Firms' Debt: Currency Choice and Exchange Rate Pass-Through

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Financial Dollarization: Causes and Consequences

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Motivation

- Wide use of the dollar in emerging economies
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  Q2: is the resulting risk-sharing efficient?
- Our approach:
  - theoretical framework $\Rightarrow$ sufficient statistic for currency choice
  - credit register + accounting data $\Rightarrow$ strong empirical support

Relation to the Literature

- Methodological approach: Gopinath, Itskhoki & Rigobon (2010)
- Theoretical models: Froot, Scharfstein & Stein (1993), Bocola & Lorenzoni (2020), Gopinath & Stein (2020), Drenik, Kirpalani & Perez (2019), Aoki, Benigno & Kiyotaki (2016)
- Empirical evidence: Maggiori, Neiman & Schreger (2020), Christiano, Dalgic & Nurbekyan (2020), Salomao & Varela (2020), Baskaya, Giovanni, Kalemli-Ozcan, Peydro & Ulu (2018), Verner and Gyongyosi (2020)

THEORETICAL FRAMEWORK

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$$\max_{W,B^h,B^f} \mathbb{E}[W] - \frac{\bar{\gamma}}{2}\mathbb{V}[W]$$

$$\text{s.t. } W = \Pi - R^h B^h - \mathcal{E} R^f B^f$$

$$B^h + B^f = B$$

  - B is total debt/investment
  - Π is stochastic cash flow/profits
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- Normalize by the size of the debt:

$$\max_{w,x} \mathbb{E}[w] - \frac{\gamma}{2}\mathbb{V}[w]$$

$$\text{s.t. } w = (\pi - R^h) + (R^h - \mathcal{E} R^f)x,$$

  - where $w = \frac{W}{B}$, $\pi = \frac{\Pi}{B}$, $x = \frac{B^f}{B}$, $\gamma = \bar{\gamma} B$

Sufficient Statistic

- Optimal debt composition:

$$x = \frac{\frac{1}{\gamma}\mathbb{E}[\psi] - \mathrm{cov}(\pi, \psi)}{\mathbb{V}[\psi]}$$

  - $\psi = R^h - \mathcal{E}R^f \approx r^h - r^f - \Delta e$ is excess returns on LC vs. FC debt

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- **Sufficient statistic** for FC debt:

$$x = \frac{\mathrm{cov}(\pi, \Delta e)}{\mathbb{V}[\Delta e]} + \mathrm{const}$$

- Can be directly estimated via OLS regression:

$$\pi = \alpha + \beta \Delta e + \varepsilon$$

Discussion

- Advantages of the sufficient statistic:
  - independent of fundamentals behind π and Δe
  - can exploit both cross-firm and time variations
  - applies to any pair of currencies
  - extends to binary choice

$$x = 1 \quad \Leftrightarrow \quad \frac{\text{cov}(\pi, \Delta e)}{\mathbb{V}[\Delta e]} \geq \frac{1}{2} - \frac{\mathbb{E}\psi}{\gamma}$$

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- Limitations:
  - ψ may vary across firms (e.g. because of defaults)
  - maturity structure of debt
  - ...

- Going to control for these confounding factors

DATA

Sources

- Credit register
  - universe of bank loans taken by firms in Russia
    - 2016-19, ∼147,000 firms each year
  - variables: loan size, maturity, interest rate, currency...
  - does not include loans taken not in Russia, other financing (e.g. bonds)

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- Match firms by taxpayer id
  - successful matching for ∼80% of firms (∼90% of debt)

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- Firms with multi-currency debt are extremely
  - scarce:
    - only 0.7% of firms ($\sim$800 out of $>$117,000) have any dollar loans
    - only 26% of these have loans of more than one currency
  - large: their median revenue is 214 times higher

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  - large: their median revenue is 214 times higher
- Dollar debt is cheaper and more long-term

PRELIMINARY RESULTS

Preliminary Steps

- Want to estimate pass-through β

$$\Delta\pi_{it} = \alpha + \beta\Delta e_t + \varepsilon_{it}$$

  - π_{it} is log of profits for firm i in year t
  - e_t is log of ruble-dollar exchange rate

- Do it separately for firms with no \$ and only \$ bank loans
  - too few observations with non-trivial share of \$ loans

- Focus on long-term ($>$1 year) loans only
  - limited by annual frequency of profits
  - 82% of all debt is long-term

Extensive Margin

$$\Delta \pi_{it} = \alpha + \beta \Delta e_t + \varepsilon_{it}$$

	no $ loans	only $ loans
Baseline β	-0.02	3.26^{***}
	(0.03)	(0.71)
# of obs	386,169	810
# of firms	136,654	362

Notes. Clustered st. err. in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Extensive Margin

$$\Delta\pi_{it} = \alpha + \beta\Delta e_t + \varepsilon_{it}$$

- Exclude observations with top 1% and bottom 1% of $\Delta\pi_{it}$

	no $ loans	only $ loans
Baseline β	-0.02	3.26^{***}
	(0.03)	(0.71)
Without outliers	-0.02	3.25^{***}
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- Weigh each observation with log of firm's revenue (averaged over the period)

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Baseline β	-0.02	3.26***
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Without outliers	-0.02	3.25***
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Weighted by revenue	0.05*	3.43***
	(0.02)	(0.70)
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Extensive Margin

$$\Delta\pi_{it} = \alpha_i + \beta\Delta e_t + \varepsilon_{it}$$

- Allow for firm-level fixed effects, α_i

	no $ loans	only $ loans
Baseline β	-0.02	3.26***
	(0.03)	(0.71)
Without outliers	-0.02	3.25***
	(0.03)	(0.51)
Weighted by revenue	0.05*	3.43***
	(0.02)	(0.70)
With firm-level trends	-0.01	2.04**
	(0.03)	(0.83)
# of obs	386,169	810
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Extensive Margin

$$\Delta\pi_{it}^{e} = \alpha + \beta\Delta e_{t}^{e/d} + \varepsilon_{it}$$

- Euro-dollar pass-through for firms with either euro or dollar loans

	no $ loans	only $ loans
Baseline β	-0.02	3.26***
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Without outliers	-0.02	3.25***
	(0.03)	(0.51)
Weighted by revenue	0.05*	3.43***
	(0.02)	(0.70)
With firm-level trends	-0.01	2.04**
	(0.03)	(0.83)
# of obs	386,169	810
# of firms	136,654	362
Euro vs dollar	1.28	5.32***
	(1.41)	(1.14)
# of obs	1,135	1,836

Notes. Clustered st. err. in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Intensive Margin

- So far, have enough variation only for extensive margin
  - firms that either never or always borrow in $
- Get more observations for intensive margin
  - include short-term debt
  - allow for gaps in the data (fixed effects instead of first differences)
  - allow firms to switch groups over time

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	no $	few $	some $	many $	only $
Fixed effects spec.	0.36^{***}	2.96^{***}	3.04^{**}	4.10^{***}	5.67^{***}
	(0.04)	(1.02)	(1.48)	(1.07)	(0.75)
# of obs	298,624	360	344	345	1,072
# of firms	148,201	191	176	202	596

Notes. Clustered st. err. in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Conclusion

- Reasons and implications of wide use of the dollar
- First look at evidence based on cross-firm variation
- Preliminary answers

  Q1: how do firms choose between LC and FC debt?

  A1: support for model with tractable sufficient statistic

  Q2: is the resulting risk-sharing efficient?

  A2: more FC debt is held by firms that are better hedged against this risk

- Major challenge is to find enough variation despite high concentration