From Carry Trade to Trade Credit: Financial Intermediation by Non-Financial Firms

Bryan Hardy [1] Felipe Saffie [2]

[1]Bank for International Settlements

[2]University of Maryland

Current Policy Challenges Facing Emerging Markets

Central Bank of Chile, IMF, IMF Economic Review

Santiago, Chile - July 25, 2019

Motivation

- Non-financial firms are important providers of financial resources to the economy: **Accounts Receivables (Trade Credit)**
- In emerging markets, financial activity is intertwined with foreign currency (FX) credit $\Rightarrow$ currency risk
- Trade credit and other linkages may connect firms financially across the economy
- Most regulation is focused on the *financial* sector

Motivation

- Non-financial firms are important providers of financial resources to the economy: **Accounts Receivables (Trade Credit)**
- In emerging markets, financial activity is intertwined with foreign currency (FX) credit $\Rightarrow$ currency risk
- Trade credit and other linkages may connect firms financially across the economy
- Most regulation is focused on the *financial* sector

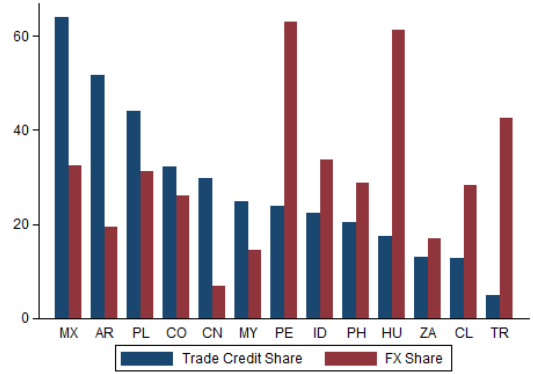
Motivation

- Non-financial firms are important providers of financial resources to the economy: **Accounts Receivables (Trade Credit)**
- In emerging markets, financial activity is intertwined with foreign currency (FX) credit $\Rightarrow$ currency risk
- Trade credit and other linkages may connect firms financially across the economy
- Most regulation is focused on the *financial* sector

Questions:

- **How do firms allocate their FX borrowing?**
- **Do financial conditions affect FX exposure or the provision of trade credit?**
- **What are the real effects of these activities?**

Importance of Trade Credit and FX Credit in Emerging Markets

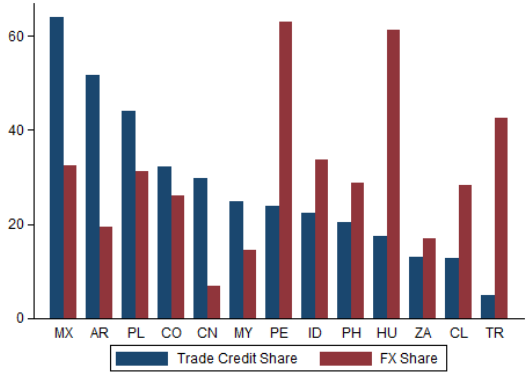


Listed Firms in Mexico

Emerging Markets

- 53% of external funds used for working capital comes from trade credit
- 28% of external funds used for investment comes from trade credit (Finkelstein Shapiro et al. (2018))

Importance of Trade Credit and FX Credit in Emerging Markets

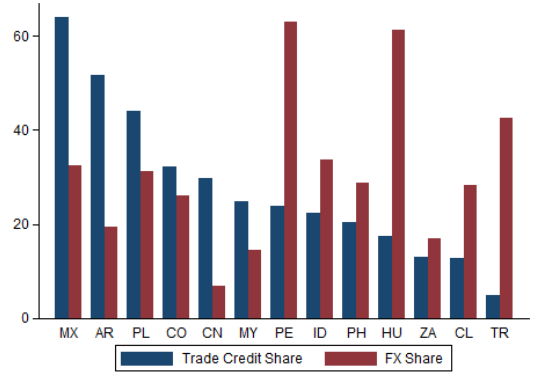


Emerging Markets

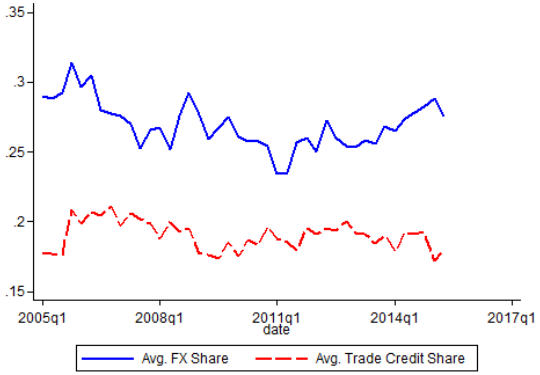
Listed Firms in Mexico

- 31% of debt in emerging markets is denominated in FX
- Chui et al. (2016)

