt} translate into higher payables stocks p_{ikt} observed in financial statements.

3.4 Upstream Suppliers and Real Adjustment

Supplier k's liquidity shortfall is the sum of delayed inflows from its customers:

$$x_{kt} \;\equiv\; \sum_{i \in \mathcal{I}} d_{ikt}. \tag{9}$$

The working-capital shock x_{kt} reduces resources available for real activity. To connect to outcomes in the SME survey, consider a reduced-form investment (or employment) choice $I_{kt} \geq 0$ that yields concave gross returns $A_k I_{kt} - \frac{\chi_k}{2} I_{kt}^2$, with $\chi_k > 0$. Financing I_{kt} requires liquidity; the supplier can borrow ℓ_{kt} at convex cost $(\rho_k/2)\ell_{kt}^2$. Let $\bar{w}_k$ denote the supplier's baseline liquid resources before payment delays. The supplier solves

$$\max_{I_{kt} \geq 0,\, \ell_{kt} \geq 0} \left\{ A_k I_{kt} - \frac{\chi_k}{2} I_{kt}^2 - I_{kt} - \frac{\rho_k}{2} \ell_{kt}^2 \right\} \quad \text{s.t.} \quad I_{kt} \;\leq\; \bar{w}_k - x_{kt} + \ell_{kt}. \tag{10}$$

This formulation delivers a transparent mapping from upstream liquidity shocks to real adjustments and highlights the role of financial constraints (high ρ_k) emphasized in corporate finance and macro-finance (Fazzari et al., 1988; Almeida et al., 2004; Guerrieri and Lorenzoni, 2017).

3.5 Equilibrium and Testable Implications

We summarize the model's key comparative statics in three propositions, with proofs in Appendix B.

Proposition 1 [Government arrears increase with liquidity pressure**]** *Suppose $\mu(\Lambda)$ is strictly increasing and differentiable and $\kappa_j > 0$. Then an optimal delayed-payment rate exists and equals $\delta_{jt} = \min\{1, \max\{0, \mu(\Lambda_{jt})/\kappa_j\}\}$. Consequently, holding (i, j) and q_{ijt} fixed, the arrears stock a_{ijt} in (3) is weakly increasing in Λ_{jt}.*

Proposition 2 [Trade-credit pass-through from public entities to suppliers**]** *In problem (6), the*

liquidity constraint binds and the unique optimum satisfies

$$d_{it} \;=\; \alpha_i \, x_{it}, \qquad \ell_{it} \;=\; (1-\alpha_i)\, x_{it}, \qquad \alpha_i \;\equiv\; \frac{\rho_i}{\rho_i + \eta_i} \in (0,1). \tag{11}$$

Given the payables law of motion (8), the payables stocks p_{ikt} are increasing in x_{it}, with stronger persistence when repayment is slow (low π_i^S). The pass-through coefficient α_i is increasing in ρ_i (tighter external finance) and decreasing in η_i (higher marginal cost of delaying suppliers).

Proposition 3 [Upstream real outcomes decline with downstream arrears exposure**]** *Let $I_{kt}^{\star}$ denote the solution to (10). Then $I_{kt}^{\star}$ is weakly decreasing in the liquidity shortfall x_{kt} defined in (9), with sensitivity increasing in the supplier's financing tightness ρ_k. Under interior solutions, $\partial I_{kt}^{\star}/\partial x_{kt} < 0$ and the magnitude of this derivative is increasing in ρ_k.*

Network propagation and empirical mapping. The two-tier structure above (government → public entity → supplier) corresponds to the relationship-level links we observe in financial statement footnotes. More generally, if all firms face the same financing trade-off as in Proposition 2, and S is the input-share matrix with elements s_{nm} equal to the share of firm n's delayed payables allocated to supplier m, then firm-level liquidity shortfalls satisfy the linear system

$$\mathbf{x}_t \;=\; S^{\top} A \, \mathbf{x}_t \;+\; \mathbf{s}_t, \tag{12}$$

where A is a diagonal matrix collecting pass-through coefficients and $\mathbf{s}_t$ is the vector of origin shocks generated by government payment delays (nonzero only for firms directly exposed to government arrears). When the spectral radius of $S^{\top}A$ is below one, the unique fixed point is $\mathbf{x}_t = (I - S^{\top}A)^{-1}\mathbf{s}_t$. The Neumann-series expansion of $(I - S^{\top}A)^{-1}$ decomposes amplification by upstream distance: the first term captures direct exposure, the second captures second-order propagation through the supply chain, and so on. In our empirics, we directly identify the first two layers of this series using dyadic government–public-entity and public-entity–supplier links, and we operationalize exposure measures using predetermined shares (e.g., pre-period input-output weights) consistent with equation (12).

Empirically testable predictions. Propositions 1–3 yield three sets of tightly testable implications that guide the empirical design:

(i) *Government → public entities.* Within a fixed (i, j) relationship, the government-related unpaid balance a_{ijt} increases in Λ_{jt}. Link fixed effects absorb time-invariant contract scale, so identification comes from within-link variation in maturity pressure.

(ii) *Public entities → suppliers.* Within a fixed (i, k) relationship, payables to suppliers increase with the component of x_{it} predicted by debtor-side Λ_{jt}. This motivates our IV construction based on maturity pressure, which we implement in Section 5.

(iii) *Upstream firms.* Investment, employment, and survival decline with exposure to downstream arrears, with stronger effects for financially constrained suppliers (high ρ_k) and for suppliers with weaker bargaining power (lower effective η_i from the buyer's perspective). We test these predictions in Section 6.

4. Data, Measurement, and Stylized Facts

Our empirical analysis links local-government liquidity conditions to firm balance sheets and supply-chain trade credit. We assemble three complementary datasets. The first is a city-year panel of local fiscal accounts and debt maturity pressure from final accounts and bond-market data. The second is firm-level financial statements with *footnote counterparty disclosures* for SOEs and LGFVs, which recover *bilateral* receivables and payables links. The third is the ESIEC SME survey, which provides direct evidence on financing constraints, operational adjustments, expectations, and overdue receivables by debtor identity. Together, these datasets measure government-side shock intensity, propagation through trade-credit links, and incidence on upstream SMEs that are rarely visible in large-firm counterparty disclosures.

4.1 Data Sources

4.1.1 Local Fiscal Accounts and Government Debt Maturity Structure

City-level fiscal variables are primarily drawn from local governments' publicly released *final accounts* reports. These reports provide realized (ex post) budget execution outcomes and are the most relevant source for measuring the *realized* fiscal resources that can be mobilized in a given year. Our research team hand-collects and digitizes these documents from local-government portals, harmonizes reporting formats across jurisdictions and years, and constructs a city-year panel covering 2015–2024. The resulting dataset includes the core components used throughout the paper: general public budget revenue and expenditure, land-related revenues recorded in the government fund budget, and related fiscal structure indicators. We retain raw source files and metadata to ensure full traceability from processed variables back to the original government releases.

We measure explicit (on-budget) local government debt using bond-level information from the public market, including both *general bonds* and *special bonds*. For each bond, we observe issuance amount, coupon characteristics, and contractual maturity (and, when

relevant, principal repayment structure), which allows us to construct the outstanding stock and the maturity schedule at each point in time.

A large share of local public investment and quasi-fiscal activity is intermediated through LGFVs, whose liabilities are widely viewed as a key component of "implicit" local public debt (Huang et al., 2020). We therefore construct LGFV debt measures using bond-market data at the issuer (platform) level. We first identify bond-issuing LGFVs and map them to their sponsoring localities using ownership and affiliation information, then aggregate bond obligations to the platform level and further to the city-year level. Crucially for our identification strategy, bond-level data provide a transparent and internally consistent way to recover *debt maturity structure* and thus near-term repayment (rollover) pressure.

Using bond maturity schedules, we compute the amount of principal coming due within the next 12 months and use it to construct our baseline city-year liquidity-pressure measure, $\text{GovPressure}_{c,t}$, defined formally in Section 4.2.2. Because the maturity profile is mechanically predetermined by past issuance and refinancing choices, it provides a direct measure of short-run repayment pressure that is conceptually distinct from contemporaneous fiscal stance or local demand conditions (Diamond, 1991b; He and Xiong, 2012b).

4.1.2 SOE/LGFV Financial Statements and Footnote Counterparty Disclosures

We assemble annual financial statements for listed SOEs/LGFVs and for bond-issuing public entities over 2015–2024. This scope is important in China: many LGFVs are unlisted but actively issue bonds, and restricting to listed firms would miss a large fraction of government-facing project platforms.

A key feature of Chinese annual reports is the disclosure of *major counterparty* information in footnotes: firms report the identities and amounts of their *top-five* counterparties for accounts receivable (A/R), other receivables (O/R), accounts payable (A/P), and other payables (O/P). We digitize these tables, standardize counterparty names, and store the output in a long panel format (firm $\times$ year $\times$ account type $\times$ rank), preserving both raw and normalized names. Appendix A documents the full extraction, cleaning, and validation pipeline, including unit harmonization, internal consistency checks, and traceability back to the raw PDF/HTML filings.

The top-five disclosure rule introduces a censoring problem that we address explicitly. On the *extensive margin*, a counterparty enters the disclosed list only if its balance ranks among the five largest for that account type in that year; smaller or more diffuse relationships are systematically excluded. On the *intensive margin*, the reported amount is the full bilateral balance conditional on appearing in the top five, so the observed distribution is right-truncated at the sixth-largest balance. This censoring could bias our government-exposure measures if government counterparties are systematically more or less likely to

appear in the top five relative to private counterparties.

Table 1 shows that receivables are highly concentrated among public entities—top-five A/R counterparties account for about 82% of total A/R and top-five O/R counterparties for about 76% of total O/R—so the top-five window captures the economically dominant relationships. Moreover, government entities account for about 36% of top-five receivables in the full sample (Table 1), indicating that government arrears are quantitatively first-order in the balance sheets of public entities. To address residual selection concerns, our dyadic specifications include firm-year fixed effects that absorb any time-varying propensity to appear in the top-five list, and we instrument for government exposure using the predetermined maturity structure of local government debt (Section 4.2.2). Payables are less concentrated but still economically meaningful: top-five A/P counterparties account for about 58% of total A/P and top-five O/P counterparties for about 69% of total O/P (Table 2). These facts motivate our focus on top-five disclosures as a high-signal window into the largest bilateral credit links.

4.1.3 ESIEC SME Survey

We use microdata from the *Enterprise Survey for Innovation and Entrepreneurship in China* (ESIEC), a large-scale field survey conducted by Peking University's Center for Enterprise Research. The ESIEC is a stratified random sample of private enterprises, with the sampling frame drawn from the National Enterprise Registration Database; stratification is by province, county, and industry, ensuring broad geographic and sectoral coverage and mitigating concerns about selection toward larger or more visible firms. The survey is especially valuable for our setting because it measures SME constraints and adjustments along dimensions that are typically unobservable in administrative datasets, including (i) financing needs and realized funding, (ii) credit access and sources of finance (banks, private financial institutions, informal finance), (iii) operating conditions and profitability, (iv) investment and innovation activities, and (v) managerial expectations and perceived business environment. Our main analysis uses ESIEC waves for 2018, 2023, and 2025, covering more than 17,000 private SMEs across multiple counties. Importantly, the 2025 wave additionally elicits information on *overdue receivables* and the identity of the debtor (government vs. non-government), which we exploit to validate our exposure measures and to interpret mechanisms. We report survey coding and question mapping in Appendix A.2.

4.2 Measurement

4.2.1 Measuring Government Payment Arrears (AR_gov)

A direct measure of government arrears would ideally isolate *overdue* obligations relative to contractual terms. In practice, overdue disclosures are incomplete and accounting-

dependent—impairment policies, renegotiation, and classification discretion vary across firms and years—making them unsuitable as a consistent panel measure. We therefore measure government arrears using *government-related receivables* appearing on the balance sheets of SOEs/LGFVs and in their top-counterparty footnotes; the rationale for this proxy is concentrated here and not repeated in subsequent sections. When governments smooth cash outflows under liquidity stress, they delay settlement to contractors and project platforms, which appear as elevated receivables on the creditor's balance sheet. Receivables thus provide a consistent, audited, and panel-comparable signal of outstanding unpaid balances owed by government counterparties.

Let $AR^{\text{top5}}_{i,j,t}$ denote the A/R balance of public entity i from counterparty j in year t, observed when j appears among i's top-five A/R debtors in the footnotes. Analogously define $OR^{\text{top5}}_{i,j,t}$ for other receivables. These dyadic objects allow us to construct a government–public-entity panel at the relationship level, which is the foundation for our within-link identification strategy in Section 5.

We classify counterparty identities using an AI-assisted name classifier applied to normalized Chinese entity names, validated against a manually labeled benchmark with a 99.2% agreement rate; Appendix A.3 provides the prompt template, validation design, and jurisdiction-mapping rules. We then define firm-year government-related receivables as follows.

Variable: $AR^{\text{gov}}_{i,t}$.

$$AR^{\text{gov}}_{i,t} \equiv \sum_{j\in\mathcal{G}} AR^{\text{top5}}_{i,j,t}, \qquad OR^{\text{gov}}_{i,t} \equiv \sum_{j\in\mathcal{G}} OR^{\text{top5}}_{i,j,t}, \tag{13}$$

where $\mathcal{G}$ is the set of counterparties classified as government departments or affiliated public institutions. *Text definition*: $AR^{\text{gov}}_{i,t}$ is the sum of accounts-receivable balances that public entity i holds against government counterparties in year t, aggregated over all government entities appearing in i's top-five A/R footnote disclosure. *Economic meaning*: This variable measures the stock of outstanding payment obligations that government units have not yet settled with their contractors and project platforms; it is preferred over total A/R because it isolates the government-origin component of delayed settlement, which is the channel of interest, and over overdue-receivable disclosures because those are inconsistently reported across firms and years. *Data source*: Annual report footnotes of listed SOEs and bond-issuing LGFVs, extracted from CNRDS and WIND financial databases and supplemented by hand-collected PDF filings for non-listed bond issuers.

In dyadic analyses, we work directly with $\ln(AR^{\text{top5}}_{i,j,t})$ (government–SOE links) and with $\ln(AP^{\text{top5}}_{k,i,t})$ (SOE–supplier links), which allows us to trace propagation along the trade-credit network.

