Payment Choice and International Trade: Theory and Evidence from Cross-country Firm Level Data

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Motivation

Why are international transactions different? International trade is risky and takes time:

- International enforcement problem
  $\rightarrow$ different contracting environments / legal traditions
  $\rightarrow$ language differences

- Time delay
  $\rightarrow$ physical transport time longer – Hummels (2001)
  $\rightarrow$ time from factory gate to ship longer – Djankov, Freund, and Pham (2006)

$\rightarrow$ Payment contracts allocate risk and arrange financing of a transaction.

Contribution

Theory:

- We extend Schmidt-Eisenlohr (2009):
  - Interest rate costs versus enforcement probability
  - The effect of the export share of firms on contract choice

Empirics:

- Analyze payment contract choice using a cross-section of firms in developing countries
- Observe payment mode at the firm level
- Observe export status and share at the firm level

  $\Rightarrow$Study the relationship between export status and share and payment contract choice.

Literature

Trade Finance:

- Schmidt-Eisenlohr (2009), Olsen (2010), Ahn (2010), Antras and Foley (2011), Eck, Engemann and Schnitzer (2011a,b)

Wider literature:

- Trade credit: Biais and Gollier (1997), Petersen and Rajan (1997)...
- Theory on financial conditions and trade: Kletzer and Bardhan (1987), Matsuyama (2005), Chaney (2005), Manova (2008)
- Importance of Financial Conditions: Beck (2002, 2003), Greenaway et al. (2007), Berman and Hericourt (2010), Manova (2008)
- Evidence on financial crisis and trade: Amiti and Weinstein (2009), Levchenko et al. (2009), Berman and Martin (2009), Eaton et al. (2009)...

Testable Predictions

- The trade-off
  - allocate financing costs with party that has lowest enforcement probability
  - allocate financing costs with party that has lowest costs
- We extend Schmidt-Eisenlohr (2009) in a CES trade model

From the theory we derive the following testable predictions:

- Proposition 2: Exporting firms use more post-sale payment (Open Account) if their financing costs and enforcement are low
- Proposition 3: The enforcement problem in proposition 2 is stronger in complex industries

The Data I

We use the World Bank Enterprise survey:

- Firm level survey for 98 developing countries between 2006 and 2010
  - Each country is surveyed only once between 2006 and 2010
- The sample is a stratified sample
- Variable of main interest: share of pre-, post- and on-sale payment
  - The firms are asked to report the fraction of each category

The Data II

On the firm level we

- have information on exporting status and export share
- have information on the firms: sales, employment, skill intensity, ...
- focus on manufacturing sectors

We complement the data with

- World Bank Doing Business Survey
  - We use the information on Enforcement of Contracts in countries
  - Enforcement is measured in calendar days to resolve a commercial dispute through the judicial system
- Financial data from Beck et al. (2009)
  - Net-interest margin $\rightarrow$ Efficiency of financial sector
  - Private credit over GDP $\rightarrow$ Access to finance

Estimation Method

- We use Seemingly Unrelated Regressions
- Specification 1

$$\begin{aligned} PaySh_{it} &= \psi_0 + \beta_1 XSHARE_{it} \\ &+ \psi_2 XSHARE_{it} \times ENF_{ct} \\ &+ \psi_3 XSHARE_{it} \times FIN_{ct} \\ &+ \Psi \text{CONTROL}_{it} + \nu_j + \nu_c + \nu_t + \epsilon_{it}. \end{aligned}$$

  - XSHARE is either the export share
  - ENF is the enforcement
  - FIN is financial conditions; Private Credit or Net Interest Margin
  - CONTROL is a vector of firm level controls

The Contract Intensity of Industries

- Industries differ in their contract intensity (Nunn (2007))
  - Industries differ in their extend of intermediate input use
  - An intermediate is complex if it is not sold on an organised exchange and does not have a reference price
  - An industry is complex is it has a large share of complex intermediate inputs
- Idea: Contractual frictions particularly important for complex industries
- Our measure
  - Use Nunn's industry classification
  - An industry is complex if the Nunn measure larger than the median

Results - Private Credit

	All Industries		Complex Industries		None-Complex Industries	
	(1)	(2)	(3)	(4)	(5)	(6)
	post-sale	pre-sale	post-sale	pre-sale	post-sale	pre-sale
Exportershare	0.0071	-0.0073	0.1329***	-0.0571*	-0.1180**	0.0395
	(0.0345)	(0.0226)	(0.0460)	(0.0309)	(0.0541)	(0.0339)
Enforcement x Exportshare	-6.2065	37.3702***	-47.1738*	43.7306***	25.0340	40.6797**
	(18.5143)	(12.0999)	(24.4988)	(16.4539)	(30.1182)	(18.8673)
Private Credit x Exportshare	0.0306	-0.0739*	0.0043	0.0249	0.0585	-0.1900***
	(0.0583)	(0.0381)	(0.0819)	(0.0550)	(0.0869)	(0.0545)
Log Sales per Worker	0.0225***	-0.0050*	0.0140***	-0.0054	0.0365***	-0.0063
	(0.0042)	(0.0027)	(0.0053)	(0.0036)	(0.0066)	(0.0041)
Log Employment	0.0137***	0.0015	0.0208***	-0.0018	0.0044	0.0064
	(0.0041)	(0.0027)	(0.0054)	(0.0036)	(0.0064)	(0.0040)
R-squared	0.3544	0.3068	0.3519	0.3356	0.4046	0.3179
N	4661		2706		1955	