Importance of Trade Credit and FX Credit in Emerging Markets



Emerging Markets



Listed Firms in Mexico

- Liabilities in our sample are on average 19% trade credit and 27% FX denominated

Findings

We utilize a unique firm level dataset of listed firms in Mexico: quarterly, **currency composition of assets and liabilities**, instrument breakdown of assets and liabilities, real outcomes (investment, etc.)

1. **Currency mismatch:** firms borrow in FX and accumulate both FX and peso short term assets. Peso borrowing typically does not accumulate FX assets.
2. **Financial intermediation:** positive comovement between liabilities (peso or FX) and ST assets, most of which is accounts receivable (trade credit)
3. **Carry trades:** Firms increase FX exposure and trade credit with increasing peso-FX interest rate differential
4. **Real effects:** Two potential channels
   - FX credit conditions $\Rightarrow$ increased trade credit $\Rightarrow$ Sales
   - FX credit conditions $\Rightarrow$ currency risk $\Rightarrow$ depreciation, balance sheet shock $\Rightarrow$ investment, employment, profits fall

Findings

We utilize a unique firm level dataset of listed firms in Mexico: quarterly, **currency composition of assets and liabilities**, instrument breakdown of assets and liabilities, real outcomes (investment, etc.)

1. **Currency mismatch:** firms borrow in FX and accumulate both FX and peso short term assets. Peso borrowing typically does not accumulate FX assets.
2. **Financial intermediation:** positive comovement between liabilities (peso or FX) and ST assets, most of which is accounts receivable (trade credit)
3. **Carry trades:** Firms increase FX exposure and trade credit with increasing peso-FX interest rate differential
4. **Real effects:** Two potential channels
   - FX credit conditions $\Rightarrow$ increased trade credit $\Rightarrow$ Sales
   - FX credit conditions $\Rightarrow$ currency risk $\Rightarrow$ depreciation, balance sheet shock $\Rightarrow$ investment, employment, profits fall

Findings

We utilize a unique firm level dataset of listed firms in Mexico: quarterly, **currency composition of assets and liabilities**, instrument breakdown of assets and liabilities, real outcomes (investment, etc.)

1. **Currency mismatch:** firms borrow in FX and accumulate both FX and peso short term assets. Peso borrowing typically does not accumulate FX assets.

2. **Financial intermediation:** positive comovement between liabilities (peso or FX) and ST assets, most of which is accounts receivable (trade credit)

3. **Carry trades:** Firms increase FX exposure and trade credit with increasing peso-FX interest rate differential

4. **Real effects:** Two potential channels
   - FX credit conditions $\Rightarrow$ increased trade credit $\Rightarrow$ Sales
   - FX credit conditions $\Rightarrow$ currency risk $\Rightarrow$ depreciation, balance sheet shock $\Rightarrow$ investment, employment, profits fall

Findings

We utilize a unique firm level dataset of listed firms in Mexico: quarterly, **currency composition of assets and liabilities**, instrument breakdown of assets and liabilities, real outcomes (investment, etc.)

1. **Currency mismatch:** firms borrow in FX and accumulate both FX and peso short term assets. Peso borrowing typically does not accumulate FX assets.

2. **Financial intermediation:** positive comovement between liabilities (peso or FX) and ST assets, most of which is accounts receivable (trade credit)

3. **Carry trades:** Firms increase FX exposure and trade credit with increasing peso-FX interest rate differential

4. **Real effects:** Two potential channels
   - FX credit conditions $\Rightarrow$ increased trade credit $\Rightarrow$ Sales
   - FX credit conditions $\Rightarrow$ currency risk $\Rightarrow$ depreciation, balance sheet shock $\Rightarrow$ investment, employment, profits fall

Findings

We utilize a unique firm level dataset of listed firms in Mexico: quarterly, **currency composition of assets and liabilities**, instrument breakdown of assets and liabilities, real outcomes (investment, etc.)