Receivables stocks can mechanically covary with the scale of transactions. To sharpen interpretation toward *delayed settlement*, we complement stock measures with liquidity-efficiency statistics: receivables turnover rate and receivables turnover days (defined as 365/turnover rate). Stylized Fact 4.3.4 below shows that turnover days rise sharply in recent years and correlate strongly with government exposure, consistent with a delayed-settlement interpretation rather than a pure scale effect.

All continuous monetary variables are winsorized at the 1st and 99th percentiles at the firm-year level, applied separately for each variable, to reduce sensitivity to rare reporting errors and unit-conversion artifacts. Appendix A.5 reports additional internal consistency checks (top-five sums vs. balance-sheet totals, share bounds, and flagged year-to-year jumps) and shows that our results are robust to alternative trimming rules.

4.2.2 Measuring Local Government Liquidity Pressure (GovPressure)

Our key city-level explanatory variable captures *near-term liquidity pressure* rather than general fiscal stance.

Variable: GovPressure$_{c,t}$.

$$\text{GovPressure}_{c,t} \equiv \frac{\text{Maturing Debt}_{c,t}^{(\leq 1\,\text{yr})}}{\text{Fiscal Revenue}_{c,t}}, \tag{14}$$

where Maturing Debt$_{c,t}^{(\leq 1\,\text{yr})}$ is the amount of debt principal coming due within the next 12 months in city c and year t, and Fiscal Revenue$_{c,t}$ is realized general public budget revenue from final accounts. *Text definition*: GovPressure$_{c,t}$ is the ratio of near-term (within-year) debt principal obligations to realized fiscal revenue for city c in year t, measuring the fraction of annual revenue that must be devoted to imminent debt repayment. *Economic meaning*: This ratio operationalizes the "liquidity wall" concept in rollover-risk models: a high ratio signals that a city faces binding short-run cash demands relative to its revenue base, creating incentives to delay discretionary payments—including settlement of contractor invoices—even absent changes in long-run solvency (Diamond, 1991b; He and Xiong, 2012b). Scaling by fiscal revenue ensures comparability across cities of different size and avoids confounding maturity pressure with the level of indebtedness. *Data source*: Maturing Debt$_{c,t}^{(\leq 1\,\text{yr})}$ is constructed by aggregating bond-level maturity schedules for (i) local government bonds (general and special) from the China Bond Information Network and (ii) affiliated LGFV bond obligations from WIND, after mapping issuers to cities using jurisdiction and affiliation information; Fiscal Revenue$_{c,t}$ is drawn from hand-collected local government final accounts reports.

Because the maturity profile is mechanically predetermined by past issuance and refinancing choices, it provides time variation in short-run repayment needs that is concep-

tually distinct from contemporaneous fiscal stance or local demand conditions. Section 5 exploits this predetermined variation as the basis for our identification strategy.

To benchmark magnitude, we aggregate government-related receivables among listed and bond-issuing public entities and obtain a conservative lower bound of roughly 11.1 trillion RMB in 2024 (4.9 trillion in A/R and 6.2 trillion in O/R), noting that this calculation relies on top-five disclosures and excludes non-issuing, non-listed firms. Appendix A.5 reports the aggregation procedure and sensitivity checks.

4.3 Stylized Facts

Before turning to the empirical strategy, we document four stylized facts that motivate our measurement choices, make the network-propagation mechanism concrete, and discipline interpretation of our causal designs.

4.3.1 Stylized Fact 1: Top-Counterparty Concentration Is High and Stable, and Government Exposure Is Quantitatively Large

Receivables of SOEs/LGFVs are highly concentrated among a small set of large debtors, validating the top-five disclosure window as a high-coverage measure of economically salient credit links. Table 1 reports that top-five A/R counterparties account for about 81.9% of total A/R and top-five O/R counterparties for about 75.7% of total O/R in the full sample. This concentration is not a transient artifact of a particular year: the top-five A/R share is 82.3% in 2016, 83.6% in 2020, and 79.1% in 2024; for O/R the corresponding shares are 77.6%, 76.8%, and 73.3%, respectively. These levels imply that the largest receivables relationships—the ones most likely to embody economically meaningful payment delays—are directly observed in footnotes, and that the censoring problem discussed in Section 4.1.2 is quantitatively limited.

The government component among these large receivables is sizable. Government entities account for about 36.2% of top-five receivables in the full sample, with a slightly higher share around 2020 (37.2%) and a still elevated level in 2024 (34.4%) (Table 1). This accounting fact underscores the macro relevance of the arrears channel: a nontrivial fraction of large receivable balances of public entities is tied to government counterparties, so government payment delays have first-order balance-sheet consequences for the public-entity sector.

On the liability side, payables are less concentrated but remain sufficiently so to meaningfully map upstream links. Table 2 shows that top-five A/P counterparties account for about 57.5% of total A/P (58.7% in 2016; 56.5% in 2020; 54.5% in 2024), while top-five O/P counterparties account for about 68.6% of total O/P (73.9% in 2016; 66.1% in 2020; 66.8% in 2024). Together, these patterns justify our use of top-counterparty disclosures to construct

a trade-credit network with strong coverage of economically salient links.

4.3.2 *Stylized Fact 2: Receivables and Payables Co-Move, Consistent with Balance-Sheet Propagation of Trade-Credit Stress*

Mean receivables and mean payables of SOEs/LGFVs trend upward together over 2015–2024, consistent with balance-sheet propagation of trade-credit stress along supply chains. Figure 3 documents two regularities. First, mean A/R, O/R, A/P, and O/P all trend upward over the sample period, indicating that trade-credit balances have become increasingly salient in the corporate balance sheets of public entities. Second, after absorbing year fixed effects, there is a strong positive within-year relationship between A/R and A/P: public entities that are owed more also tend to owe more (Panel B, $R^2 \approx 0.144$).

This co-movement is exactly what one would expect if liquidity stress propagates through balance sheets. When a firm becomes an involuntary creditor—higher receivables due to delayed payment by its customers—it partially finances the resulting working-capital shortfall by stretching payments to its own suppliers (higher payables). The pattern aligns with the broader trade-credit literature emphasizing that payment delays can transmit shocks along supply chains (Petersen and Rajan, 1997b; Cuñat, 2007; Jacobson and von Schedvin, 2015). Stylized Fact 2 therefore provides descriptive motivation for our dyadic pass-through estimation in Section 5.

4.3.3 *Stylized Fact 3: Government Arrears Exposure Is Heterogeneous across Provinces and Industries, and Survey Evidence Validates the Accounting-Based Patterns*

Government arrears exposure varies substantially across provinces and industries, and this heterogeneity is consistently captured by both audited financial statements and independent survey data. Figure 4 (top panels) shows pronounced cross-sectional variation in government-related receivables across provinces using SOE/LGFV balance-sheet data. The bottom panels show closely aligned patterns using ESIEC 2025 micro survey data from six provinces (Shanghai, Zhejiang, Guangdong, Liaoning, Gansu, and Henan), where SMEs directly report government-related overdue receivables. The alignment across fundamentally different measurement systems—audited financial statements for public entities versus survey-reported overdue receivables for private SMEs—provides external validation that our accounting-based proxy captures economically meaningful government arrears exposure rather than idiosyncratic reporting artifacts.

Government exposure is also highly uneven across industries. Figure 4 shows that industries closely tied to public procurement and infrastructure delivery—most notably construction and utilities (electricity/water/gas), and, in the SME survey, government-facing service sectors such as information and software-related activities—exhibit both larger receivable amounts and higher government shares. This sectoral structure implies

that government liquidity stress can disproportionately load onto specific downstream industries and then propagate upstream through input-output and supplier networks. It also motivates our shift-share exposure strategy in Section 6.1.2, which explicitly leverages heterogeneity across both *location* and *industry* dimensions.

4.3.4 Stylized Fact 4: Turnover Days Rise Sharply and Correlate Strongly with Government Exposure, Consistent with Delayed Settlement Rather Than Routine Trade Credit

Receivables turnover days have deteriorated markedly over the sample period and are tightly linked to government exposure, distinguishing delayed settlement from contractually normal trade credit. Figure 5 addresses this interpretational concern using turnover-based measures.

First, turnover efficiency deteriorates markedly over time. Panel A shows that receivables turnover days increase steadily in recent years; by the end of the sample, the median collection period exceeds 200 days and approaches roughly 250 days. These horizons far exceed standard commercial payment terms and typical project settlement windows in procurement and construction settings, suggesting that a substantial portion of receivables reflects delayed payment rather than routine short-term credit.

Second, turnover days are tightly linked to government exposure on the receivables side but not mechanically mirrored on the payables side. Panels B–C show a steep positive relationship between government share among major receivables and A/R turnover days: public entities with more government-exposed receivables collect significantly more slowly. In contrast, Panel D shows that the corresponding relationship between government share and A/P turnover days is much weaker. This asymmetry is consistent with an origin-of-shock interpretation: government liquidity conditions primarily impair collection at downstream nodes (raising receivables and receivables days), while payables extension is an endogenous adjustment margin that depends on intermediary liquidity management and bargaining frictions. Stylized Fact 4 therefore motivates our empirical emphasis on maturity-driven government liquidity pressure as the trigger and on dyadic links as the propagation mechanism.

The four stylized facts together establish that (i) our top-five disclosure data capture the dominant bilateral credit relationships, (ii) balance-sheet co-movement is consistent with propagation, (iii) geographic and sectoral heterogeneity in government exposure is real and independently validated, and (iv) the receivables signal reflects delayed settlement rather than routine trade credit. Section 5 builds on these facts to estimate the causal effect of government maturity pressure on the full arrears-propagation chain.

5. Fiscal-to-Real Transmission via Trade Credit Networks

This section tests the paper's core transmission mechanism: local-government liquidity pressure increases delayed settlement to public entities (SOEs/LGFVs), which then passes through to suppliers via trade credit. The central challenge is identification. Liquidity pressure is not randomly assigned, and standard fiscal accounts do not directly record the commercial liabilities that matter for this channel.

Our contribution is to make the arrears channel observable and identifiable at the level of *bilateral debtor–creditor relationships*. Using audited financial statements and footnote disclosures of major counterparties, we construct panels of (i) government unit j–public entity i receivables links, and (ii) public entity i–supplier k payables links. These data allow us to trace a directed trade-credit network in which the government is the origin node, SOEs/LGFVs are intermediary hubs, and upstream suppliers are recipient nodes. This dyadic mapping is the key step that prior work typically cannot implement due to the absence of relationship-level information on unpaid obligations.[4]

The section evaluates three testable predictions: debtor-government maturity pressure raises unpaid balances in government–public-entity dyads; public entities with larger government-induced receivables delay payments to suppliers; and pass-through is incomplete and varies by intermediary liquidity and supplier type.

Our empirical design maps one-to-one to these predictions. We begin with city–firm motivation regressions, then estimate relationship-level effects in government–public-entity dyads, and finally estimate supplier pass-through with IV to isolate maturity-driven variation (e.g., Khwaja and Mian, 2008).

5.1 Empirical Framework and Identification

5.1.1 Why identification is hard in the arrears literature

A credible government arrears design must confront three recurring obstacles.

Measurement. Commercial arrears can accumulate without a contemporaneous increase in reported government debt, because overdue settlements to contractors are typically not recorded as quota-managed liabilities and are often invisible in standard fiscal datasets. This wedge motivates our measurement choice: we treat government-related receivables

[4] A large literature studies trade credit as a financing margin and as a propagation mechanism (Petersen and Rajan, 1997b; Cuñat, 2007; Jacobson and von Schedvin, 2015; Burkart and Ellingsen, 2004b). What is generally missing in the context of government arrears is a clean measurement of *who owes whom* and thus a credible strategy to separate payment delays from changes in transactions or demand.

on creditors' balance sheets as a conservative proxy for unpaid obligations that are economically meaningful but administratively hard to observe.

Confounding. Local downturns can simultaneously raise fiscal pressure, reduce procurement demand, and worsen private credit conditions, creating confounding in reduced-form correlations. Our key explanatory variable therefore focuses on a maturity-driven component of liquidity stress—the "liquidity wall" implied by debt coming due within one year—which is largely determined by past borrowing and refinancing choices and is conceptually distinct from contemporaneous local demand (Diamond, 1991b; Acharya et al., 2011; He and Xiong, 2012b). Because the maturity structure of outstanding obligations is predetermined relative to current fiscal conditions, it provides variation in liquidity pressure that is plausibly orthogonal to contemporaneous demand shocks. We further verify this claim by showing that pre-trends in receivables do not predict subsequent changes in maturity pressure in supplementary event-study diagnostics, and that results are robust to using explicit local-government bond maturities only (excluding LGFV obligations) and to using LGFV obligations only, which rules out that a single debt category drives the findings.

Endogeneity of receivables and payables. Receivables and payables respond endogenously to firm-level shocks (project progress, renegotiation, enforcement) and to common local shocks. Without relationship-level information, it is difficult to distinguish a government-induced working-capital shock from firm-specific shocks or from changes in sales.

Our dyadic data directly address the endogeneity obstacle and materially improve measurement. To address confounding, we combine maturity-driven variation with within-relationship and within-firm identification.

5.1.2 Data feature that enables dyadic identification

Chinese annual reports and audited financial statements disclose the identities and balances of top counterparties for accounts receivable (A/R), other receivables (O/R), accounts payable (A/P), and other payables (O/P). We digitize these footnote tables and harmonize counterparty names, then classify government entities and map them to jurisdictions (see Appendix A for extraction, cleaning, and classification). Two empirical facts justify the use of top-counterparty disclosures to recover economically meaningful links.

First, receivables are highly concentrated: top-five A/R counterparties account for roughly 80% of total A/R in the SOE/LGFV sample, and top-five O/R counterparties account for roughly 75% (Table 1). Second, the government share among these major receivables is large and persistent (Table 1). On the liability side, payables are less concentrated but still sufficiently so to map salient upstream links: top-five A/P counterparties account for about 55–60% of total A/P (Table 2). These properties imply that the dis-

closed top links capture the relationships most likely to embody quantitatively important payment delays.

5.1.3 Key variables and notation

Let c index cities, t index years, i index public entities (SOEs/LGFVs), j index government units, and k index suppliers.

City-level maturity pressure. Our main city-year measure, $\text{GovPressure}_{c,t}$, is the ratio of debt principal maturing within one year to realized fiscal revenue (constructed from bond-level maturity schedules and final accounts; see Section 4.2.2).

Government-related receivables. At the firm-year level, $AR^{gov}_{i,t}$ denotes the sum of A/R balances owed by government counterparties appearing among firm i's disclosed major debtors. At the dyad level, we observe $AR^{\text{top5}}_{i,j,t}$ whenever government unit j appears among i's top-five A/R debtors in year t.

