

Bank credit supply shocks, lending relationships, and real resilience

Evidence from exporting firms in Peru

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The views expressed are those of the author and do not necessarily represent those of the Central Reserve Bank of Peru.

Outline

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Bank shocks reach the real economy through specific lending relationships

- Bank-level credit disturbances affect firms' borrowing, investment, employment, and output.
- Exporters are a particularly credit-sensitive margin: production, imported inputs, shipment, and payment delays create working-capital needs before revenues are realized.
- But firms do not borrow from an anonymous financial sector: they enter stress through **pre-existing lender networks**.
- The key ambiguity is whether a concentrated bank relationship provides **liquidity insurance** or instead creates **dependence on a lender that may retrench**.

Motivating question: when do close bank relationships protect real activity, and when do they amplify fragility?

Relationship concentration can insure one borrower and trap another

Relationship insurance

- Better information and monitoring
- Long-term relationship value
- Greater willingness to preserve credit during stress
- More likely for borrowers with scale, collateral, and bargaining capacity

Relationship fragility

- Weak outside options
- Costly lender substitution
- High exposure to the main bank's retrenchment
- More likely for small and financially constrained borrowers

Which force dominates is an empirical question.

Three results organize the paper

1. **Adverse bank credit supply shocks reduce firm credit and exports.**
2. **For non-small firms, concentrated lending relationships attenuate the transmission of bank shocks.**
3. **For small firms, that cushioning effect disappears and reverses; imported-input dependence adds a second amplification margin.**

Interpretation. Aggregate banking-system resilience can coexist with concentrated real fragility because the distribution of liquidity across borrower networks matters.

The paper links credit-supply identification, relationship lending, and trade finance

- **Bank credit supply and real outcomes.** Multi-bank designs separate supply from borrower demand and trace bank shocks to firm outcomes.

Khwaja and Mian (2008); Schnabl (2012); Jiménez et al. (2012); Chodorow-Reich (2014); Amiti and Weinstein (2018); Degryse et al. (2019); Hardy (2023).

- **Relationship lending.** Close relationships may reduce information frictions and provide liquidity insurance, but concentrated relationships may also create lender dependence.

Petersen and Rajan (1994); Berger and Udell (1995); Boot (2000); Elsas (2005).

- **Finance and international trade.** Exporting requires working capital and is sensitive to credit conditions, trade finance, and imported-input financing.

Ahn, Amiti and Weinstein (2011); Amiti and Weinstein (2011); Chor and Manova (2012); Manova (2013); Antràs and Foley (2015); Paravisini et al. (2015).

Contribution: the same lender concentration can be stabilizing for financially stronger borrowers and destabilizing for small borrowers within the same credit market.

Matched administrative data connect bank credit to granular export outcomes

- **Supervisory credit registry:** outstanding credit by firm, bank, currency, and period.
- **Customs registry:** exports by firm, product, destination, and transaction date.
- Matched by firm tax identifier; baseline export panel is **firm–product–destination–quarter**.
- Main outcome: $\log(\text{FOB exports})$.
- Pre-pandemic lending shares determine inherited exposure to bank shocks and relationship concentration.
- Main export specifications contain roughly **365,000–491,000** observations.

Key advantage: bank-side credit variation can be separated from firm demand and then linked directly to real outcomes in the same firms.

Small exporters enter stress with much more concentrated lender networks

Variable	Non-small			Small			Total		
	Mean	SD	N	Mean	SD	N	Mean	SD	N
Number of banks per firm	4.228	2.175	2,462	2.009	1.206	1,412	3.419	2.163	3,874
Bank dependence (BD_i)	0.685	0.276	2,462	0.931	0.164	1,412	0.775	0.269	3,874
Largest bank share ($wmax_i$)	0.755	0.234	2,462	0.946	0.135	1,412	0.824	0.223	3,874
Share with $wmax_i \geq 0.8$	0.492	—	2,462	0.877	—	1,412	0.632	—	3,874
Share with $wmax_i \geq 0.9$	0.408	—	2,462	0.851	—	1,412	0.569	—	3,874
Share with single bank	0.071	—	2,462	0.441	—	1,412	0.206	—	3,874

Notes: Non-small firms are corporate, large, and medium firms; small firms are small and micro firms. BD_i is the Herfindahl index of pre-pandemic lending shares.

Descriptive fact: small firms have fewer lenders, a higher HHI, and a much larger dominant-bank share.

Multi-bank firms identify bank-time credit supply

For firm i , bank b , quarter t :

$$\Delta \log Credit_{ibt} = \alpha_{it} + \beta_{bt} + \varepsilon_{ibt}.$$

- α_{it} : firm–time fixed effects absorb borrower-specific credit demand and common firm shocks.
- β_{bt} : bank–time component captures systematic differences in lenders' credit adjustments to the same borrower at the same time.
- Identification comes from firms borrowing from multiple banks simultaneously.

Core comparison: how do different banks change credit to the *same firm in the same quarter*?