1. **Currency mismatch:** firms borrow in FX and accumulate both FX and peso short term assets. Peso borrowing typically does not accumulate FX assets.

2. **Financial intermediation:** positive comovement between liabilities (peso or FX) and ST assets, most of which is accounts receivable (trade credit)

3. **Carry trades:** Firms increase FX exposure and trade credit with increasing peso-FX interest rate differential

4. **Real effects:** Two potential channels
   - FX credit conditions $\Rightarrow$ increased trade credit $\Rightarrow$ Sales
   - FX credit conditions $\Rightarrow$ currency risk $\Rightarrow$ depreciation, balance sheet shock $\Rightarrow$ investment, employment, profits fall

Literature

- **Non-financial firm carry trades:** Bruno and Shin (2017, 2018); Acharya and Vij (2017)

  ⇒ Quarterly data, currency composition of all liabilities and assets

- **Financial intermediation by non-financial firms** Shin and Zhao (2013); Caballero Panizza and Powell (2016); Huang et al. (2018)

  ⇒ Focus on trade credit instead of cash holdings

- **Currency mismatch, balance sheet effects:** Aguiar (2005); Kim, Tesar, and Zhang (2015); Bleakley and Cowan (2008); Hardy (2018); Serena Garralda and Sousa (2017); Salamao and Varela (2018); and many others

  ⇒ Show quarterly evolution of FX mismatch, response to financial conditions, role of trade credit, real effects due to increase in exposure

- **Financial Conditions and Supply Chains:** Kalemli-Özcan et al. (2014); Minetti et al. (2018); Bruno, Kim, and Shin (2018); Alfaro, García-Santana, and Moral-Benito (2018)

  ⇒ Tie FX borrowing directly to trade credit, varies with interest rate differential

Literature

- **Non-financial firm carry trades:** Bruno and Shin (2017, 2018); Acharya and Vij (2017)

  ⇒ Quarterly data, currency composition of all liabilities and assets

- **Financial intermediation by non-financial firms** Shin and Zhao (2013); Caballero Panizza and Powell (2016); Huang et al. (2018)

  ⇒ Focus on trade credit instead of cash holdings

- **Currency mismatch, balance sheet effects:** Aguiar (2005); Kim, Tesar, and Zhang (2015); Bleakley and Cowan (2008); Hardy (2018); Serena Garralda and Sousa (2017); Salamao and Varela (2018); and many others

  ⇒ Show quarterly evolution of FX mismatch, response to financial conditions, role of trade credit, real effects due to increase in exposure

- **Financial Conditions and Supply Chains:** Kalemli-Özcan et al. (2014); Minetti et al. (2018); Bruno, Kim, and Shin (2018); Alfaro, García-Santana, and Moral-Benito (2018)

  ⇒ Tie FX borrowing directly to trade credit, varies with interest rate differential

Literature

- **Non-financial firm carry trades:** Bruno and Shin (2017, 2018); Acharya and Vij (2017)

  ⇒ Quarterly data, currency composition of all liabilities and assets

- **Financial intermediation by non-financial firms** Shin and Zhao (2013); Caballero Panizza and Powell (2016); Huang et al. (2018)

  ⇒ Focus on trade credit instead of cash holdings

- **Currency mismatch, balance sheet effects:** Aguiar (2005); Kim, Tesar, and Zhang (2015); Bleakley and Cowan (2008); Hardy (2018); Serena Garralda and Sousa (2017); Salamao and Varela (2018); and many others

  ⇒ Show quarterly evolution of FX mismatch, response to financial conditions, role of trade credit, real effects due to increase in exposure

- **Financial Conditions and Supply Chains:** Kalemli-Özcan et al. (2014); Minetti et al. (2018); Bruno, Kim, and Shin (2018); Alfaro, García-Santana, and Moral-Benito (2018)

  ⇒ Tie FX borrowing directly to trade credit, varies with interest rate differential