Supplier payables. For supplier k and public entity i, we observe $AP^{\text{top5}}_{k,i,t}$ whenever k appears among i's top-five A/P creditors in year t.

5.1.4 Layer 1: city–firm motivation regressions

We begin with city–firm regressions that ask whether public entities located in cities facing higher maturity-induced fiscal pressure exhibit larger receivables and worse collection efficiency. Let $c(i)$ denote the city associated with entity i. We estimate:

$$Y_{i,t} = \beta\, \text{GovPressure}_{c(i),t} + X'_{i,t}\Gamma + \mu_i + \delta_t + \varepsilon_{i,t}, \tag{15}$$

where $Y_{i,t}$ includes (i) receivables levels and scales (e.g., ln(A/R), A/R-to-assets), (ii) receivables turnover rate and turnover days, and (iii) the government share among major receivables. $X_{i,t}$ includes standard time-varying firm controls (size, leverage, profitability, and related balance-sheet metrics). μ_i are firm fixed effects and δ_t are year fixed effects. Standard errors are clustered at the city level.

These regressions provide motivating evidence but are not definitive: they cannot fully separate (a) a payment-delay mechanism from (b) changes in the scale or composition of government projects, nor can they cleanly rule out local confounders. We therefore treat (15) as a disciplined motivation step and move to dyadic designs that exploit bilateral links.

5.1.5 Layer 2: government-to-public-entity transmission in dyadic data

We test whether fiscal liquidity pressure at the *debtor government* predicts relationship-level arrears owed to public entities.

Define an indicator for whether government unit j is disclosed as a top-five A/R debtor of public entity i:

$$\mathbb{I}_{i,j,t}^{\text{top5}} \equiv \mathbf{1}\{j \text{ appears among } i\text{'s top-five A/R debtors in year } t\}.$$

We estimate:

$$\mathbb{I}_{i,j,t}^{\text{top5}} = \beta\, \text{GovPressure}_{c(j),t} + X_{i,t}'\Gamma + \lambda_i + \delta_t + u_{i,j,t}, \tag{16}$$

where $c(j)$ maps government unit j to its jurisdiction in the fiscal panel. The extensive margin is naturally threshold-based: it captures whether delinquency becomes large enough to enter the firm's disclosed major-debtor set.

Conditional on observing a government–public-entity dyad, we estimate:

$$\ln\left(AR_{i,j,t}^{\text{top5}}\right) = \beta\, \text{GovPressure}_{c(j),t} + X_{i,t}'\Gamma + \mu_{i,j} + \delta_t + \varepsilon_{i,j,t}, \tag{17}$$

where $\mu_{i,j}$ are government–public-entity pair fixed effects that absorb all time-invariant relationship characteristics (persistent project type, baseline enforcement, contracting history). Identification in (17) comes from *within-pair* changes: conditional on pair fixed effects, do unpaid balances rise precisely in years when the debtor government faces greater short-run maturity pressure?

A remaining concern is that government liquidity pressure could correlate with changes in project demand or settlement timing that affect receivables through channels other than delayed payment. To further isolate a payment-delay mechanism, we exploit the fact that many public entities transact with multiple government units in a given year. We can therefore compare, within the same SOE/LGFV-year, which debtor governments become more delinquent when their liquidity pressure rises. This motivates a within-public-entity specification:

$$\ln\left(AR_{i,j,t}^{\text{top5}}\right) = \beta\, \text{GovPressure}_{c(j),t} + \mu_{i,j} + \phi_{i,t} + \varepsilon_{i,j,t}, \tag{18}$$

where $\phi_{i,t}$ are public-entity-by-year fixed effects absorbing *all* time-varying firm-level factors in year t (overall project scale, liquidity management, accounting practices, and common demand shocks to i). This is directly analogous to the within-firm approach in matched credit data used to disentangle loan-supply shocks from borrower demand (Khwaja and Mian, 2008), and has become a canonical identification tool in the lending-channel literature.

In (18), conditional on public-entity-by-year fixed effects, any remaining effect must operate through differential delinquency across debtor governments rather than through firm-wide changes in activity.

The identifying assumption in Layer 2 is that $\text{GovPressure}_{c(j),t}$ is orthogonal to unobserved determinants of $AR^{\text{top5}}_{i,j,t}$ conditional on pair and year (or entity-by-year) fixed effects. Three arguments support this assumption. First, the maturity structure of outstanding obligations is predetermined: it reflects past borrowing and refinancing decisions, not current fiscal conditions or project-level shocks. Second, we verify the absence of differential pre-trends in receivables across high- and low-pressure jurisdictions using an event-study design, which shows no systematic divergence prior to the pressure shock. Third, results are robust to decomposing $\text{GovPressure}_{c,t}$ into explicit local-government bond maturities only and LGFV obligations only; the consistency across these sub-components rules out that a single debt category or institutional feature drives the findings. The pair fixed effects absorb all time-invariant confounders at the relationship level (e.g., persistent project type, enforcement environment, contracting history), and the entity-by-year fixed effects in (18) additionally absorb all firm-wide time-varying shocks. The residual identification threat—that maturity pressure correlates with time-varying, relationship-specific shocks—is addressed by the within-firm comparison across multiple debtor governments.

5.1.6 Layer 3: propagation from public entities to upstream suppliers

The core network prediction is that public entities do not merely accumulate receivables; they also transmit liquidity stress by delaying payments to suppliers. Using supplier–SOE dyads, we estimate pass-through elasticities of payables with pair fixed effects:

$$\ln\left(AP^{\text{top5}}_{k,i,t}\right) = \theta \, \ln\left(AR^{gov}_{i,t}\right) + Z'_{k,t}\Pi + \mu_{k,i} + \nu_k + \delta_t + e_{k,i,t}, \tag{19}$$

where $\mu_{k,i}$ are supplier–SOE pair fixed effects, ν_k are supplier fixed effects, and δ_t are year fixed effects. $Z_{k,t}$ includes supplier controls when available. The coefficient θ is the pass-through elasticity: the percent increase in payables to supplier k associated with a 1% increase in government-related receivables owed to public entity i.

Endogeneity and IV design. Estimating (19) by OLS is problematic because $AR^{gov}_{i,t}$ may respond to firm-specific shocks (project execution, management, discretionary settlement policies) that also directly affect payment behavior toward suppliers. To isolate the component of $AR^{gov}_{i,t}$ driven by debtor governments' liquidity pressure, we instrument $\ln(AR^{gov}_{i,t})$ with a predicted arrears component constructed from debtor-side maturity pressure. The logic is straightforward: variation in $\text{GovPressure}_{c(j),t}$ is predetermined by the debt maturity structure of government units and thus shifts the likelihood and size of arrears on the government-to-public leg, but is plausibly orthogonal to supplier-level payment outcomes except through the public entity's balance-sheet shock.

Under the exclusion restriction that debtor-government maturity pressure affects

supplier payables only through the public entity's balance-sheet shock, the IV estimates recover the causal pass-through elasticity. We assess the plausibility of this restriction directly. The main threat is that $\text{GovPressure}_{c(j),t}$ may affect suppliers through local economic conditions—for example, by reducing local demand or tightening local credit markets—rather than solely through the public entity's receivables. We address this concern in two ways. First, the supplier–SOE pair fixed effects and supplier fixed effects absorb time-invariant supplier-level exposure to local conditions. Second, we implement a placebo IV check using non-government receivables of the same public entity as an alternative instrument: if the exclusion restriction holds, this placebo should not predict supplier payables after conditioning on the government-receivables channel. In our estimates, the first stage is strong, and a placebo instrument based on non-government receivables is not significant in the reduced form, which is consistent with the exclusion restriction.

In practice, we operationalize the IV using the dyadic first-stage relationship between government liquidity pressure and government-related receivables (see Appendix B for construction details). Standard errors are clustered at the supplier–SOE pair level to allow serial correlation within relationships.

5.2 Empirical evidence

This subsection follows the three-prediction structure above: motivation evidence, dyadic government-to-public transmission, and supplier pass-through.

5.2.1 Macro motivation: liquidity pressure, receivables, and collection efficiency

Table 3 presents estimates of (15). First, public entities in high-pressure cities hold larger receivables balances. The coefficient in Column (1) implies economically meaningful increases in $\ln(\text{A/R})$ associated with higher maturity-driven fiscal pressure. Scaling by assets yields the same pattern (Column (2)), indicating that the association is not purely mechanical through firm size.

Second, collection efficiency deteriorates in high-pressure locations. Turnover days rise (Column (3)) while turnover rates fall (Column (4)). Because turnover captures settlement speed rather than transaction scale, this pattern is more consistent with delayed payments than with a pure decline in procurement volume.

Third, the government share among major receivables rises with fiscal pressure (Column (5)), consistent with a reallocation of unpaid balances toward government debtors rather than an undifferentiated increase in receivables. Figure 5 reinforces this point by showing that higher government exposure is tightly linked to slower collection and longer receivables cycles.

While these patterns motivate the mechanism, they remain exposed to aggregate confounds. We next turn to dyadic evidence that exploits relationship-level variation.

5.2.2 *Government-to-public transmission: dyadic evidence and within-relationship identification*

Table 4 reports dyadic estimates of (16) and (17). We emphasize two margins.

Extensive margin. Column (1) shows that higher liquidity pressure raises the probability that a given government unit appears among a public entity's top-five receivables counterparties. Because disclosure is rank-based, this extensive margin is naturally interpreted as a threshold effect: fiscal stress induces arrears large enough to become economically salient on the creditor's balance sheet.

Intensive margin. Columns (2)–(5) show that liquidity pressure increases unpaid balances conditional on appearing. The estimates remain strong when we include government–public-entity pair fixed effects (columns with $\mu_{i,j}$), which implies that the results are not driven by time-invariant differences in relationship types. Conditional on pair fixed effects, arrears expand precisely when the debtor government's short-run maturity pressure tightens.

Within-firm identification. A key identification concern for any arrears measure is whether it reflects delayed payment or changes in demand and project allocation. The within-firm logic in (18) directly targets this concern: by comparing multiple debtor governments within the same SOE-year, we net out all firm-wide changes in activity and isolate differential delinquency on the debtor side, in the spirit of within-firm estimators in Khwaja and Mian (2008). This approach is particularly natural here because the shock of interest is explicitly located on the debtor-government side, and our data structure provides repeated observations of multiple debtor links per public entity.

5.2.3 *Why arrears arise: heterogeneity by alternative fiscal and financial buffers*

If arrears are a liquidity-management margin—rather than an artifact of contracting technology or a byproduct of changing procurement—then the government-to-public-entity transmission should be weaker in jurisdictions with more abundant alternative financing instruments. Table 5 provides evidence consistent with this prediction.

The interaction terms are negative across three distinct buffer measures: land-related fiscal capacity, bond-financing access, and local financial depth. Governments with more ample alternative resources rely less on payment delays when facing maturity pressure. This pattern strengthens the interpretation of arrears as a *quasi-fiscal* instrument: when conventional fiscal tools are constrained, governments smooth cash outflows by shifting

working-capital burdens to contractors and affiliated public entities; when tools are abundant, the same pressure translates less into unpaid commercial obligations.

5.2.4 Propagation to suppliers: public entities as imperfect buffers in trade credit networks

We now analyze whether and how this government-induced working-capital shock is transmitted to upstream firms. The conceptual benchmark is not necessarily one-for-one pass-through. SOEs and LGFVs often have better access to bank credit and implicit support, and may partially absorb the shock. At the same time, a large trade credit literature suggests that liquidity shocks are commonly propagated along supply chains through payment delays, especially when bank finance is imperfect and bargaining frictions shape settlement (Petersen and Rajan, 1997b; Cuñat, 2007; Jacobson and von Schedvin, 2015; Burkart and Ellingsen, 2004b).

Table 6 reports estimates of (19). Columns (1)–(2) show a positive association between government-related receivables and payables to suppliers within the same supplier–SOE relationship, consistent with pass-through. However, OLS is vulnerable to attenuation and simultaneity: firm-level shocks can raise both receivables and payables, and measurement error in receivables can bias estimates toward zero.

Columns (3)–(4) report IV estimates using predicted government arrears driven by debtor-side maturity pressure. Under the exclusion restriction that debtor-government maturity pressure affects supplier payables only through the public entity's balance-sheet shock, these estimates recover the causal pass-through elasticity. The implied elasticity is 0.31–0.35: a 10% increase in government-induced receivables raises payables to a given supplier by roughly 3%–3.5% within the same relationship. First-stage diagnostics indicate strong instrument relevance, and the placebo instrument based on non-government receivables is not significant in the reduced form, supporting the exclusion restriction.

Two implications follow. First, the elasticity is far from zero: public entities transmit a substantial fraction of fiscal liquidity stress upstream, consistent with trade credit acting as a propagation mechanism. Second, the elasticity is well below one, implying incomplete transmission: SOEs/LGFVs partially buffer the shock, consistent with their superior financing access and the possibility of internal liquidity management.

Table 7 examines heterogeneity that illuminates the network economics of propagation. Pass-through is stronger when intermediaries are themselves liquidity constrained, proxied by low cash ratios (interaction with "Liquidity Stress"). This aligns with a balance-sheet channel: intermediaries with less internal liquidity capacity are less able to smooth shocks and thus stretch payables more aggressively. Pass-through is weaker to state-owned suppliers (negative interaction with the SOE supplier indicator), consistent with bargaining and institutional frictions: SOE suppliers may have stronger enforcement

capacity, better credit access, or implicit protection that limits how much payment delay they absorb. In network terms, node type and bargaining position shape the incidence of the shock, even conditional on being connected.

5.2.5 Section summary and link to the upstream-incidence analysis

This section provides relationship-level evidence for the first two legs of the arrears cascade. Maturity-driven fiscal liquidity pressure is associated with larger government-related receivables and slower collection among SOEs/LGFVs (Table 3), and with within-relationship increases in unpaid balances owed by debtor governments (Table 4), with attenuation in jurisdictions that have stronger alternative financing buffers (Table 5). These balance-sheet shocks are then propagated upstream: public entities increase payables to suppliers in the same bilateral links, with economically meaningful but incomplete pass-through (Table 6) and heterogeneity consistent with financial-frictions and bargaining mechanisms (Table 7).

Section 6 builds on these estimates to quantify incidence further upstream among SMEs that are rarely observed as major counterparties in public-entity disclosures. There, we aggregate the network propagation implied by the dyadic evidence into industry–location exposure measures and trace real outcomes and financing responses in SME survey data.