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; Firm controls, year fe, country fe and industry fe

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Results - Interest Margin

	All Industries		Complex Industries		None-Complex Industries	
	(1)	(2)	(3)	(4)	(5)	(6)
	post-sale	pre-sale	post-sale	pre-sale	post-sale	pre-sale
Exportershare	0.0857	-0.0821**	0.1630**	-0.1121**	0.0348	-0.0706
	(0.0538)	(0.0352)	(0.0733)	(0.0492)	(0.0844)	(0.0530)
Enforcement x Exportshare	-10.7242	32.9582***	-50.4279**	55.5464***	15.2931	15.0357
	(15.9911)	(10.4511)	(21.7293)	(14.5892)	(25.1795)	(15.8144)
Interest Margin x Exportshare	-1.0575*	0.9669***	-0.4055	0.7822	-2.0557**	1.4627***
	(0.5732)	(0.3746)	(0.7843)	(0.5266)	(0.8760)	(0.5502)
Log Sales per Worker	0.0226***	-0.0050*	0.0140***	-0.0054	0.0377***	-0.0067
	(0.0041)	(0.0027)	(0.0053)	(0.0036)	(0.0066)	(0.0041)
Log Employment	0.0137***	0.0015	0.0209***	-0.0020	0.0048	0.0067*
	(0.0041)	(0.0027)	(0.0054)	(0.0036)	(0.0064)	(0.0040)
R-squared	0.3549	0.3072	0.3520	0.3361	0.4061	0.3161
N	4661		2706		1955	

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; Firm controls, year fe, country fe and industry fe

Domestic versus Foreign Enforcement/Financing Costs

- Theory would tell us that it is the relative enforcement/financing costs that matter
- We attempt to proxy for foreign enforcement/financing costs by constructing a trade weighted matrix
- Specification 2:

$$\begin{aligned} PaySh_{it} &= \psi_0 + \psi_1 \text{ XSHARE}_{it} \\ &+ \psi_2 ENFD_{jct} \\ &+ \psi_3 FIND_{jct} \\ &+ \Psi \text{ CONTROL}_{it} + \nu_j + \nu_c + \nu_t + \epsilon_{it}. \end{aligned}$$

  - XSHARE is the firm's export share
  - ENFD is the weighted destination enforcement
  - FIND is the weighted destination financial conditions

Results - Destination Variables

	All Industries		Complex Industries		None-Complex Industries	
	(1)	(2)	(3)	(4)	(5)	(6)
	post-sale	pre-sale	post-sale	pre-sale	post-sale	pre-sale
Exportshare	0.0065	0.0371***	0.0386*	0.0432***	-0.0315	0.0321**
	(0.0161)	(0.0103)	(0.0220)	(0.0144)	(0.0242)	(0.0151)
Destination Enforcement	30.0764***	-7.5920	42.5872***	-9.8964	-9.1362	-3.7780
	(9.9536)	(6.3916)	(12.6087)	(8.2551)	(18.3874)	(11.4900)
Destination Private Credit	-0.0224	0.0202*	-0.0230	0.0183	-0.0036	0.0223
	(0.0175)	(0.0112)	(0.0226)	(0.0148)	(0.0303)	(0.0190)
Log Sales per Worker	0.0230***	-0.0057**	0.0161***	-0.0079**	0.0337***	-0.0038
	(0.0043)	(0.0027)	(0.0055)	(0.0036)	(0.0067)	(0.0042)
Log Employment	0.0123***	0.0018	0.0183***	-0.0014	0.0022	0.0078*
	(0.0042)	(0.0027)	(0.0055)	(0.0036)	(0.0065)	(0.0041)
R-squared	0.3571	0.3192	0.3587	0.3545	0.4046	0.3233
N	4453		2560		1893	

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; Firm controls, year fe, country fe and industry fe

Results - Instrumental Variables

- Export status and share are endogenous
- Use country-industry (isic4) mean as instrument for exportshare:

	Complex Industries		None-Complex Industries	
	(1)	(2)	(3)	(4)
Exportershare	0.0844	-0.0794*	-0.1487**	0.0559
	(0.0667)	(0.0450)	(0.0744)	(0.0469)
Enforcement x Exportshare	-41.6984	64.1750**	25.1215	81.1919**
	(38.0840)	(25.6823)	(51.9544)	(32.7711)
Private Credit x Exportshare	-0.1151	0.0774	0.0105	-0.3699***
	(0.1484)	(0.1001)	(0.1697)	(0.1071)
Log Sales per Worker	0.0184***	-0.0105***	0.0344***	-0.0057
	(0.0057)	(0.0038)	(0.0066)	(0.0042)
Log Employment	0.0271***	-0.0066*	0.0030	0.0066
	(0.0059)	(0.0040)	(0.0071)	(0.0045)
R-squared	0.3421	0.3200	0.3969	0.2995
N	2706	2706	1955	1955

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$; Firm controls, year fe, country fe and industry fe

Conclusion

We develop a theory model and provide evidence that:

- Firms with a larger export share use more Open Account if financing costs and enforcement are low (Proposition 2)
- Enforcement matters more in complex industries (Proposition 3)