Literature

- **Non-financial firm carry trades:** Bruno and Shin (2017, 2018); Acharya and Vij (2017)

  ⇒ Quarterly data, currency composition of all liabilities and assets

- **Financial intermediation by non-financial firms** Shin and Zhao (2013); Caballero Panizza and Powell (2016); Huang et al. (2018)

  ⇒ Focus on trade credit instead of cash holdings

- **Currency mismatch, balance sheet effects:** Aguiar (2005); Kim, Tesar, and Zhang (2015); Bleakley and Cowan (2008); Hardy (2018); Serena Garralda and Sousa (2017); Salamao and Varela (2018); and many others

  ⇒ Show quarterly evolution of FX mismatch, response to financial conditions, role of trade credit, real effects due to increase in exposure

- **Financial Conditions and Supply Chains:** Kalemli-Özcan et al. (2014); Minetti et al. (2018); Bruno, Kim, and Shin (2018); Alfaro, García-Santana, and Moral-Benito (2018)

  ⇒ Tie FX borrowing directly to trade credit, varies with interest rate differential

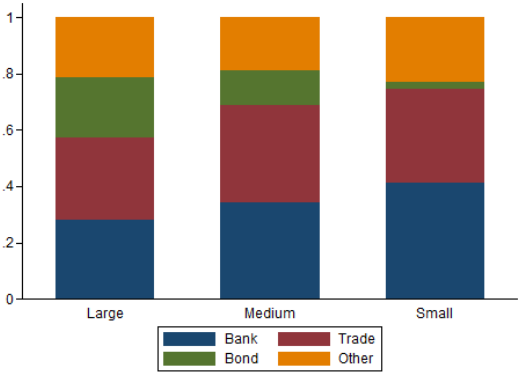
Data

- Quarterly regulatory filings for 183 non-financial firms listed on the Mexican Stock Exchange (BMV)
- Detailed balance sheet information, including detail on instrument and currency composition

	FX Liabilities				FX Assets	
	Total	by Maturity	by Instrument	by Inst. & Mat.	Total	by Maturity
2005q1-2007q4	✓	✓			✓	
2008q1-2011q4	✓	✓	✓	✓	✓	
2012q1-2015q2	✓	✓	✓	✓	✓	✓

- Real outcomes (investment, employment, profits)
- Interest rate data on loan level borrowing

Balance Sheet Positions, Share of Total

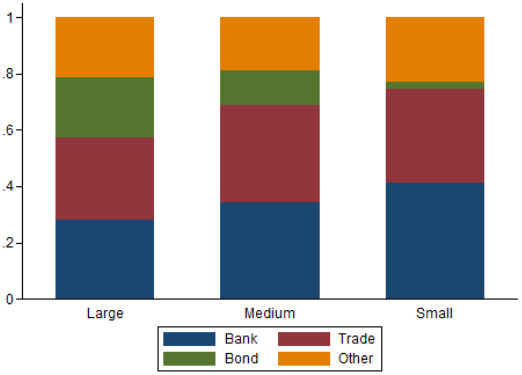


Average FX Liabilities

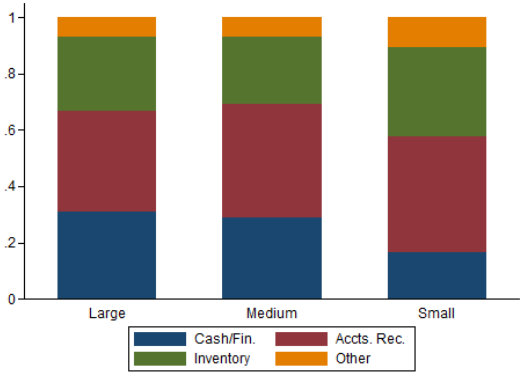
Average Short Term Assets

- Bank and Trade credit make up the majority of firm FX debt, on average, even for the large firms

Balance Sheet Positions, Share of Total



Average FX Liabilities



Average Short Term Assets

- Trade credit lending is the largest piece of short term assets

Empirical Analysis: Accumulation of Short Term Assets

- How do firms allocate funds towards short term assets? How much from FX debt, and where does it go?