6. Upstream Incidence on SMEs

Section 5 establishes the first two links of the arrears transmission chain: (i) maturity-driven government liquidity pressure predicts within-relationship increases in unpaid balances owed to SOEs/LGFVs; and (ii) these public intermediaries partially pass the shock upstream by delaying payments to their suppliers through trade credit. This section asks a harder and substantively distinct question: *what is the incidence of this arrears cascade on the broad population of private SMEs that are upstream, rarely contract directly with the state, and are largely invisible in large-firm counterparty disclosures?*

Answering this question requires a different empirical strategy. A direct dyadic matching approach is infeasible because the typical SME is too small to enter the top-five counterparty lists of large public entities, implying severe selection on relationship size and an inability to trace the full multi-tier subcontracting chain edge-by-edge. We therefore shift from relationship-level identification (Section 5) to an *exposure* design that aggregates network propagation using predetermined production linkages and local industry composition. The approach is conceptually similar to Bartik/shift–share designs (Bartik, 1991a; Adão et al., 2019; Goldsmith-Pinkham et al., 2020; Borusyak et al., 2022): we combine time

variation in downstream arrears intensity with pre-determined "shares" that govern how shocks load onto upstream industries and local economies.

Beyond reduced-form incidence, we use rich micro survey data to trace a mechanism-consistent sequence of effects. Upstream exposure to government arrears (i) tightens SME financing constraints and reallocates funding sources, (ii) increases both receiving and extending trade-credit arrears, (iii) depresses profitability and expectations, and (iv) reshapes local firm dynamics through lower entry and higher exit. These results highlight a key contribution of our setting: existing evidence on public-sector payment frictions mainly covers prime contractors and large intermediaries, while much of the incidence is borne by upstream SMEs that are typically unobserved in standard datasets.[5]

6.1 Empirical Strategy

6.1.1 Identification challenges

Estimating the causal impact of government arrears on SMEs is challenging for reasons that go beyond data availability. The core issues are conceptual and econometric.

In dyadic footnote data, we observe high-signal bilateral credit links for public intermediaries (SOEs/LGFVs) and their *largest* counterparties (Tables 1–2). But SMEs that bear the aggregate incidence are typically smaller, more upstream, and less likely to appear among top creditors of large public entities. Any attempt to trace SMEs via observed dyads would therefore condition on being "large enough to be seen" and would conflate arrears exposure with selection into large contracts. This is a canonical sample-selection problem in network settings: the observed network is an endogenous, truncated view of the true production-credit graph.

Government arrears episodes coincide with local macroeconomic stress (demand downturns, tightening credit supply, policy adjustments, enforcement campaigns), any of which can affect SME outcomes independently of arrears. Simple city-level correlations are therefore not informative about causal incidence. A credible design must difference out time-varying local conditions while preserving differential exposure to the arrears cascade within the same local economy.

Even with rich fixed effects, one must address the concern that arrears-intensity measures may proxy for downstream demand contractions rather than delayed settlement. Our construction intentionally focuses on the *government share* of receivables and on turnover-based indicators (Section 4.2.1), which are more closely tied to collection

[5]This is why the layered subcontracting structure in Section 2.2 is central for identification: SMEs are rarely direct government counterparties, but are systematically connected to government-facing sectors through production networks and trade credit.

frictions than to scale. Nevertheless, we treat this distinction as an empirical question and provide multiple validation and falsification exercises below and in the Appendix.

In shift–share designs, naive clustering can understate uncertainty because the effective number of independent shocks is the number of "shifts" rather than the number of micro observations (Adão et al., 2019; Goldsmith-Pinkham et al., 2020; Borusyak et al., 2022). In our setting, exposure is driven by downstream industry-year arrears intensity, so inference must account for this aggregation structure.

These challenges motivate our shift from dyadic matching to an exposure strategy that (a) aggregates propagation beyond observed links, (b) nets out local macro confounders using saturated fixed effects, and (c) emphasizes identification and inference practices tailored to shift–share designs.

6.1.2 Constructing an upstream arrears exposure measure

We construct a shift–share exposure measure that maps downstream government-arrears intensity into upstream SME industries through predetermined production linkages. The construction has three components: a downstream "shift" capturing time variation in arrears intensity, an I/O mapping capturing upstreamness, and a local "share" capturing the pre-determined importance of each upstream industry in a location.

To make the logic transparent, define weights

$$w_{c,u,d} \equiv \omega_{c,u} \cdot \alpha_{u \to d},$$

where $\omega_{c,u}$ is the pre-period local employment share of upstream industry u in location c, and $\alpha_{u \to d}$ is the I/O coefficient capturing how much upstream industry u sells into downstream industry d (directly or as intermediate inputs). Let $\theta^{\text{Gov}}_{d,t}$ denote arrears intensity in downstream industry d at time t. Then our exposure is simply a multi-shock shift–share:

$$\text{Exposure}_{c,u,t} \;=\; \sum_{d} w_{c,u,d}\, \theta^{\text{Gov}}_{d,t}. \tag{20}$$

Equation (20) clarifies what varies and what is predetermined: the time-varying "shifts" are $\theta^{\text{Gov}}_{d,t}$, while the exposure weights $w_{c,u,d}$ are constructed from pre-determined shares $\omega_{c,u}$ and (pre-sample) I/O coefficients $\alpha_{u \to d}$. This structure delivers two empirical advantages. First, it allows us to study upstream SMEs that never directly transact with governments by leveraging the network topology implied by production linkages. Second, it naturally yields within-location comparisons across industries that share the same local macro environment but have different upstream exposure to government-facing downstream sectors.

We now describe each component in detail.

For each downstream industry d and year t, we construct an arrears-intensity index:

$$\theta_{d,t}^{\text{Gov}} \equiv \frac{\sum_{i \in \mathcal{P}_d} AR_{i,t}^{gov}}{\sum_{i \in \mathcal{P}_d} AR_{i,t}}, \tag{21}$$

where $\mathcal{P}_d$ denotes public entities (SOEs/LGFVs) in downstream industry d, $AR_{i,t}^{gov}$ is government-related accounts receivable of entity i, and $AR_{i,t}$ is total accounts receivable. Two features are important for interpretation.

First, $\theta_{d,t}^{\text{Gov}}$ is *scale-normalized*. It captures the *composition* of receivables (government-linked versus not), which mitigates mechanical correlation with industry size. Second, it is aligned with our arrears mechanism: under liquidity stress, governments delay settlement, which shows up as elevated government-related receivables and longer collection cycles (Section 4.2.1). In robustness checks, we replace $\theta_{d,t}^{\text{Gov}}$ with turnover-based measures (e.g., government-exposed receivables turnover days) to further sharpen the "delayed payment" interpretation (see Appendix).

Addressing residual endogeneity of $\theta_{d,t}^{Gov}$. While $\theta_{d,t}^{\text{Gov}}$ is designed to capture payment frictions rather than demand, downstream industries may still face concurrent shocks that correlate with arrears intensity. Our main safeguard is validation using debtor-identity outcomes in ESIEC 2025 (Section 6.2.1), where exposure predicts government-related delinquency more strongly than non-government delinquency.

Let $\alpha_{u \to d}$ be the input–output coefficient measuring the share of upstream industry u's output sold (directly or as intermediate inputs) to downstream industry d.[6] Define the downstream-weighted shock relevant for upstream industry u as:

$$\text{Shock}_{u,t}^{\text{IO}} \equiv \sum_{d} \alpha_{u \to d}\, \theta_{d,t}^{\text{Gov}}. \tag{22}$$

Equation (22) formalizes "upstreamness" in our mechanism: upstream industries more tightly connected to government-facing downstream sectors inherit a larger portion of the arrears shock. This approach is grounded in the production-network literature, where I/O linkages discipline how shocks propagate across sectors.

To translate industry-level upstream shocks into local SME exposure, we interact $\text{Shock}_{u,t}^{\text{IO}}$ with local industry composition. Let $\omega_{c,u}$ denote the (predetermined) employment share of upstream industry u in county/city c measured in a pre-period and held

[6] In our baseline, $\alpha_{u \to d}$ is obtained from the 2017 national input–output table and is treated as predetermined over our sample period. Appendix reports alternative constructions using different benchmark years and using total-requirements (Leontief inverse) matrices to allow for multi-round propagation.

fixed.[7]

We define exposure for upstream industry u in location c at time t as:

$$\text{Exposure}_{c,u,t} \equiv \omega_{c,u} \cdot \text{Shock}^{\text{IO}}_{u,t} = \omega_{c,u} \cdot \sum_{d} \alpha_{u \to d}\, \theta^{\text{Gov}}_{d,t}. \tag{23}$$

Equation (23) is the baseline object used in the SME regressions.

The combination of city×year fixed effects and industry×year fixed effects (Section 6.1.3) implies that identification comes from *within the same city and year*, comparing SMEs in industries with different upstream exposure to government-facing downstream sectors. Intuitively, when downstream arrears intensify (a national sectoral shift), local industries that (i) are more upstream-connected to those downstream sectors and (ii) constitute a larger share of the local production structure experience a larger predicted working-capital shock. This is precisely the kind of "industry–region interaction" variation that shift–share designs are built to exploit (Bartik, 1991a; Adão et al., 2019).

A distinctive feature of the ESIEC 2025 wave is that it collects information on overdue receivables and the identity of the debtor (government vs. private). This allows us to validate that our exposure measure captures the intended arrears mechanism rather than generic local business cycle risk. In Figure 4 (Panels C–D), the cross-sectional pattern of government-related overdue receivables among private SMEs aligns closely with the variation implied by $\text{Exposure}_{c,u,t}$, supporting its interpretation as upstream exposure to government arrears. We formalize this validation in regression form in Section 6.2.1.

6.1.3 Data and baseline specification

We use the Enterprise Survey for Innovation and Entrepreneurship in China (ESIEC) for 2018, 2023, and 2025, covering more than 17,000 private SMEs across 106 counties. The survey provides granular measures of financing needs and realized funding, financing sources (banks, private financial institutions, family/friends), trade credit, profitability, and expectations. We assign each firm i an exposure value based on its location $c(i)$ and industry $u(i)$ and merge in year-t exposure values constructed from the downstream arrears indices and I/O weights described above. Because most outcomes are contemporaneous in the survey, we use lagged exposure $\text{Exposure}_{c,u,t-1}$ to discipline temporal ordering and reduce simultaneity concerns.

[7] Fixing $\omega_{c,u}$ in a pre-period avoids mechanical endogeneity from contemporaneous entry/exit and sectoral reallocation in response to arrears. We report stability of shares over time and robustness to alternative base years (see Appendix).

Our baseline specification is:

$$Y_{i,t} = \beta \, \text{Exposure}_{c(i),u(i),t-1} + X'_{i,t}\Gamma + \mu_{c(i),t} + \phi_{u(i),t} + \varepsilon_{i,t}, \tag{24}$$

where $Y_{i,t}$ is an SME outcome, $X_{i,t}$ includes firm-level controls (size, age, ownership, baseline productivity proxies), $\mu_{c,t}$ are city-by-year fixed effects absorbing all local macro shocks and policies in year t, and $\phi_{u,t}$ are industry-by-year fixed effects absorbing nationwide industry trends. Standard errors are clustered at the city×industry level.

The fixed-effects structure is intentionally demanding. City×year fixed effects remove confounders common to all SMEs in a locality-year (local demand, credit supply, enforcement, and contemporaneous policy responses). Industry×year fixed effects absorb national shocks to upstream industries (input prices, technology, and sectoral cycles). Identification therefore comes from differential exposure induced by predetermined local shares and upstreamness weights, which is the core logic of Bartik/shift–share designs (Bartik, 1991a; Adão et al., 2019).

Because exposure aggregates downstream industry-year shocks, baseline clustering alone can understate uncertainty. We therefore use shift–share-consistent inference procedures (Adão et al., 2019; Goldsmith-Pinkham et al., 2020), which are especially relevant because downstream arrears intensity is concentrated in a subset of government-facing sectors (Figure 4).

To keep identification transparent, the baseline specification in Equation (24) is paired with saturated fixed effects and lagged exposure. Interpretation relies on the combination of this design and the mechanism-consistent sequencing of outcomes in the results subsection.

6.2 Results: From Liquidity Constraints to Firm Dynamics

We organize the evidence in the order implied by the arrears-cascade mechanism. We first validate that our exposure measure is meaningfully related to SME-level government delinquency. We then trace a sequence from financing constraints, to trade-credit contagion, to real-side performance and beliefs, and finally to market dynamics. This "mechanism-ordered" presentation is deliberate: in environments with rich confounders, coherent sequencing across outcomes provides an internal-consistency check that is difficult to reconcile with spurious correlation.

6.2.1 Validation: does exposure predict SME-level government delinquency?

A key advantage of the ESIEC 2025 wave is its module on overdue receivables by debtor identity (government vs. non-government). We use this module to test a direct implication of the exposure design: SMEs with higher $\text{Exposure}_{c,u,t-1}$ should be more likely

to report government-related overdue receivables, even though they typically do not contract with the state directly. The intuition is that upstream SMEs can inherit government-originated payment delays through subcontracting and trade-credit chains, consistent with Section 5.

Specifically, we estimate variants of Equation (24) where $Y_{i,t}$ captures government-identified overdue receivables in ESIEC. The resulting coefficients support the view that $\text{Exposure}_{c,u,t}$ captures propagation of government payment delays rather than generic local demand conditions.

6.2.2 Financing constraints and funding reallocation

A delayed-payment shock is, in corporate-finance terms, a working-capital shock that raises the wedge between internal funds and the liquidity needed to sustain operations. Financial frictions imply that such shocks have disproportionate effects on smaller and more constrained firms (Gertler and Gilchrist, 1994; Fazzari et al., 1988; Almeida et al., 2004). The prediction is therefore not only that exposed SMEs report tighter liquidity, but also that they attempt to substitute across financing channels—often toward more expensive and informal sources—while still exhibiting a residual funding gap.

Table 8 reports the effects of exposure on SME financing outcomes. Exposure significantly increases the financing gap: more exposed SMEs report a larger shortfall between desired and obtained funding. This pattern is difficult to reconcile with a pure "low investment demand" channel; instead, it is consistent with a binding liquidity constraint in which firms seek funds but are rationed.

