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

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Usage of Payment Contracts

October 2008:

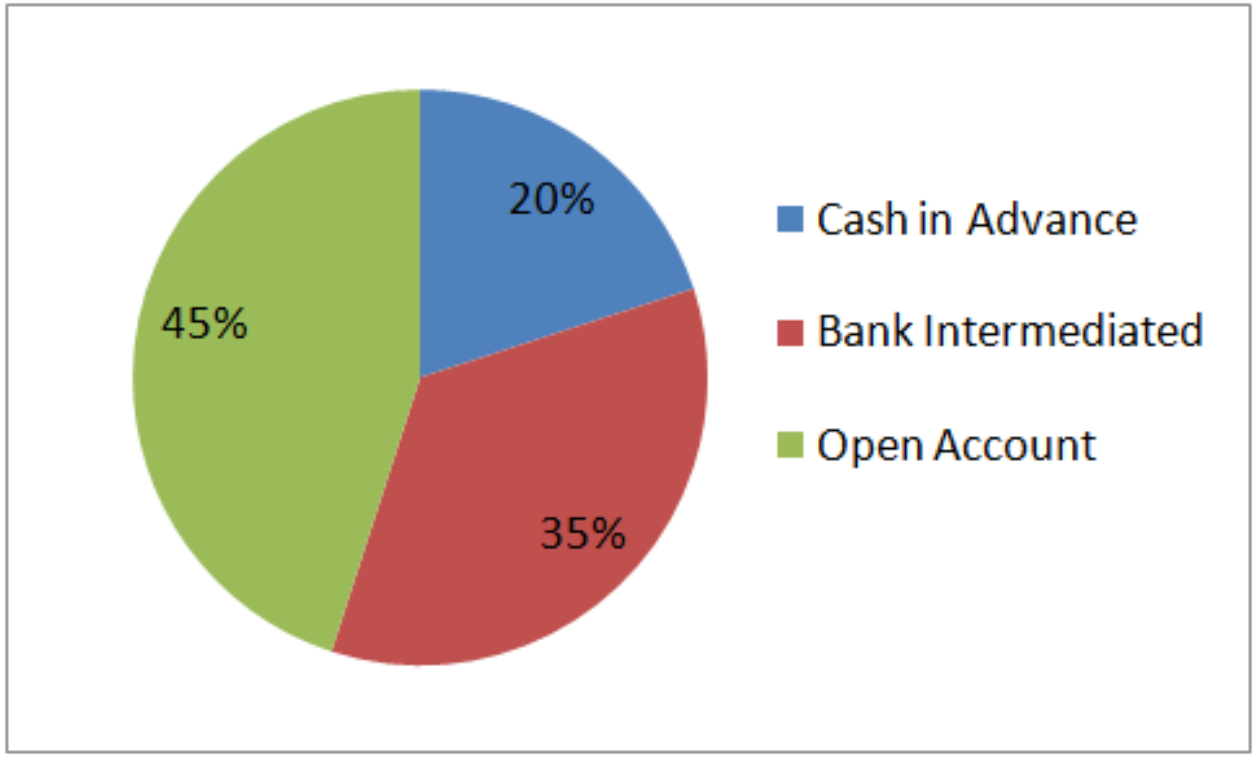

Figure: Source: IMF World Economic Outlook

Motivation I

- Different Payment Contracts: Cash in Advance, Open Account and Letter of Credit

Two questions:

- What are the trade-offs faced by firms?
- How can patterns across countries be explained?

Motivation II

Schmidt-Eisenlohr (2011):

- Introduces choice between Cash in Advance, Open Account and Letter of Credit
- Firms trade-off international differences in enforcement and efficiency between financial markets
- Estimates effects of source and destination country variables on trade flows
  $\Rightarrow$ no direct test of the payment contract choice model

This Paper

Focus on Open Account vs. Cash in Advance

Empirics: Test the payment contract choice model

- Source country and firm level variation
- Different export intensities
- Different product complexities

Theory: Extend the model

- Allow for firm level variation in contract choice
- Differentiate between contracts for domestic and international sales
- Introduce product complexity and study its implications

Main Findings

Predictions of contract choice model on source country conditions confirmed:

Share of Open Account in international sales higher if

i) source country financing costs are lower
(*Open Account more attractive*)

ii) source country enforcement is weaker
(*Cash in Advance less attractive*)

New predictions on complex industries supported:

- Complexity affects the payment contract choice:
  - Complex industries: enforcement is key
  - Non-complex industries: financing is central

Literature

Trade Finance:

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

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)
- Relevance of financial conditions: Beck (2002, 2003), Greenaway et al. (2007), Berman and Hericourt (2010), Manova (2008)
- Relevance of contract enforcement: Nunn (2007), Levchenko (2007)

Literature II

Most related paper: Antras and Foley (2011):

- Transactions data from 1 large US food seller
- Adapt model from Schmidt-Eisenlohr (2009) and test its predictions in regard of destination country enforcement:
  Stronger destination enforcement$\Rightarrow$ more OA and less CIA
- Extend the model dynamically and test effects from the length of relationship

Contributions

Empirical contributions

- First test of contract choice for many independent firms from many source countries
- Provide first evidence for:
  - Role of source country variation
  - Choice between domestic and international sales
  - Role of industry complexity
- Provide evidence for effects of financing costs and enforcement on contract choice

Theoretical contributions:

- Extend the trade finance model to include firm effects, industry complexity, and comparison between international and domestic sales

Basic Mechanism I

Two problems:

- Financing problem: time delay between production and sales
  $\rightarrow$ Importer or exporter pre-finances
  $\rightarrow$ Financing costs matter

- Commitment problem: party not pre-financing can default on contract
  $\rightarrow$ Exogenous probability of contract enforcement λ

Basic Mechanism II

- Cash in Advance
  $\rightarrow$ Financing in destination country
  $\rightarrow$ Enforcement in source country
  $\Rightarrow r_d, \lambda_o$
- Open Account
  $\rightarrow$ Financing in source country
  $\rightarrow$ Enforcement in destination country
  $\Rightarrow r_o, \lambda_d$

Proposition Contract Choice

Proposition 1

The optimal choice of payment contract is uniquely determined by the following conditions:

i) International trade:

$$\mathrm{E}\left[\Pi_S^{OA}\right] > \mathrm{E}\left[\Pi_S^{CIA}\right] \Leftrightarrow (\lambda_d)^{\sigma}(1+r_o)^{-\sigma} - \lambda_o(1+r_d)^{-\sigma} z_{ij} > 0$$

ii) Domestic trade:

$$\mathrm{E}\left[\Pi_S^{OA}\right] > \mathrm{E}\left[\Pi_S^{CIA}\right] \Leftrightarrow (\lambda_o)^{\sigma} - \lambda_o z_{ij} > 0$$

⇒**International Trade:** Source and destination country legal and financial conditions matter.
⇒**Domestic Sales:** only source country legal conditions matter.

Source Country Predictions

Proposition 3

Suppose $S^{OA} \in (0, 1)$. Then, an exporter uses more Open Account than another exporter who generates a smaller share of her revenues abroad if

i) financing costs in the source country are lower (*Open Account more attractive*)

ii) contract enforcement in the source country is worse (*Cash in Advance less attractive*)

Product Complexity

Complex product are harder to enforce in court:

- Take this into account by introducing product complexity $\gamma \in [0, 1]$
- Assume country level enforcement probability equals λ^{γ}

Proposition 4

For higher γ, the payment contract choice is

- more affected by source country enforcement
- less affected by source country financing costs

The Data

We use the World Bank Enterprise survey:

- Cross-section data from firm level survey for 54 developing countries between 2006 and 2009
- Firms report share of post-, pre- and on-delivery payments in total sales
- 2 ways to calculate the share of Open Account:
  - Post-delivery + on-delivery payments
  - Post-delivery/(post-delivery+pre-delivery)
- Shares of payment contracts in total sales
  $\Rightarrow$ Compare firms with different export intensities
- Drop non-manufacturing and foreign affiliates

The Data II

Additional data sources:

- Enforcement measures
  - WB Doing Business Survey: calendar days to resolve a commercial dispute
  - WB Worldwide Governance Indicators: rule of law
- Financial data from Beck et al. (2009)
  - Main variable: net interest rate margin
  - Robustness checks: private credit over GDP and overhead costs