$$\frac{\Delta STAsset_{it}}{TotalAssets_{it-1}} = \alpha_i + \alpha_t + \gamma \frac{CashFlow_{it}}{TotalAssets_{it-1}} + \sum_{type} \beta^{type} \frac{\Delta Borrowing_{it}^{type}}{TotalAssets_{it-1}} + \epsilon_{it} \quad (1)$$

- $type$ = {Bond, Bank, Trade} or {FX, Peso}
- $STAsset \in$ {Total, FX,Peso, Cash and Financial, Accounts Receivable, Inventories, Other}
- $CashFlow$ = Net Income
- α_i and α_t are firm and time fixed effects

Empirical Analysis: Accumulation of Short Term Assets

- How do firms allocate funds towards short term assets? How much from FX debt, and where does it go?

$$\frac{\Delta STAsset_{it}}{TotalAssets_{it-1}} = \alpha_i + \alpha_t + \gamma \frac{CashFlow_{it}}{TotalAssets_{it-1}} + \sum_{type} \beta^{type} \frac{\Delta Borrowing_{it}^{type}}{TotalAssets_{it-1}} + \epsilon_{it} \quad (1)$$

- $type$ = {Bond, Bank, Trade} or {FX, Peso}
- $STAsset \in$ {Total, FX,Peso, Cash and Financial, Accounts Receivable, Inventories, Other}
- $CashFlow$ = Net Income
- α_i and α_t are firm and time fixed effects

A First Look: Borrowing and Short Term Assets

	(1) Total	(2) FX	(3) Peso	(4) Cash and Financial	(5) Accounts Receivable
Cash Flow$_{it}$	0.0999	0.0665	0.0719	0.0248	0.0235
	(0.0819)	(0.0638)	(0.0687)	(0.0209)	(0.0209)
Δ Bond$_{it}$	0.541***	0.291***	0.274***	0.119**	0.346***
	(0.0782)	(0.0740)	(0.0720)	(0.0546)	(0.105)
Δ Loan$_{it}$	0.409***	0.263***	0.248***	0.0930***	0.216***
	(0.0419)	(0.0775)	(0.0779)	(0.0239)	(0.0290)
Δ Trade$_{it}$	0.695***	0.612***	0.635***	0.0936***	0.187***
	(0.0572)	(0.0607)	(0.0618)	(0.0258)	(0.0406)
Observations	4779	4225	4225	4756	4771
R^2	0.237	0.0874	0.0898	0.0345	0.129
Firms	183	161	161	183	183
FirmFE	Yes	Yes	Yes	Yes	Yes
TimeFE	Yes	Yes	Yes	Yes	Yes

A First Look: Borrowing and Short Term Assets

	(1) Total	(2) FX	(3) Peso	(4) Cash and Financial	(5) Accounts Receivable
Cash Flow$_{it}$	0.0999	0.0665	0.0719	0.0248	0.0235
	(0.0819)	(0.0638)	(0.0687)	(0.0209)	(0.0209)
Δ Bond$_{it}$	0.541***	0.291***	0.274***	0.119**	0.346***
	(0.0782)	(0.0740)	(0.0720)	(0.0546)	(0.105)
Δ Loan$_{it}$	0.409***	0.263***	0.248***	0.0930***	0.216***
	(0.0419)	(0.0775)	(0.0779)	(0.0239)	(0.0290)
Δ Trade$_{it}$	0.695***	0.612***	0.635***	0.0936***	0.187***
	(0.0572)	(0.0607)	(0.0618)	(0.0258)	(0.0406)
Observations	4779	4225	4225	4756	4771
R^2	0.237	0.0874	0.0898	0.0345	0.129
Firms	183	161	161	183	183
FirmFE	Yes	Yes	Yes	Yes	Yes
TimeFE	Yes	Yes	Yes	Yes	Yes