At the same time, SMEs actively reallocate financing sources. More exposed firms are more likely to obtain (or attempt to obtain) formal credit and also increase reliance on non-bank channels, including private financial institutions and borrowing from family and friends (Table 8, Columns (2)–(4)). This combination—greater use of multiple channels *and* a larger residual gap—matches the textbook signature of a liquidity shock under frictions rather than a voluntary contraction in scale.

The estimated magnitudes are economically meaningful given the high baseline sensitivity of SME operations to short-term liquidity.

A natural concern is that increased borrowing might reflect expansion rather than distress. ESIEC elicits intended uses of funds. Consistent with the arrears channel, exposure increases the likelihood that financing is used for short-term liquidity needs (paying wages, purchasing inputs, servicing obligations) rather than capacity expansion or long-horizon investment (Table 8). This "use-of-funds" evidence strengthens the working-capital interpretation.

If the mechanism operates through financial constraints, effects should be stronger for SMEs with weaker balance sheets and lower access to formal finance. The pattern in

Table 8 is consistent with this interpretation: firms report both greater funding gaps and stronger reliance on non-bank channels.

6.2.3 Trade credit contagion and upstream propagation

Trade credit is both a financing margin and a propagation mechanism: suppliers extend implicit credit when formal finance is limited, and payment delays can transmit distress along supply chains (Petersen and Rajan, 1997b; Cuñat, 2007). Our Section 5 dyadic evidence shows precisely such pass-through from government arrears to SOE payables. For SMEs, the corresponding prediction is a *two-sided* adjustment: exposed SMEs should (i) become involuntary creditors as customers delay payments, and (ii) respond by delaying payments to their own suppliers, transmitting stress further upstream.

Table 8 provides direct evidence of trade-credit contagion. First, exposure increases the likelihood that SMEs finance operations by accepting delayed payments from customers (Column (5)), indicating that they become involuntary creditors when downstream clients pay slowly. Second, exposure also increases the likelihood (or intensity) of delaying payments to their own key suppliers (Column (6)), implying further propagation upstream. The joint movement of these margins is highly diagnostic of trade-credit-based transmission: it is not simply that firms "do worse"; it is that the *structure of payment timing* deteriorates on both sides of the SME balance sheet.

A concern is that exposure could proxy for locations with generally poor payment culture. Our fixed-effects structure mitigates this concern by absorbing any location-year common factors. Combined with the debtor-identity validation results, the estimates are more consistent with a government-originated arrears cascade than with a generic delinquency environment.

6.2.4 Operating performance and managerial expectations

Working-capital constraints can depress performance through multiple channels: costly external finance, disruptions in input purchasing, foregone early-payment discounts, and precautionary cuts in scale. Table 9 reports that exposure reduces both gross and net profit margins (Columns (1)–(2)). The stronger effect on net margins is consistent with higher financing costs and broader liquidity-management frictions rather than purely technological productivity changes.

Beyond realized profitability, exposure significantly worsens managerial expectations about output, orders, and employment (Table 9, Columns (3)–(5)). This expectations channel is economically meaningful: under uncertainty and liquidity risk, firms may reduce hiring and input purchases preemptively, amplifying the real effects of an initial payment shock (Bloom, 2009; Baker et al., 2016). In the Chinese setting—where SMEs already operate with limited buffers—the combination of delayed settlement and pessimistic ex-

pectations can generate nonlinear contraction dynamics.

Delayed payment is not only a balance-sheet shock; it can also reduce confidence in transactional reliability. ESIEC asks entrepreneurs to rate the business environment and perceived contract/court enforcement. Exposure is associated with worse perceived enforcement and a weaker business environment. This is consistent with a complementary mechanism emphasized in the institutional literature: when a prominent counterparty (directly or indirectly linked to the state) delays payment, it can weaken belief in enforceability and increase reliance on relationship-based and informal finance (Johnson et al., 2002).

The joint pattern across liquidity-sensitive outcomes and real outcomes supports a payment-friction interpretation rather than a pure demand-only channel.

6.2.5 Market dynamics: entry and exit

The welfare and long-run efficiency implications of arrears cascades depend not only on incumbent adjustments but also on market selection and dynamism. Canonical models of industry dynamics predict that tighter financial constraints can increase exit among marginal firms and discourage entry, potentially shifting market structure and amplifying misallocation (Hopenhayn, 1992; Haltiwanger et al., 2013).

Table 9, Columns (6)–(7) shows that exposure predicts a decline in firm entry and an increase in firm exit at the city×industry×year level. These extensive-margin responses are consistent with the upstream incidence of the arrears cascade: liquidity stress and pessimistic expectations reduce entrepreneurial entry, while working-capital shortages and delayed settlement push vulnerable incumbents out.

Administrative exit records can be incomplete, especially for small firms and in stress episodes with informal closure. We therefore interpret entry–exit coefficients as evidence on directional market-dynamism effects rather than precise hazard magnitudes.

The entry/exit results complement the financing and trade-credit evidence. If exposure merely captured contemporaneous demand reallocation, one might expect weaker effects on the payment-timing margins (arrears received and arrears owed) and less coherent sequencing across liquidity, beliefs, and dynamics. Instead, we observe a tightly linked pattern consistent with a propagation mechanism: upstream liquidity stress emerges first in financing and payment timing, then maps into profitability and expectations, and finally manifests in market structure through entry and exit.

6.3 Summary and connection to downstream welfare

This section quantifies the upstream incidence of government payment arrears on private SMEs—a population that is difficult to study using standard administrative or listed-

firm datasets precisely because SMEs are typically not direct government counterparties and are rarely visible in large-firm disclosure networks. We overcome this challenge by constructing a production-network-based shift–share exposure measure that maps downstream government-arrears intensity into upstream SME industries using predetermined I/O linkages and local industry composition.

Empirically, we document a coherent, mechanism-ordered set of results. Exposure tightens SME financing constraints and induces substitution across formal and informal funding channels; it increases both receiving and extending trade-credit arrears, consistent with contagion; it reduces profitability and worsens managerial expectations and perceived contract reliability; and it reshapes local market dynamics through lower entry and higher exit. These findings, together with the dyadic evidence in Section 5, provide an integrated picture of how maturity-driven government liquidity stress can propagate through trade-credit networks and ultimately impact the broader upstream SME sector. The next section uses these firm-side disruptions to study downstream welfare-relevant household responses.

7. Household Spillovers and Precautionary Responses

Sections 5–6 establish that maturity-driven fiscal liquidity stress translates into payment arrears to public entities and then propagates upstream through trade credit networks, tightening SME liquidity constraints and depressing firm performance. This section asks whether the arrears cascade has *welfare-relevant household spillovers*. Households do not contract with local governments directly, and sub-provincial arrears are not observed in administrative fiscal accounts. We therefore frame this analysis as an *extension*: it documents mechanism-consistent equilibrium responses in local labor markets and household balance sheets that are consistent with the arrears cascade, rather than introducing a third standalone identification design. The household evidence is best interpreted as *reduced-form equilibrium responses* to the upstream firm-side disruptions documented in Sections 5–6, not as a direct causal estimate of household welfare losses from government arrears.

The conceptual link is standard. When firms face working-capital stress, they reduce labor demand, cut variable compensation, and increase employment risk; in incomplete-markets settings, higher income risk and tighter liquidity constraints induce precautionary behavior, including a shift toward liquid assets and buffer-stock saving and a disproportionate cut in discretionary consumption (especially durables) (Zeldes, 1989; Deaton, 1991; Carroll, 1997; Blundell et al., 2008; Chetty and Szeidl, 2007; Guerrieri and Lorenzoni, 2017). We test these implications using household panel data and a county-level exposure

proxy that maps the upstream arrears shock into local labor markets using predetermined industrial structure.

7.1 Data and outcome measures

We use the China Family Panel Studies (CFPS), a nationally representative biennial longitudinal survey (Xie and Hu, 2014). The baseline sample pools waves 2016, 2018, 2020, and 2022, and is restricted to non-agricultural households to align with the primary transmission mechanism operating through urban labor markets and SME-intensive supply chains. Households are matched to their county (or urban district) of residence, which is the geographic unit for exposure measurement and for clustering standard errors.

We focus on four outcome blocks.

$\ln(\text{Wage}_{h,t})$ is the log annual wage income of the main earner in household h.

Liquidity preference and portfolio rebalancing. We measure the share of liquid assets as:

$$\text{LiquidShare}_{h,t} \equiv \frac{\text{Cash}_{h,t} + \text{Deposits}_{h,t}}{\text{TotalAssets}_{h,t}}. \tag{25}$$

An increase in (25) is consistent with "flight to liquidity" under heightened risk.

Following the precautionary saving literature, we operationalize a residual-based measure of "excess saving" that nets out flexible income and demographic components (Deaton, 1991; Carroll, 1997). Let $\text{SaveRate}_{h,t}$ be the observed saving rate. We estimate a flexible prediction $\widehat{\text{SaveRate}}_{h,t}$ as a function of income and demographics (details and coding in the Appendix) and define:

$$\text{ExcessSave}_{h,t} \equiv \text{SaveRate}_{h,t} - \widehat{\text{SaveRate}}_{h,t}. \tag{26}$$

We study $\ln(\text{TotalCons}_{h,t})$ and its decomposition into durables, food, and services. A key diagnostic is composition: precautionary motives predict larger adjustments in durables and other discretionary categories than in necessities (Chetty and Szeidl, 2007; Guerrieri and Lorenzoni, 2017).

7.2 County-level exposure to the arrears cascade

Because county-level government arrears are not directly observed, we construct a county-level proxy that maps the upstream arrears shock identified on firms into local labor markets via predetermined industrial composition, in the spirit of shift–share (Bartik-style) local-shock designs commonly used in the local labor market literature (Bartik,

1991b; Autor et al., 2013). This exposure index is intended to summarize differential vulnerability of counties to the same national arrears episode, not to recover a separate causal parameter of county arrears.

Let c index counties, u upstream industries, d downstream industries, and t CFPS wave-years. We begin from the downstream industry arrears intensity $\theta_{d,t}^{Gov}$ constructed from SOE/LGFV balance sheets (Section 5.1.2). Using input–output coefficients $\alpha_{u\to d}$, we form the implied upstream industry shock:

$$\text{Shock}_{u,t}^{IO} \equiv \sum_{d} \alpha_{u\to d}\, \theta_{d,t}^{Gov}. \tag{27}$$

We then aggregate (27) into a county exposure using predetermined county employment shares $\omega_{c,u}$:

$$\text{Exposure}_{c,t} \equiv \sum_{u} \omega_{c,u}\, \text{Shock}_{u,t}^{IO}. \tag{28}$$

Intuitively, counties with larger employment shares in upstream industries that sell heavily into government-facing downstream sectors are more exposed when arrears intensify in those downstream sectors.

7.3 Empirical specification

Our baseline household-panel specification is parsimonious:

$$Y_{h,c,t} = \beta\, \text{Exposure}_{c,t} + X_{h,t}'\Gamma + \mu_h + \delta_t + \varepsilon_{h,c,t}, \tag{29}$$

where μ_h are household fixed effects, δ_t are wave-year fixed effects, and $X_{h,t}$ includes standard time-varying household controls (age and age squared, household size, dependency ratio, health, marital status, and related covariates; Appendix for definitions). Standard errors are clustered at the county level.

A central prediction of the labor-market channel is that incidence should be stronger for households with less employment protection. We therefore estimate:

$$Y_{h,c,t} = \beta\, \text{Exposure}_{c,t} + \eta \left(\text{Exposure}_{c,t} \times \text{NonBianzhi}_{h,t}\right) + X_{h,t}'\Gamma + \mu_h + \delta_t + \varepsilon_{h,c,t}, \tag{30}$$

where $\text{NonBianzhi}_{h,t}$ indicates that the household head (or main earner) does not hold a formal public-sector position with staffing quota (*bianzhi*), a widely used proxy for higher employment stability in China. As a robustness check, we additionally include province-by-wave fixed effects to absorb province-level time-varying macro trends and policy shifts (reported in Appendix Table 11).

7.4 Results

7.4.1 Income effects and precautionary responses

Table 10 reports estimates of (29) and (30). Three results are worth highlighting.

First, exposure predicts lower wage income. The coefficient in Column (1) is negative and statistically significant, consistent with local labor-market incidence of the arrears cascade.

Second, households tilt their balance sheets toward liquidity. Columns (2) and (3) show that higher exposure is associated with a higher liquid asset share and higher excess saving, indicating buffer-stock behavior under heightened perceived risk and tighter liquidity (Deaton, 1991; Carroll, 1997).

Third, heterogeneity aligns with employment security. In Panel B, the interaction term Exposure $\times$ NonBianzhi is negative for wage income and positive for liquid share and excess saving. The pattern implies that households without secure public-sector employment exhibit larger wage declines and stronger precautionary responses, consistent with differential exposure to private-sector labor-market risk.

7.4.2 Consumption and category composition

Table 11 turns to expenditures. Exposure predicts a decline in total consumption, and the estimate remains robust when adding province-by-wave fixed effects (Column (2)). The category decomposition is diagnostic: durable spending exhibits the sharpest reduction (Column (3)), food expenditure is close to zero and statistically insignificant (Column (4)), and services decline moderately (Column (5)). This composition is consistent with precautionary re-optimization: households cut discretionary, postponable purchases more than necessities when facing increased uncertainty and liquidity needs (Chetty and Szeidl, 2007; Guerrieri and Lorenzoni, 2017).

7.5 Welfare implications and an equilibrium feedback loop

While the household analysis is intentionally reduced-form, the consumption results are directly welfare-relevant. Two implications follow.

A simple way to translate the consumption response into a welfare metric is a consumption-equivalent variation under CRRA preferences. Suppose per-period utility is $u(c) = \frac{c^{1-\gamma}}{1-\gamma}$ and exposure induces a proportional consumption change $c' = (1-\Delta)c$. The compensating transfer λ (as a fraction of post-shock consumption) that restores utility satisfies:

$$u\big((1+\lambda)c'\big) = u(c) \quad \Rightarrow \quad (1+\lambda)(1-\Delta) = 1 \quad \Rightarrow \quad \lambda = \frac{\Delta}{1-\Delta}. \tag{31}$$

Using the estimates in Appendix Table 11, (31) yields a transparent mapping from the estimated log-consumption impact into a consumption-equivalent welfare loss.[8]

Precautionary saving and cuts in durable expenditure can generate an additional local general-equilibrium feedback loop. When households reduce discretionary spending, local demand softens precisely in the counties where SMEs face the most severe liquidity pressure, potentially amplifying firm-side contraction through a demand channel. This logic is consistent with incomplete-markets models in which heightened risk triggers precautionary saving and depresses aggregate demand (Guerrieri and Lorenzoni, 2017). Although we do not separately quantify this feedback, the joint pattern of (i) SME retrenchment and exit in exposed industries (Table 9) and (ii) household precautionary responses in exposed counties (Tables 10–11) suggests that arrears can have broader welfare consequences than what is visible in firm balance sheets alone.