Predetermined lending shares map bank shocks into firm exposure

The bank-time components are aggregated using pre-pandemic lender weights:

$$BankShock_{it} = \sum_{b \in B_i} w_{ib}^{pre} \hat{\beta}_{bt}.$$

Relationship concentration is measured by

$$BD_i = \sum_b (w_{ib}^{pre})^2, \quad wmax_i = \max_b w_{ib}^{pre}.$$

- Pre-pandemic weights prevent crisis-period lender reallocation from mechanically determining exposure.
- BD_i captures overall concentration; $wmax_i$ isolates exposure to the dominant lender.
- The design therefore combines time-varying bank shocks with inherited lender structure.

The export regression tests insurance versus fragility directly

$$\begin{aligned}\log X_{ipdt} = & \theta_1 BankShock_{it} + \theta_2 BankShock_{it} \times BD_i \\ & + \theta_3 BankShock_{it} \times Small_i + \theta_4 BankShock_{it} \times BD_i \times Small_i \\ & + Z'_{it}\Gamma + \alpha_i + \lambda_{pt} + \delta_{dt} + u_{ipdt}.\end{aligned}$$

- α_i : firm fixed effects.
- λ_{pt} : product–time fixed effects absorb common product-market shocks.
- δ_{dt} : destination–time fixed effects absorb common foreign-demand shocks.
- Insurance for non-small firms: $\theta_2 > 0$. Fragility among small firms: $\theta_4 < 0$.

The key object is the differential slope of the same bank shock across pre-existing lender structures.

Adverse bank shocks contract firm credit

	(1) Total credit	(2) LC credit	(3) FX credit
BankShock	-0.800*** (0.205)	-0.701 (0.569)	-1.593*** (0.344)
BankShock $\times$ Bank dependence	1.059*** (0.321)	0.950 (0.819)	2.019*** (0.490)
BankShock $\times$ Small	1.565*** (0.442)	1.388* (0.770)	7.222*** (1.531)
BankShock $\times$ Bank dependence $\times$ Small	-2.264*** (0.547)	-2.017** (0.996)	-8.712*** (1.676)
Observations	63,669	56,312	43,716
R-squared	0.207	0.273	0.159

Dependent variables are annual growth rates of total, local-currency, and foreign-currency credit. Firm and quarter fixed effects. Sample from 2020 onward. Robust standard errors in parentheses.

The credit channel is strongest in FX credit, and the cushioning slope is substantially weaker for small firms.

Concentrated relationships cushion export losses for non-small firms

	(1) Baseline	(2) + Bank dependence	(3) + Small firms	(4) Full model
$BankShock_{it}$	-0.00201*** (0.000552)	-0.00697*** (0.00168)	-0.00183*** (0.000671)	-0.00936*** (0.00191)
$BankShock_{it} \times BD_i$		0.00746*** (0.00223)		0.0119*** (0.00275)
$BankShock_{it} \times Small_i$			-0.000486 (0.00127)	0.00784* (0.00466)
$BankShock_{it} \times BD_i \times Small_i$				-0.0128** (0.00558)
Observations	491,451	384,299	364,773	364,773
R-squared	0.652	0.630	0.623	0.623

Dependent variable: log FOB exports. All specifications include firm, product–time, and destination–time fixed effects. Robust standard errors in parentheses.

For non-small firms, the positive $BankShock \times BD$ interaction is consistent with relationship-based insurance.

For small firms, the same concentration no longer provides insurance

	(1) Baseline	(2) + Bank dependence	(3) + Small firms	(4) Full model
$BankShock_{it}$	-0.00201*** (0.000552)	-0.00697*** (0.00168)	-0.00183*** (0.000671)	-0.00936*** (0.00191)
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Observations	491,451	384,299	364,773	364,773
R-squared	0.652	0.630	0.623	0.623

Dependent variable: log FOB exports. Firm, product–time, and destination–time fixed effects. Robust standard errors in parentheses.

Small-firm concentration slope: $0.0119 - 0.0128 \approx -0.0009$. The insurance slope effectively disappears and reverses in sign.

The result is robust to measuring exposure with the dominant lender share

	(1) Alt. exposure	(2) Alt. exposure + Small firms
$BankShock_{it}$	-0.00762*** (0.00210)	-0.0107*** (0.00243)
$BankShock_{it} \times wmax_i$	0.00764*** (0.00262)	0.0124*** (0.00319)
$BankShock_{it} \times Small_i$		0.0111** (0.00531)
$BankShock_{it} \times wmax_i \times Small_i$		-0.0155** (0.00619)
Observations	384,299	364,773
R-squared	0.630	0.623

Dependent variable: log FOB exports. $wmax_i$ is the maximum pre-2019 bank credit share. Firm, product–time, and destination–time fixed effects.

The insurance–fragility pattern is not specific to the HHI definition of lender concentration.