- Positive comovement between all types of liabilities and short term assets

A First Look: Borrowing and Short Term Assets

	(1) Total	(2) FX	(3) Peso	(4) Cash and Financial	(5) Accounts Receivable
Cash Flow$_{it}$	0.0999	0.0665	0.0719	0.0248	0.0235
	(0.0819)	(0.0638)	(0.0687)	(0.0209)	(0.0209)
Δ Bond$_{it}$	0.541***	0.291***	0.274***	0.119**	0.346***
	(0.0782)	(0.0740)	(0.0720)	(0.0546)	(0.105)
Δ Loan$_{it}$	0.409***	0.263***	0.248***	0.0930***	0.216***
	(0.0419)	(0.0775)	(0.0779)	(0.0239)	(0.0290)
Δ Trade$_{it}$	0.695***	0.612***	0.635***	0.0936***	0.187***
	(0.0572)	(0.0607)	(0.0618)	(0.0258)	(0.0406)
Observations	4779	4225	4225	4756	4771
R^2	0.237	0.0874	0.0898	0.0345	0.129
Firms	183	161	161	183	183
FirmFE	Yes	Yes	Yes	Yes	Yes
TimeFE	Yes	Yes	Yes	Yes	Yes

- Holds for both FX and Peso assets
- Trade credit has highest correlation

A First Look: Borrowing and Short Term Assets

	(1) Total	(2) FX	(3) Peso	(4) Cash and Financial	(5) Accounts Receivable
Cash Flow$_{it}$	0.0999	0.0665	0.0719	0.0248	0.0235
	(0.0819)	(0.0638)	(0.0687)	(0.0209)	(0.0209)
Δ Bond$_{it}$	0.541***	0.291***	0.274***	0.119**	0.346***
	(0.0782)	(0.0740)	(0.0720)	(0.0546)	(0.105)
Δ Loan$_{it}$	0.409***	0.263***	0.248***	0.0930***	0.216***
	(0.0419)	(0.0775)	(0.0779)	(0.0239)	(0.0290)
Δ Trade$_{it}$	0.695***	0.612***	0.635***	0.0936***	0.187***
	(0.0572)	(0.0607)	(0.0618)	(0.0258)	(0.0406)
Observations	4779	4225	4225	4756	4771
R^2	0.237	0.0874	0.0898	0.0345	0.129
Firms	183	161	161	183	183
FirmFE	Yes	Yes	Yes	Yes	Yes
TimeFE	Yes	Yes	Yes	Yes	Yes

- Firms accumulate cash with their borrowing...
-

A First Look: Borrowing and Short Term Assets

	(1) Total	(2) FX	(3) Peso	(4) Cash and Financial	(5) Accounts Receivable
Cash Flow$_{it}$	0.0999	0.0665	0.0719	0.0248	0.0235
	(0.0819)	(0.0638)	(0.0687)	(0.0209)	(0.0209)
Δ Bond$_{it}$	0.541***	0.291***	0.274***	0.119**	0.346***
	(0.0782)	(0.0740)	(0.0720)	(0.0546)	(0.105)
Δ Loan$_{it}$	0.409***	0.263***	0.248***	0.0930***	0.216***
	(0.0419)	(0.0775)	(0.0779)	(0.0239)	(0.0290)
Δ Trade$_{it}$	0.695***	0.612***	0.635***	0.0936***	0.187***
	(0.0572)	(0.0607)	(0.0618)	(0.0258)	(0.0406)
Observations	4779	4225	4225	4756	4771
R^2	0.237	0.0874	0.0898	0.0345	0.129
Firms	183	161	161	183	183
FirmFE	Yes	Yes	Yes	Yes	Yes
TimeFE	Yes	Yes	Yes	Yes	Yes

- Firms accumulate cash with their borrowing...
- ...but firms increase their accounts receivable even more

Balance Sheet Evolution Summary: Borrowing by Currency

	$1 FX borrowed	$1 Peso borrowed
Short Term Assets	**$0.43**	**$0.49**
FX	$0.21	$0.04
Peso	$0.19	$0.42
Cash/Financial	$0.08	$0.09
Acc. Rec.	$0.21	$0.24
Inventories	$0.10	$0.11
Other	$0.02	$0.04

Balance Sheet Evolution Summary: Borrowing by Currency

	$1 FX borrowed	$1 Peso borrowed
Short Term Assets	**$0.43**	**$0.49**
FX	$0.21	$0.04
Peso	$0.19	$0.42
Cash/Financial	$0.08	$0.09
Acc. Rec.	$0.21	$0.24
Inventories	$0.10	$0.11
Other	$0.02	$0.04