7.6 Section summary

This extension links the firm-side arrears cascade to household outcomes. Counties with higher predicted exposure experience lower wage income, a shift toward liquidity, higher excess saving, and lower consumption—with the sharpest contraction in durables. Incidence is stronger for households without secure public-sector employment, consistent with a local labor-market transmission of the arrears shock and with precautionary behavior under heightened income risk.

8. Conclusion

Government payment arrears are an undermeasured margin of fiscal adjustment. Using China as a laboratory, we show that higher local-government rollover pressure is associated with delayed settlement to public entities, higher government-related receivables on their balance sheets, and subsequent upstream propagation through supplier payables. Relationship-level designs in government–public-entity dyads and supplier–public-entity dyads support this transmission pattern and sharply reduce concerns that the findings are driven by composition changes in projects or firms.

The quantitative effects are economically meaningful. The IV pass-through elasticity from government-induced receivables to supplier payables is 0.31–0.35, implying substantial but incomplete transmission. In aggregate, government-related receivables among

[8]This calculation abstracts from changes in consumption risk, labor-market volatility, and non-separabilities (e.g., durables commitments). To the extent that exposure raises income uncertainty (as suggested by the increase in liquid share and excess saving), the welfare cost can be materially larger than the mean-consumption channel alone (Blundell et al., 2008; Chetty and Szeidl, 2007).

covered entities reach a lower bound of about RMB 11 trillion in 2024. Incidence extends beyond directly exposed contractors: SMEs with higher network exposure exhibit tighter financing constraints, weaker performance, and higher exit, while households in more exposed counties experience lower wage income and larger cuts in durable consumption.

These findings imply that fiscal surveillance based only on explicit debt and deficits can miss an important liquidity-adjustment margin. When refinancing pressure rises, governments can substitute from visible liabilities toward delayed commercial settlement. Policy design should therefore include transparent reporting of outstanding government payables, credible settlement timelines, and rule frameworks that treat persistent commercial arrears as part of fiscal risk rather than purely administrative delay.

Two limitations are important for interpretation. First, counterparty disclosure is top-five based, so the dyadic network captures high-value links rather than the full distribution of supplier relationships. Second, household evidence currently ends in 2022, limiting direct inference for the most recent phase of policy adjustment. Administrative transaction-level payables data and newer household panels would allow sharper identification of distributional incidence and dynamic welfare effects.

Government arrears are therefore not only an accounting artifact; they are a mechanism through which public-sector refinancing stress is transmitted to private firms and households.

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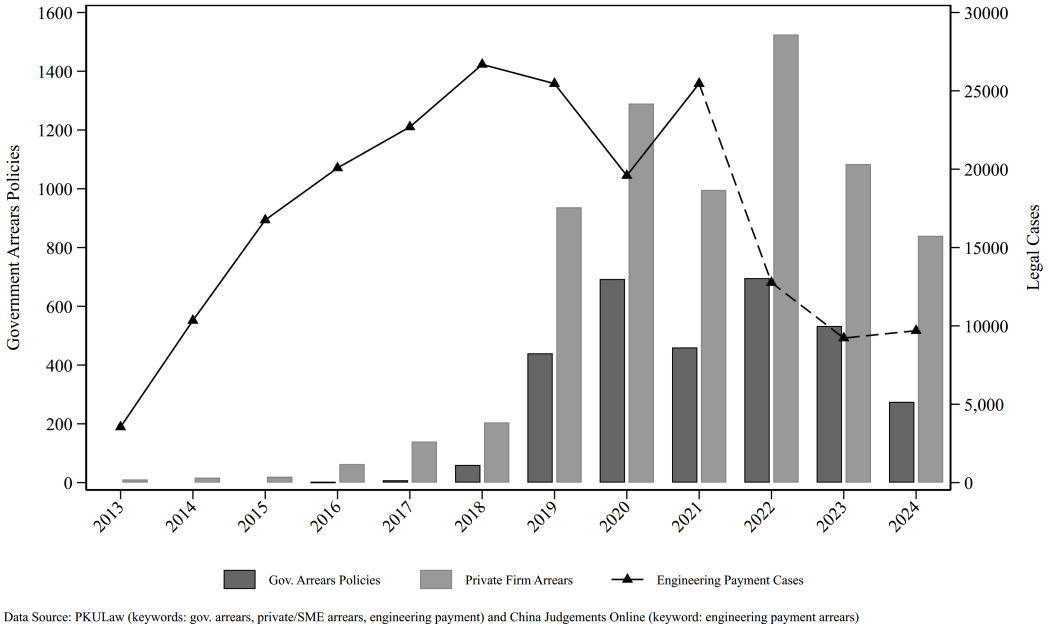
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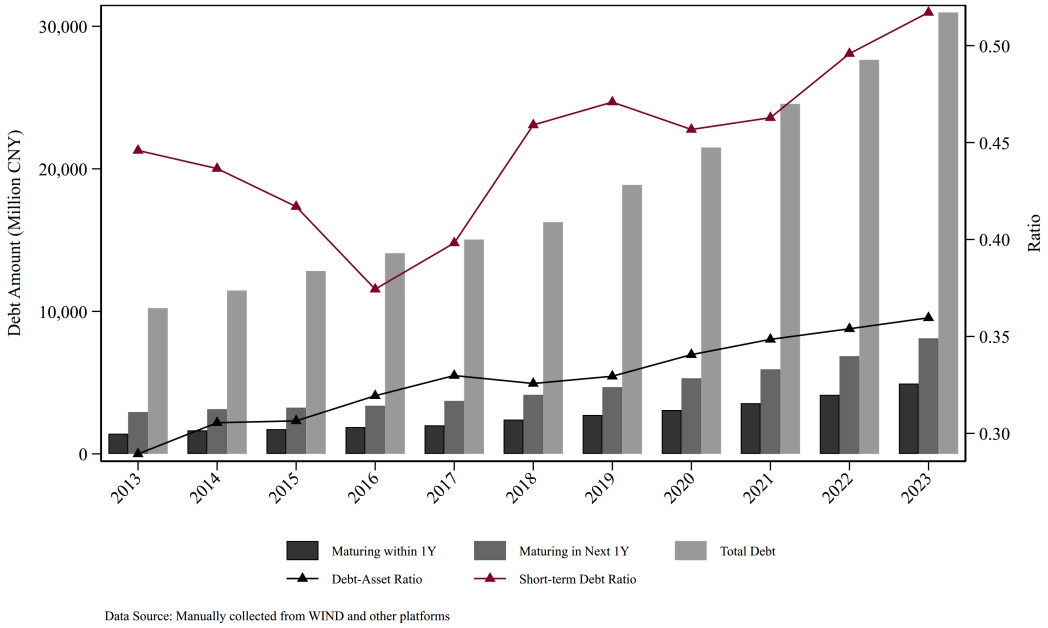
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Figure 1. Government Arrears Attention Trend



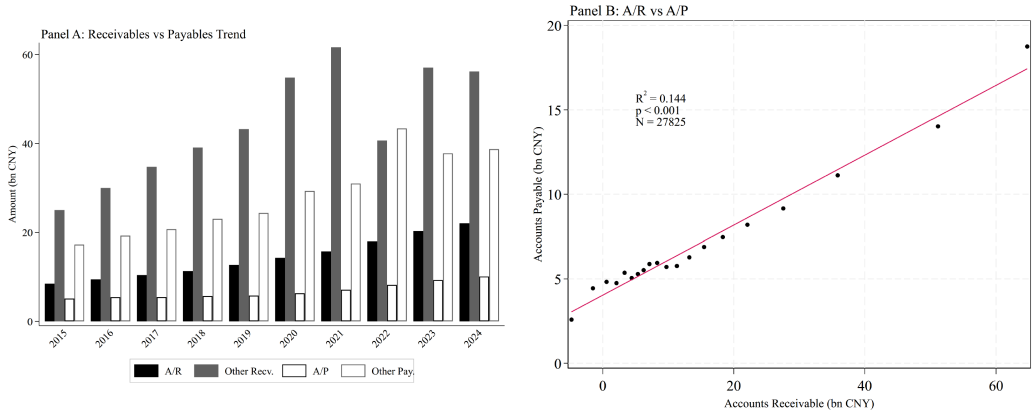
Notes: This figure plots the time trend of official attention to government arrears, measured by the frequency of keywords related to "government arrears" in official documents and news reports. The spike around 2023–2024 coincides with the local government liquidity crisis. Data source: authors' text analysis of official government documents.

Figure 2. LGFV Debt Pressure Index



Notes: This figure plots the aggregate LGFV debt pressure index, defined as the ratio of maturing debt within one year to total assets. The index captures the "liquidity wall" that local government financing vehicles face when short-term obligations come due. Data source: Wind Financial Terminal; authors' calculations.

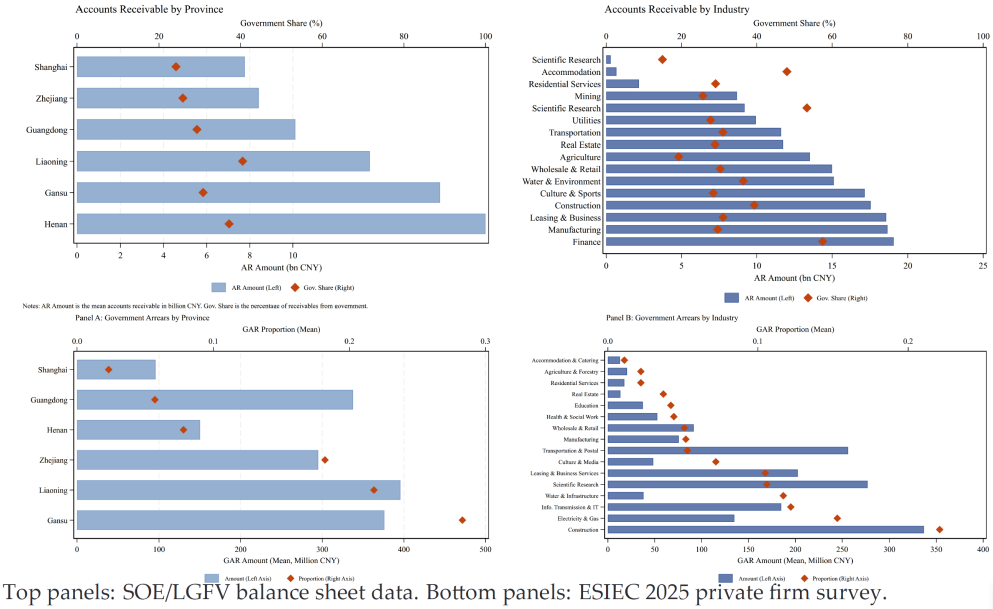
Figure 3. Receivables and Payables: Trend and Correlation



Notes: Panel A shows mean receivables and payables by year. Solid bars = receivables (black: A/R, gray: Other). Hollow bars = payables. Panel B shows binscatter of A/R vs A/P with year FE. All variables winsorized at 1%/99%. Strong positive correlation suggests pass-through: firms owed money tend to delay their own payments.

Notes: Panel A shows the time trend of mean receivables (A/R and Other Receivables) and payables (A/P and Other Payables) for SOEs/LGFVs in the sample, 2015–2024. Panel B shows a binscatter plot of A/R versus A/P after absorbing year fixed effects, illustrating the strong positive within-year correlation consistent with balance-sheet propagation of trade-credit stress. Data source: CNRDS; Wind Financial Terminal; authors' calculations.

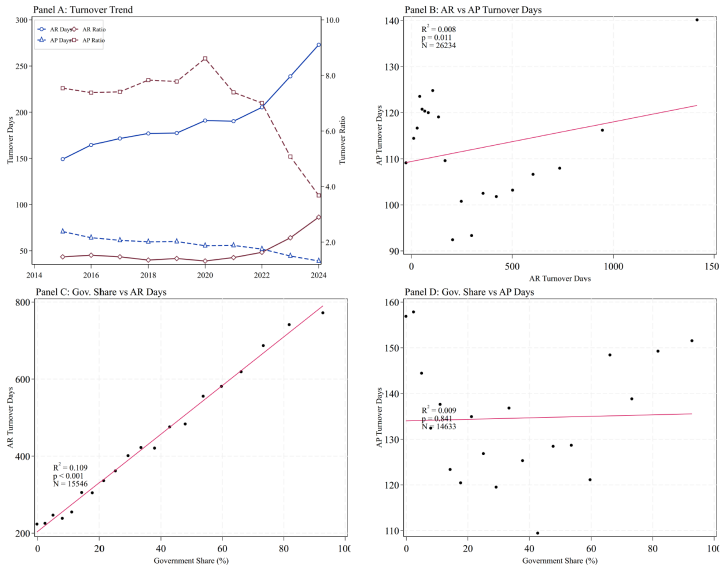
Figure 4. Heterogeneity in Government Arrears Exposure Across Provinces and Industries



Notes: Top panels: SOE/LGFV balance sheet data. Bottom panels: ESIEC 2025 private firm survey.

Notes: This figure documents cross-sectional variation in government arrears exposure. Panel A shows province-level variation in government-related receivables among SOEs/LGFVs; Panel B shows industry-level variation. Panels C–D report corresponding patterns from the ESIEC 2025 private-firm survey, where SMEs report government-related overdue receivables. The alignment across accounting and survey measures supports external validation of the proxy. Data sources: CNRDS; Wind Financial Terminal; ESIEC 2025.

Figure 5. Deteriorating Liquidity Efficiency and Government Exposure



Notes: Panel A shows median turnover trends. Panels B-D show binscatter plots with year FE.

Notes: Panel A shows the median receivables turnover days for SOEs/LGFVs over 2015–2024. Panels B–C show binscatter plots of the relationship between government share in major receivables and A/R turnover days, illustrating that higher government exposure is associated with significantly slower collection. Panel D shows the corresponding relationship for A/P turnover days, which is substantially weaker, consistent with an origin-of-shock interpretation. Data source: CNRDS; Wind Financial Terminal; authors' calculations.