Main Specification

Our main estimation equation:

$$OA_{it} = \psi_0 + \psi_1 XS_{it} + \psi_2 XS_{it} \times ENF_{ct} + \psi_3 XS_{it} \times FIN_{ct} + \Psi X_{it} + \nu_j + \nu_c + \nu_t + \epsilon_{it}.$$

Main prediction: $\psi_2 < 0$ **and** $\psi_3 < 0$

- OA_{it}: Share of Open Account
- XS_{it}: Share of exports in total sales
- ENF_{ct}: Measure of contract enforcement
- $FINct$: Financing cost measure
- X_{it}: Firm level controls
- Industry, country and year FE
- i: firm; t: year; c: country; j: industry

IV Estimation

Share of exports can be jointly determined with payment contracts. To address endogeneity:

- Use log employment and years of being an exporter as instruments at first stage for share of exports in total sales
- Also generate instruments for interaction terms: $\ln emp \times ENF$ and $\ln emp \times FIN$
- Estimate as 2 SLS

The Contract Intensity of Industries

- Proposition 4:
  - Enforcement more important in complex industries
  - Financing costs more relevant in non-complex industries
- Follow Nunn (2007) industry classification:
  - Classify input as complex if it is not sold on an organized exchange and does not have a reference price
  - Define industry as complex if it has a large share of complex intermediate inputs
- Introduce triple interactions with complexity.

Table: Payment Contract Choice - Baseline

	Dependent Variable: Share of Open Account		
	(1)	(2)	(3)
Exportshare	0.131***	0.033	0.119***
	(0.049)	(0.029)	(0.043)
Enforcement x Exportshare	-57.379***	-64.582***	-55.399***
	(13.617)	(15.782)	(13.384)
Interest Margin x Exportshare	-1.254**		
	(0.554)		
Private Credit x Exportshare		0.107**	
		(0.052)	
Overhead x Exportshare			-1.363***
			(0.517)
R-squared	0.321	0.321	0.322
N	3762	3762	3741

Table: Payment Contract Choice: Complexity

Exportershare	0.033	-0.191**	-0.030
	(0.134)	(0.081)	(0.121)
Enforcement x Exportshare	49.788	-31.398	52.165
	(37.790)	(44.480)	(37.488)
Enforcement x Exportshare x Complexity	-195.365***	-54.848	-197.473***
	(64.492)	(76.798)	(63.152)
Interest Margin x Exportshare	-2.883**		
	(1.390)		
Interest Margin x Exportshare x Complexity	2.872		
	(2.259)		
Private Credit x Exportshare		0.551***	
		(0.145)	
Private Credit x Exportshare x Complexity		-0.847***	
		(0.247)	
Overhead x Exportshare			-1.911
			(1.315)
Overhead x Exportshare x Complexity			1.034
			(2.234)
R-squared	0.326	0.328	0.327
N	3762	3762	3741

Table: IV Regressions

	Both Instruments (1)	Exporting Experience (2)	log Employment (3)	Both Instruments (4)
Exportershare	0.650***	0.599**	0.440	0.658***
	(0.221)	(0.253)	(0.505)	(0.223)
Enforcement x Exportshare	-189.589***	-166.869**	-187.775**	-191.534***
	(54.467)	(66.094)	(82.210)	(54.831)
Interest Margin x Exportshare	-5.032**	-4.774*	-3.145	-5.096**
	(2.375)	(2.455)	(6.769)	(2.395)
N	3476	3476	3533	3476
F	7.240	7.283	7.223	7.230
Sargan-Test	1.974	0.000	0.000	1.973
p-value	0.578			0.578
Regressor	2SLS	2SLS	2SLS	LIML

Robustness Checks

- Fractional Response Model
  - Results in line with predictions
  - Less efficient estimation $\Rightarrow$ lose some significance.
- Post-Delivery versus Pre-Delivery
- Exporter Dummy

Conclusion

- Payment contracts trade-off differences in financing costs and contract enforcement across countries
- Industry complexity changes the relative importance of these factors
- Source and Destination country institutions interact in non-trivial ways
  $\Rightarrow$ Payment contracts are a market solution to mitigate adverse institutional factors

Thanks!!!