- Nearly half of incoming funding goes to short term assets

Balance Sheet Evolution Summary: Borrowing by Currency

	$1 FX borrowed	$1 Peso borrowed
Short Term Assets	**$0.43**	**$0.49**
FX	$0.21	$0.04
Peso	$0.19	$0.42
Cash/Financial	$0.08	$0.09
Acc. Rec.	$0.21	$0.24
Inventories	$0.10	$0.11
Other	$0.02	$0.04

- FX funding equally funds FX and peso ST assets
- Peso borrowing funds only peso assets

Balance Sheet Evolution Summary: Borrowing by Currency

	$1 FX borrowed	$1 Peso borrowed
Short Term Assets	**$0.43**	**$0.49**
FX	$0.21	$0.04
Peso	$0.19	$0.42
Cash/Financial	$0.08	$0.09
Acc. Rec.	$0.21	$0.24
Inventories	$0.10	$0.11
Other	$0.02	$0.04

- Firms do save into cash
- ... but accounts receivable is largest destination for funds going to ST assets

Balance Sheet Evolution Summary: Borrowing by Currency

	$1 FX borrowed	$1 Peso borrowed
Short Term Assets	**$0.43**	**$0.49**
FX	$0.21	$0.04
Peso	$0.19	$0.42
Cash/Financial	$0.08	$0.09
Acc. Rec.	$0.21	$0.24
Inventories	$0.10	$0.11
Other	$0.02	$0.04

- FX borrowing likely funds peso trade credit

Balance Sheet Evolution Summary: Borrowing by Currency

	$1 FX borrowed	$1 Peso borrowed
Short Term Assets	**$0.43**	**$0.49**
FX	$0.21	$0.04
Peso	$0.19	$0.42
Cash/Financial	$0.08	$0.09
Acc. Rec.	$0.21	$0.24
Inventories	$0.10	$0.11
Other	$0.02	$0.04

- Patterns are largely similar for non-exporters; pre- and post-crisis subsamples; for retail firms or manufacturing firms

Carry Trade Incentives, FX Exposure and Trade Credit

- How does the behavior of firm borrowing and short term assets change with carry trade incentives?

$$\frac{\Delta Position_{it}}{TotalAssets_{it-1}} = \alpha_i + \sum_{k=0,1} (\delta_k IRD_{t-k} + \gamma_k XRvol_{t-k}) + X_{it-1}\beta + \epsilon_{it} \quad (2)$$

- *Position* is short term positions by Asset {FX, Peso, Cash and Financial, Accounts Receivable, Inventories, Other} and Liability {FX, Peso, FX Loans, FX Bonds, FX Trade Credit}
- *IRD* = **interest rate differential** between the average **peso** loan rate and average **FX** loan rate for firms in sample
- *XRvol* = exchange rate volatility over the quarter
- *X* is a vector of controls (log assets, sales, cash, liabilities, bond credit, exports)

Carry Trade Incentives, FX Exposure and Trade Credit

- How does the behavior of firm borrowing and short term assets change with carry trade incentives?

$$\frac{\Delta Position_{it}}{TotalAssets_{it-1}} = \alpha_i + \sum_{k=0,1} (\delta_k IRD_{t-k} + \gamma_k XRvol_{t-k}) + X_{it-1}\beta + \epsilon_{it} \quad (2)$$

- *Position* is short term positions by Asset {FX, Peso, Cash and Financial, Accounts Receivable, Inventories, Other} and Liability {FX, Peso, FX Loans, FX Bonds, FX Trade Credit}
- IRD = **interest rate differential** between the average **peso** loan rate and average **FX** loan rate for firms in sample
- $XRvol$ = exchange rate volatility over the quarter
- X is a vector of controls (log assets, sales, cash, liabilities, bond credit, exports)