Table 1. Concentration of Receivables

	Full Sample		2016		2020		2024	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Accounts Receivable (A/R)								
Top 1 Amount (bn)	11.9	17.2	2.4	3.7	10.9	16.5	15.3	20.0
Top 5 Amount (bn)	16.3	23.2	2.8	3.7	14.6	21.7	21.9	27.7
Top 1 Share (%)	60.3	30.9	61.2	30.4	62.4	30.9	56.1	30.0
Top 5 Share (%)	81.9	23.9	82.3	18.8	83.6	23.5	79.1	24.0
HHI	0.54	0.26	0.52	0.25	0.55	0.27	0.52	0.25
Other Receivables								
Top 1 Amount (bn)	16.6	23.1	12.1	19.4	16.7	23.3	20.1	25.7
Top 5 Amount (bn)	31.7	38.7	20.6	29.7	32.0	38.8	40.4	44.5
Top 1 Share (%)	41.3	22.0	45.9	23.6	41.5	22.0	38.1	20.7
Top 5 Share (%)	75.7	19.3	77.6	19.4	76.8	18.8	73.3	19.4
HHI	0.39	0.18	0.43	0.20	0.39	0.17	0.37	0.16
Gov't Share (%)	36.2	27.3	–	–	37.2	27.6	34.4	26.4

Notes: This table reports summary statistics for the concentration of receivables among SOEs and LGFVs. Top 5 disclosure covers approximately 80% of total receivables. HHI ranges from 0.2 to 1, with higher values indicating more concentration. Gov't Share is the fraction of top-5 receivables owed by government entities. All variables winsorized at 1%/99%.

Table 2. Concentration of Payables

	Full Sample		2016		2020		2024	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Accounts Payable (A/P)								
Top 1 Amount (bn)	1.7	2.6	1.6	3.2	1.4	2.2	2.0	2.8
Top 5 Amount (bn)	3.4	5.1	4.2	7.6	2.7	4.3	4.3	5.7
Top 1 Share (%)	31.7	24.0	27.2	18.1	31.0	23.2	28.4	21.3
Top 5 Share (%)	57.5	26.9	58.7	31.3	56.5	27.1	54.5	25.0
HHI	0.36	0.17	0.31	0.11	0.37	0.18	0.33	0.14
Other Payables								
Top 1 Amount (bn)	10.7	15.9	12.4	19.3	9.8	15.5	13.7	18.1
Top 5 Amount (bn)	19.0	23.3	19.6	27.1	17.0	22.0	25.0	27.0
Top 1 Share (%)	37.9	22.2	47.8	23.6	36.4	22.0	35.9	21.7
Top 5 Share (%)	68.6	22.6	73.9	23.0	66.1	23.9	66.8	22.0
HHI	0.39	0.18	0.49	0.21	0.39	0.18	0.37	0.17

Notes: This table reports summary statistics for the concentration of payables among SOEs and LGFVs. Top 5 disclosure covers approximately 60% of total payables. HHI ranges from 0.2 to 1, with higher values indicating more concentration. All variables winsorized at 1%/99%.

Table 3. Motivation Evidence: Fiscal Pressure and Public Sector Receivables

	(1)	(2)	(3)	(4)	(5)
	Ln(AR)	AR/Assets	Turnover Days	Turnover Rate	Gov Share
$\text{GovPressure}_{c,t}$	0.312***	0.045***	56.420***	−1.245***	4.150***
	(0.076)	(0.011)	(15.240)	(0.412)	(1.280)
Controls	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Observations	29,343	29,343	29,095	28,777	15,704
Within R^2	0.415	0.388	0.224	0.245	0.315
Cluster (City)	Yes	Yes	Yes	Yes	Yes

Notes: This table reports descriptive patterns between local government maturity pressure and public-sector receivables at the firm-year level. $\text{GovPressure}_{c,t}$ is the ratio of debt principal maturing within one year to realized fiscal revenue (see Section 4.2.2). Turnover Days $= 365/$ Turnover Rate. These regressions are motivating evidence and should not be interpreted causally. Standard errors clustered at city level in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 4. Q1: Government to Public Sector Transmission (Dyadic Analysis)

	Extensive	**Intensive Margin**			
	(1)	(2)	(3)	(4)	(5)
Dependent Var:	**In Top 5?**	**Ln(AR Amount)**		**AR Share (%)**	
Gov. Pressure$_{j,t}$	0.054***	0.212***	0.155***	3.120***	1.850**
	(0.012)	(0.045)	(0.032)	(0.950)	(0.780)
Controls	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Pair FE (μ_{ij})	No	No	Yes	No	Yes
Observations	62,540	41,215	41,215	41,215	41,215
Adj. R^2	0.145	0.355	0.712	0.295	0.645

Notes: This table reports dyadic analysis of the government-to-public-sector transmission channel. Sample restricted to pairs where the debtor is a government unit. Column (1) estimates a linear probability model for whether a government unit appears in the top-5 receivables. Columns (2)–(5) analyze arrears size and share conditional on appearance. Columns (3) and (5) include pair fixed effects (μ_{ij}) to absorb time-invariant relationship characteristics. Standard errors clustered at the government level in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 5. Q1 Heterogeneity: Alternative Financing Buffers

	(1)	(2)	(3)
Dependent Var:		**Ln(AR Amount)**	
Mitigation Channel:	**Land Buffer**	**Bond Access**	**Bank Depth**
Gov. Pressure$_{j,t}$	0.245***	0.228***	0.235***
	(0.042)	(0.038)	(0.040)
$\times$ High Land Cap$_j$	$-$0.105**		
	(0.045)		
$\times$ High Bond Access$_j$		$-$0.092**	
		(0.036)	
$\times$ High Fin Depth$_j$			$-$0.088**
			(0.041)
Controls	Yes	Yes	Yes
Pair FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Observations	41,215	41,215	41,215
Within R^2	0.715	0.714	0.713

Notes: This table examines how alternative fiscal instruments mitigate the arrears response. High Land Cap indicates cities with above-median land transfer revenue capacity. High Bond Access indicates cities with above-median special bond issuance. High Fin Depth indicates cities with above-median bank loan-to-GDP ratio. Standard errors clustered at the government level in parentheses. *** p<0.01, ** p<0.05.

Table 6. Q2: Government Arrears Pass-through to Suppliers

	(1)	(2)	(3)	(4)
Dep. Var.: Ln(Payables to Supplier k)				
Gov. Receivables	0.125**	0.108**		
	(0.063)	(0.054)		
Predicted Gov. Arrears ($\widehat{AR}_{it}$)			0.352**	0.315**
			(0.178)	(0.159)
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Supplier FE	Yes	Yes	Yes	Yes
Pair FE (μ_{ki})	–	Yes	–	Yes
Observations	182,150	165,420	182,150	165,420
Adj. R^2	0.185	0.512	0.485	0.715

Notes: This table reports the pass-through elasticity from government arrears to SOE payables to suppliers. Columns (1)–(2) use observed government receivables (OLS); Columns (3)–(4) instrument government-related receivables with predicted arrears driven by debtor-government maturity pressure (IV). Pair fixed effects (μ_{ki}) absorb time-invariant supplier–SOE relationship characteristics. Standard errors clustered at firm-pair level in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 7. Q2 Heterogeneity: Liquidity Stress and Supplier Type

	Baseline		× Liquidity Stress		× Supplier Type	
	(1)	(2)	(3)	(4)	(5)	(6)
Dep. Var.: Ln(Payables to Supplier k)						
Predicted Gov. Arrears ($\widehat{AR}_{it}$)	0.352**	0.315**	0.248**	0.218**	0.398***	0.362***
	(0.178)	(0.159)	(0.115)	(0.102)	(0.125)	(0.112)
$\widehat{AR}_{it} \times$ Liquidity Stress$_{t-1}$			0.138**	0.125**		
			(0.062)	(0.055)		
$\widehat{AR}_{it} \times$ **1**(SOE Supplier)					−0.158**	−0.142**
					(0.075)	(0.068)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Supplier FE	Yes	Yes	Yes	Yes	Yes	Yes
Pair FE (μ_{ki})	–	Yes	–	Yes	–	Yes
Observations	182,150	165,420	178,632	162,108	182,150	165,420
Adj. R^2	0.485	0.715	0.492	0.722	0.498	0.728

Notes: This table examines heterogeneity in pass-through by SOE liquidity conditions and supplier ownership. Liquidity Stress is measured as SOE's cash ratio below median in year $t-1$. SOE Supplier indicates the supplier is a state-owned enterprise. The negative interaction in Columns (5)–(6) suggests SOE suppliers face lower pass-through, consistent with their stronger bargaining power. Standard errors clustered at firm pair level in parentheses. *** p<0.01, ** p<0.05.

Table 8. Q3: Effects on SME Financing Constraints

	Formal Credit		Informal Credit		Trade Credit	
	(1) Fin. Gap	(2) Bank	(3) PFI	(4) Family	(5) Arrears	(6) Top Supp.
$\text{Exposure}_{c,u,t-1}$	0.038***	0.012**	0.018**	0.009*	0.045**	0.032***
	(0.011)	(0.005)	(0.007)	(0.005)	(0.023)	(0.009)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
City × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,462	10,886	9,378	6,683	8,674	12,782
Adj. R^2	0.142	0.118	0.085	0.072	0.156	0.124

Notes: Sample from ESIEC 2018, 2023, and 2025. (1) Financing gap = desired minus obtained funding; (2) Bank loan application success; (3) Borrowing from Private Financial Institutions; (4) Borrowing from family/friends; (5) Using trade credit (accepting arrears from customers); (6) Arrears owed to top supplier. Standard errors clustered at city × industry level in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 9. Q3: Effects on Expectations, Performance, and Market Dynamics

	Performance		Expectations			Market Dynamics	
	(1) Gross	(2) Net	(3) Output	(4) Order	(5) Employ	(6) Ln(Entry)	(7) Ln(Exit)
$\text{Exposure}_{c,u,t-1}$	−0.008*	−0.015***	−0.024*	−0.031**	−0.028**	−0.052**	0.038*
	(0.005)	(0.004)	(0.014)	(0.013)	(0.012)	(0.022)	(0.021)
Controls	Yes	Yes	Yes	Yes	Yes	–	–
City × Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry × Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	13,124	8,763	7,428	7,456	7,512	2,134	2,134
Adj. R^2	0.089	0.112	0.065	0.071	0.068	0.342	0.287

Notes: Columns (1)–(2) report effects on gross and net profit margins. Columns (3)–(5) report effects on expected change in output, orders, and employment (coded as −1/0/1 for decrease/same/increase). Columns (6)–(7) report city-industry-year level regressions on log firm entry and exit counts. Standard errors clustered at city × industry level in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

Table 10. Household Income, Asset Allocation, and Saving Behavior

	Panel A: Full Sample			Panel B: Interaction with Non-Bianzhi		
	(1) Ln(Wage)	(2) Liquid Share	(3) Excess Save	(4) Ln(Wage)	(5) Liquid Share	(6) Excess Save
$\text{Exposure}_{c,t}$	−0.085**	0.032**	0.028**	−0.058*	0.021*	0.016
	(0.038)	(0.014)	(0.012)	(0.032)	(0.012)	(0.010)
Exposure × Non-Bz.				−0.052**	0.022**	0.024**
				(0.024)	(0.009)	(0.010)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	28,652	31,245	30,128	28,652	31,245	30,128
Adj. R^2	0.682	0.425	0.318	0.688	0.432	0.325

Notes: Data from CFPS 2016–2022. Sample restricted to non-agricultural households. Liquid Share = (Cash + Deposits) / Total Assets. Excess Save = Actual saving rate − predicted saving rate based on income and demographics. Non-Bianzhi indicates household head is not a formal civil servant. Controls include age, age^2, hukou, education, marriage, family size, dependency ratio, and health status. SEs clustered at county level. ** $p<0.05$, * $p<0.1$.

Table 11. Household Consumption Expenditure

	Panel A: Total Expenditure		Panel B: By Category		
	(1) Ln(Total)	(2) Ln(Total)	(3) Ln(Durables)	(4) Ln(Food)	(5) Ln(Services)
$\text{Exposure}_{c,t}$	−0.068**	−0.055**	−0.142***	−0.016	−0.038*
	(0.028)	(0.024)	(0.048)	(0.014)	(0.022)
Controls	Yes	Yes	Yes	Yes	Yes
Household FE	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
Prov. × Year FE	–	Yes	Yes	Yes	Yes
Observations	31,856	31,856	24,128	31,652	29,845
Adj. R^2	0.712	0.745	0.485	0.625	0.542

Notes: Data from CFPS 2016, 2018, 2020, 2022. Sample restricted to non-agricultural households. Durables include appliances, vehicles, and furniture. Services include education, healthcare, and leisure. Column (2) adds Province × Year FE to absorb regional economic trends. Standard errors clustered at county level in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

A. Data Extraction, Cleaning, and Validation

This appendix documents the data construction pipeline, covering (i) extraction of top-counterparty disclosures from financial statement footnotes, (ii) counterparty name cleaning and government entity classification, (iii) construction of firm-year arrears proxies and dyadic panels, and (iv) sample quality checks and validation.

A.1 Data Sources and Extraction

We assemble annual reports and audited financial statements for listed firms and bond-issuing public entities (SOEs and LGFVs) over 2015–2024. The key raw inputs are balance sheets and income statements (for total receivable/payable balances and scale variables) and footnote disclosures listing top counterparties for A/R, O/R, A/P, and O/P. Because disclosure formats vary across firms and years, we retain the original documents (PDF/HTML) with metadata (issuer, year, report type, file hash) to enable full traceability from the processed dataset back to source documents.

Extraction procedure. For each firm-year, we extract the "Top-5 major debtors" table for A/R (and O/R when available) and the "Top-5 major creditors" table for A/P (and O/P when available), standardizing the output into a long format with fields: firm identifier, year, account type $\in \{AR, OR, AP, OP\}$, rank, counterparty name (raw), amount, unit, and share. We implement a hybrid procedure combining rule-based parsing (regular expressions for table headers and cell delimiters), template matching for common disclosure layouts, and manual verification for irregular cases (e.g., image-embedded tables). Consolidated statements are used when available; parent-company-only disclosures are retained and flagged with an indicator variable. Amounts reported in non-standard units (thousand, million, or hundred million RMB) are converted to RMB using header information, cross-checked against balance-sheet totals for plausibility.