Imported-input dependence adds a second amplification margin for small firms

	(1) Import dep.	(2) Import dep. $\times$ Small	(3) Bank dep. + Import dep.	(4) Full
BankShock	-0.00264*** (0.000612)	-0.00267*** (0.000756)	-0.00733*** (0.00170)	-0.00946*** (0.00191)
BankShock $\times$ Bank dependence			0.00724*** (0.00227)	0.0111*** (0.00280)
BankShock $\times$ Small		0.000651 (0.00131)		0.00759 (0.00466)
BankShock $\times$ Bank dependence $\times$ Small				-0.0113** (0.00560)
BankShock $\times$ Import dependence	0.00816** (0.00318)	0.00863** (0.00337)	0.00669** (0.00326)	0.00600* (0.00346)
BankShock $\times$ Import dependence $\times$ Small		-0.00937*** (0.00329)		-0.00936*** (0.00329)
Observations	449,417	364,773	373,901	364,773
R-squared	0.643	0.623	0.627	0.623

Import dependence = 2019 imports/(2019 imports + exports). All specifications include firm, product-quarter, and destination-quarter fixed effects; sample from 2020 onward.

The lender-network mechanism survives, while imported-input dependence identifies an additional working-capital exposure among financially small exporters.

Conclusion

1. Bank credit supply shocks transmit to the real economy: tighter bank credit lowers firm borrowing and exports.
2. Lender concentration is not uniformly stabilizing or destabilizing. It cushions shocks for non-small firms but not for small and micro firms.
3. Imported-input dependence creates an additional working-capital amplification margin among financially small exporters.

Policy implication. Preserving aggregate bank liquidity need not protect borrowers with weak outside options. Lender substitution and access to working-capital finance matter for the distribution of resilience.

The same lending architecture can insure one borrower and expose another.

Thank you

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Appendix: variable definitions and sample construction

- **BankShock:** estimated bank–time supply components aggregated with pre-pandemic firm–bank shares.
- **Bank dependence:** $BD_i = \sum_b (w_{ib}^{pre})^2$.
- **Dominant lender share:** $wmax_i = \max_b w_{ib}^{pre}$.
- **Small:** small and micro firms in the supervisory credit-registry classification.
- **Import dependence:** $Imports_{i,2019} / (Imports_{i,2019} + Exports_{i,2019})$.
- **Export outcome:** log FOB exports at the firm–product–destination–quarter level.
- **Main export FE:** firm, product–quarter, and destination–quarter.

Appendix: imported-input dependence also loads on working-capital shocks

	(1) Depreciation	(2) Dep. $\times$ Small	(3) VIX	(4) VIX $\times$ Small	(5) EPU	(6) EPU $\times$ Small
WC Shock: Depreciation $\times$ Import dep.	-0.0235*** (0.00571)	-0.0225*** (0.00669)				
WC Shock $\times$ Small		-0.0135 (0.0482)				
WC Shock: VIX $\times$ Import dep.			0.00769 (0.00597)	0.00733 (0.00694)		
WC Shock $\times$ Small				0.0706 (0.0545)		
WC Shock: EPU $\times$ Import dep.					-0.00699* (0.00373)	-0.0122*** (0.00438)
WC Shock $\times$ Small						0.0382 (0.0320)
Observations	572,404	377,954	572,404	377,954	572,404	377,954
R-squared	0.655	0.625	0.655	0.625	0.655	0.625

Dependent variable: log FOB exports. Working-capital exposures interact import dependence with depreciation, VIX, or EPU. Firm, product-quarter, and destination-quarter FE.

Appendix: export size and financial size capture different margins

	(1) Export-small	(2) Bank dep.	(3) Dominant lender	(4) Bank dep. + Import dep.
BankShock	-0.00195*** (0.000568)	-0.00694*** (0.00171)	-0.00781*** (0.00214)	-0.00728*** (0.00172)
BankShock × Export-small	-0.0113* (0.00584)	-0.0856*** (0.0223)	-0.127*** (0.0404)	-0.0904*** (0.0241)
BankShock × Bank dependence		0.00749*** (0.00228)		0.00719*** (0.00228)
BankShock × Bank dependence × Export-small		0.110*** (0.0294)		0.114*** (0.0306)
BankShock × Dominant lender share			0.00795*** (0.00268)	
BankShock × Dominant lender share × Export-small			0.146*** (0.0487)	
BankShock × Import dependence				0.00708** (0.00328)
BankShock × Import dependence × Export-small				0.101 (0.154)
Observations	437,686	364,773	364,773	364,773
R-squared	0.640	0.623	0.623	0.623

Export-small identifies firms below the median of pre-pandemic log FOB exports. The contrast with the supervisory small-firm classification suggests that export scale and financial capacity are distinct dimensions.

Appendix: identification relies on within-firm comparisons and inherited exposures

- **Demand control:** firm–time fixed effects remove borrower-specific contemporaneous credit demand when estimating bank-time components.
- **Predetermination:** lender weights are fixed using pre-pandemic borrowing shares.
- **Trade-demand control:** product–time and destination–time fixed effects absorb common export-demand movements.
- **Heterogeneity:** relationship concentration and firm size are predetermined state variables, not crisis-period choices.
- **Interpretation:** the design estimates differential exposure to bank-side disturbances through inherited lender networks.

Natural next robustness checks: clustered/shock-level inference, leave-one-borrower-out shock construction, and dynamic lead/lag specifications.