A.2 ESIEC Question Mapping and Variable Coding

For the ESIEC waves used in the main text, we harmonize question wording across survey rounds and map raw questionnaire responses into a stable analysis dictionary. The harmonized dictionary covers financing outcomes (funding demand, realized funding, financing gap, and source-specific credit access), operating outcomes (gross and net profit margins), expectation outcomes (anticipated output, orders, and employment), and payment outcomes (overdue receivables and debtor identity in the 2025 wave).

All coding rules are deterministic and version-controlled. Ordinal expectation responses are mapped to a symmetric $-1/0/1$ scale (decrease/same/increase), monetary

variables are converted to a common RMB unit before trimming, and binary outcomes retain the original survey skip logic. We retain raw-to-analytic variable crosswalks and missing-value flags to ensure that every regression variable can be traced back to its original questionnaire item and response coding.

A.3 Name Cleaning and Government Entity Classification

Name normalization. Counterparty names are disclosed as free text and often contain punctuation variants, inconsistent spacing, full-width/half-width characters, and bracketed qualifiers (e.g., "(本级)", "(财政)", project notes). For each raw name, we produce a normalized name via: (i) full-width to half-width conversion, punctuation normalization, and whitespace removal; (ii) extraction of bracketed qualifiers into a separate field while retaining a core name; (iii) standardization of common corporate suffixes (e.g., "有限公司", "有限责任公司") while retaining suffixes that distinguish government units from corporatized LGFVs; and (iv) deduplication within firm-year-account-type. Both raw and standardized names are retained for transparency.

AI-assisted government entity classification. Government entities (city/county/district governments, finance bureaus, construction bureaus, administrative committees, and other affiliated public units) do not have standardized corporate identifiers in commercial databases, which motivates a name-based classifier. We classify each unique standardized counterparty name using the DeepSeek v3.2 API with a fixed prompt template:

> Task: Determine whether the following Chinese entity name is a government department or affiliated public institution. If yes, output "Government". If not, output "Non-government". Entity name: `<counterparty_std>` Output format: one word only (Government / Non-government).

We validate the classifier against 1,000 manually labeled names; the agreement rate is 99.2%. All API inputs, outputs, and model version identifiers are archived to ensure reproducibility independent of future model updates.

Jurisdiction mapping. To merge government counterparties with city-year fiscal variables, we parse geographic tokens from standardized names and match them to official administrative division dictionaries. Subordinate departments (for example, city finance bureaus) are assigned to the corresponding city, and county/district units are mapped to their parent prefecture city. Ambiguous cases are manually reviewed and flagged in `mapping_flag` (exact, fuzzy, or manually confirmed).

A.4 Constructing Arrears Proxies and Dyadic Panels

Government-related receivables. We use government-related A/R and O/R as the primary proxy for payment arrears rather than overdue disclosures, because overdue classification is highly selective and depends on discretionary accounting treatments. For each public entity i and year t:

$$AR_{i,t}^{gov} = \sum_{j \in \mathcal{G}} AR_{i,j,t}^{top5},$$

where $\mathcal{G}$ is the set of government-classified counterparties; we analogously define $OR_{i,t}^{gov}$. Top-5 aggregation constitutes a conservative lower bound of total government-related receivables; top-5 counterparties nonetheless capture the largest debtor relationships and thus the most economically consequential arrears exposure.

Dyadic panel construction. We construct government–public entity dyads (i, j, t) where public entity i lists government unit j among its top-5 A/R debtors in year t. The intensive-margin outcome is $\ln(AR_{i,j,t}^{top5})$. For extensive-margin analysis, we define:

$$InTop5_{i,j,t}^{AR} = \mathbb{I}\{j \text{ appears in the top-5 A/R list of } i \text{ in } t\}.$$

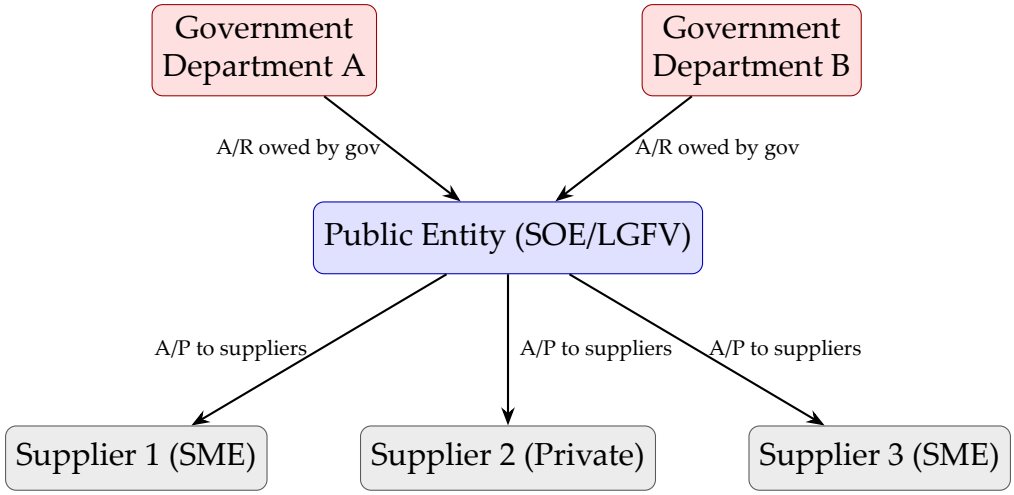
The panel universe includes all (i, j) pairs that appear at least once. Public entity–supplier dyads (k, i, t) are constructed analogously from payables disclosures. For heterogeneity analyses by supplier ownership, we match supplier names to firm registries; when a match is successful, $SOE_Supplier = 1$ if state-owned. Unmatched suppliers are retained with missing ownership flags and excluded only when ownership classification is required.

A.5 Sample Quality and Validation

Continuous monetary variables are winsorized at the 1st and 99th percentiles at the firm-year level, applied separately for each variable, to reduce sensitivity to reporting unit errors or parsing artifacts. We apply three internal consistency checks: (i) top-5 shares should not exceed 100% after unit harmonization; (ii) the sum of top-5 amounts should not substantially exceed balance-sheet receivables/payables; and (iii) year-to-year jumps beyond pre-specified thresholds are flagged for manual verification. Observations with missing table disclosures are retained, and disclosure indicators are included in robustness checks.

Figure 6 presents a stylized schematic of the receivables–payables network used in the paper's identification logic. The diagram shows the directional flow of payment obligations from government departments to public entities and then to upstream suppliers.

Figure 6. Stylized receivables–payables network for the arrears transmission channel. *Notes:* The schematic illustrates the empirical structure traced in the dyadic analysis: government units are debtors to a public entity (A/R side), and the public entity is debtor to upstream suppliers (A/P side).



B. Model Derivations and Proofs

This appendix provides detailed derivations for Propositions 1–3 and the network system in equation (12).

B.1 Proof of Proposition 1: Delayed-Payment Choice and Arrears Dynamics

Fix (j, t). The objective in (2) is strictly concave in δ_{jt} because the quadratic term has coefficient $-\kappa_j Q_{jt} < 0$ when $Q_{jt} > 0$. The unconstrained first-order condition is

$$\frac{\partial U_{jt}}{\partial \delta_{jt}} \;=\; \mu(\Lambda_{jt})\, Q_{jt} \;-\; \kappa_j\, \delta_{jt}\, Q_{jt} \;=\; 0, \tag{A.1}$$

which yields $\delta_{jt}^{\text{uc}} = \mu(\Lambda_{jt})/\kappa_j$. Imposing the constraint $\delta_{jt} \in [0, 1]$ gives the optimal policy

$$\delta_{jt} \;=\; \min\left\{1, \max\left\{0, \frac{\mu(\Lambda_{jt})}{\kappa_j}\right\}\right\}. \tag{A.2}$$

Because $\mu'(\Lambda) > 0$, the optimal δ_{jt} is weakly increasing in Λ_{jt}.

Next, holding (i, j) fixed, the arrears law of motion (3) implies

$$\frac{\partial a_{ijt}}{\partial \Lambda_{jt}} \;=\; q_{ijt}\, \frac{\partial \delta_{jt}}{\partial \Lambda_{jt}} \;\geq\; 0, \tag{A.3}$$

where the inequality follows from $q_{ijt} \geq 0$ and monotonicity of δ_{jt} in Λ_{jt}. This delivers Proposition 1.

B.2 Proof of Proposition 2: Optimal Pass-Through to Suppliers

Consider the cost-minimization problem (6). Because the objective is strictly convex and the constraint set is convex, the optimum is unique.

Binding constraint. Suppose the liquidity constraint were slack, i.e. $\ell_{it} + d_{it} > x_{it}$. Then reducing either ℓ_{it} or d_{it} would reduce costs in (5) while keeping feasibility, contradicting optimality. Hence the constraint binds:

$$\ell_{it} + d_{it} = x_{it}. \tag{A.4}$$

Interior solution and first-order conditions. With Lagrange multiplier λ_{it} on (A.4), the Lagrangian is

$$\mathcal{L} = \frac{\rho_i}{2}\ell_{it}^2 + \frac{\eta_i}{2}d_{it}^2 + \lambda_{it}\,(x_{it} - \ell_{it} - d_{it}).$$

The first-order conditions for an interior solution are

$$\rho_i\,\ell_{it} - \lambda_{it} = 0, \qquad \eta_i\,d_{it} - \lambda_{it} = 0, \qquad \ell_{it} + d_{it} = x_{it}. \tag{A.5}$$

From the first two conditions, $\rho_i\,\ell_{it} = \eta_i\,d_{it}$. Combining with (A.4) yields

$$d_{it} = \frac{\rho_i}{\rho_i + \eta_i}\,x_{it}, \qquad \ell_{it} = \frac{\eta_i}{\rho_i + \eta_i}\,x_{it}. \tag{A.6}$$

Define $\alpha_i \equiv \rho_i/(\rho_i + \eta_i) \in (0, 1)$ to obtain (11).

Comparative statics. Because $\alpha_i = \rho_i/(\rho_i + \eta_i)$,

$$\frac{\partial \alpha_i}{\partial \rho_i} = \frac{\eta_i}{(\rho_i + \eta_i)^2} > 0, \qquad \frac{\partial \alpha_i}{\partial \eta_i} = -\frac{\rho_i}{(\rho_i + \eta_i)^2} < 0. \tag{A.7}$$

Thus tighter external finance (larger ρ_i) increases pass-through to suppliers, while higher marginal costs of delaying suppliers (larger η_i) reduce pass-through.

B.3 Network System and the Neumann-Series Decomposition

This subsection derives the fixed point and the upstream-distance decomposition for equation (12).

Let $\mathcal{N}$ denote the set of all firms (including $\mathcal{I}$ and $\mathcal{K}$). For each firm $n \in \mathcal{N}$, let x_{nt} be its liquidity shortfall, and let $d_{nt} = \alpha_n x_{nt}$ be the delayed-payables amount implied by Proposition 2, where $\alpha_n \in (0, 1)$. Let $s_{nm} \in [0, 1]$ denote the share of firm n's delayed payables that is allocated to supplier m, with $\sum_m s_{nm} = 1$. Then the cash inflow delayed *to* supplier m equals $\sum_n s_{nm} d_{nt}$, so the supplier's liquidity shortfall satisfies

$$x_{mt} = \sum_{n \in \mathcal{N}} s_{nm}\, d_{nt} + s_{mt},$$

where s_{mt} is an origin shock (e.g., government arrears for firms directly exposed to government payment delays). Stacking across firms yields

$$\mathbf{x}_t = S^\top \mathbf{d}_t + \mathbf{s}_t = S^\top A\, \mathbf{x}_t + \mathbf{s}_t,$$

which is (12).

Existence and uniqueness. If the spectral radius $\varrho(S^\top A) < 1$, then $I - S^\top A$ is invertible and the unique fixed point is

$$\mathbf{x}_t = (I - S^\top A)^{-1} \mathbf{s}_t. \tag{A.8}$$

Upstream-distance decomposition. Under the same condition, the Neumann series converges:

$$(I - S^\top A)^{-1} = \sum_{\ell=0}^{\infty} (S^\top A)^\ell. \tag{A.9}$$

Hence

$$\mathbf{x}_t = \sum_{\ell=0}^{\infty} (S^\top A)^\ell \mathbf{s}_t. \tag{A.10}$$

The term with $\ell = 0$ is the origin shock; $\ell = 1$ captures one-step upstream propagation (customers $\to$ suppliers); $\ell = 2$ captures two-step propagation, and so on. Our dyadic data identify the origin shock on the government–public leg and the first upstream step on the public–supplier leg, consistent with truncating (A.10) at $\ell \leq 1$ when higher-order links are not fully observed.

B.4 Proof of Proposition 3: Supplier Real Adjustment

We solve (10). Let the liquidity constraint bind with multiplier $\lambda_{kt} \geq 0$. Using the constraint to substitute $\ell_{kt} = I_{kt} - \bar{w}_k + x_{kt}$ (for interior solutions), the supplier's objective

becomes a concave function of I_{kt}:

$$\max_{I_{kt}\geq 0}\left\{A_k I_{kt} - \frac{\chi_k}{2}I_{kt}^2 - I_{kt} - \frac{\rho_k}{2}\left(I_{kt} - \bar{w}_k + x_{kt}\right)^2\right\}. \tag{A.11}$$

The first-order condition for an interior optimum is

$$A_k - \chi_k I_{kt} - 1 - \rho_k\left(I_{kt} - \bar{w}_k + x_{kt}\right) = 0, \tag{A.12}$$

which yields

$$I_{kt}^{\star} = \frac{A_k - 1 + \rho_k(\bar{w}_k - x_{kt})}{\chi_k + \rho_k}. \tag{A.13}$$

Differentiating (A.13) gives

$$\frac{\partial I_{kt}^{\star}}{\partial x_{kt}} = -\frac{\rho_k}{\chi_k + \rho_k} < 0, \tag{A.14}$$

so investment (or employment) decreases with the liquidity shortfall. Moreover,

$$\frac{\partial}{\partial \rho_k}\left|\frac{\partial I_{kt}^{\star}}{\partial x_{kt}}\right| = \frac{\chi_k}{(\chi_k + \rho_k)^2} > 0, \tag{A.15}$$

implying that more financially constrained suppliers (larger ρ_k) are more sensitive to payment delays. This proves Proposition 3.

Exit (optional extension). If the supplier must pay a fixed operating cost $\varphi_k > 0$ each period, it exits when the maximized value is below zero. Because the maximized value is decreasing in x_{kt}, there exists a threshold $\bar{x}_k$ such that the supplier exits for $x_{kt} \geq \bar{x}_k$, delivering a direct mapping from arrears exposure to survival outcomes.