Result 3: Change in Short Term Liabilities

	Short Term Peso Liabilities		Short Term FX Liabilities				
	(1)	(2)	(3) All	(4) All	(5) Loan	(6) Bond	(7) Trade
IRD_t	0.601	0.229	1.415***	0.846***	0.391**	0.0191	0.308***
	(0.464)	(0.456)	(0.352)	(0.321)	(0.168)	(0.0889)	(0.109)
IRD_{t-1}	-0.563	-0.199	-1.387***	-0.946***	-0.436**	0.00173	-0.383***
	(0.446)	(0.450)	(0.345)	(0.325)	(0.196)	(0.0822)	(0.104)
$XRvol_t$		0.877*		1.421**	0.676***	-0.0340	0.262**
		(0.520)		(0.548)	(0.196)	(0.253)	(0.124)
$XRvol_{t-1}$		-0.728*		-0.652**	-0.225*	-0.0182	-0.310**
		(0.433)		(0.260)	(0.126)	(0.0526)	(0.154)
Observations	2346	2346	2346	2346	2487	2487	2487
R^2	0.0192	0.0220	0.0251	0.0346	0.0274	0.00816	0.0183
Firms	116	116	116	116	121	121	121
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Result 3: Change in Short Term Liabilities

	Short Term Peso Liabilities		Short Term FX Liabilities				
	(1)	(2)	(3) All	(4) All	(5) Loan	(6) Bond	(7) Trade
IRD_t	0.601	0.229	1.415***	0.846***	0.391**	0.0191	0.308***
	(0.464)	(0.456)	(0.352)	(0.321)	(0.168)	(0.0889)	(0.109)
IRD_{t-1}	-0.563	-0.199	-1.387***	-0.946***	-0.436**	0.00173	-0.383***
	(0.446)	(0.450)	(0.345)	(0.325)	(0.196)	(0.0822)	(0.104)
$XRvol_t$		0.877*		1.421**	0.676***	-0.0340	0.262**
		(0.520)		(0.548)	(0.196)	(0.253)	(0.124)
$XRvol_{t-1}$		-0.728*		-0.652**	-0.225*	-0.0182	-0.310**
		(0.433)		(0.260)	(0.126)	(0.0526)	(0.154)
Observations	2346	2346	2346	2346	2487	2487	2487
R^2	0.0192	0.0220	0.0251	0.0346	0.0274	0.00816	0.0183
Firms	116	116	116	116	121	121	121
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

- ST peso liabilities do not respond

Result 3: Change in Short Term Liabilities

	Short Term Peso Liabilities		Short Term FX Liabilities				
	(1)	(2)	(3) All	(4) All	(5) Loan	(6) Bond	(7) Trade
IRD_t	0.601	0.229	1.415***	0.846***	0.391**	0.0191	0.308***
	(0.464)	(0.456)	(0.352)	(0.321)	(0.168)	(0.0889)	(0.109)
IRD_{t-1}	-0.563	-0.199	-1.387***	-0.946***	-0.436**	0.00173	-0.383***
	(0.446)	(0.450)	(0.345)	(0.325)	(0.196)	(0.0822)	(0.104)
$XRvol_t$		0.877*		1.421**	0.676***	-0.0340	0.262**
		(0.520)		(0.548)	(0.196)	(0.253)	(0.124)
$XRvol_{t-1}$		-0.728*		-0.652**	-0.225*	-0.0182	-0.310**
		(0.433)		(0.260)	(0.126)	(0.0526)	(0.154)
Observations	2346	2346	2346	2346	2487	2487	2487
R^2	0.0192	0.0220	0.0251	0.0346	0.0274	0.00816	0.0183
Firms	116	116	116	116	121	121	121
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

- With larger carry trade incentives, firms increase their ST FX liabilities

Result 3: Change in Short Term Liabilities

	Short Term Peso Liabilities		Short Term FX Liabilities				
	(1)	(2)	(3) All	(4) All	(5) Loan	(6) Bond	(7) Trade
IRD_t	0.601	0.229	1.415***	0.846***	0.391**	0.0191	0.308***
	(0.464)	(0.456)	(0.352)	(0.321)	(0.168)	(0.0889)	(0.109)
IRD_{t-1}	-0.563	-0.199	-1.387***	-0.946***	-0.436**	0.00173	-0.383***
	(0.446)	(0.450)	(0.345)	(0.325)	(0.196)	(0.0822)	(0.104)
$XRvol_t$		0.877*		1.421**	0.676***	-0.0340	0.262**
		(0.520)		(0.548)	(0.196)	(0.253)	(0.124)
$XRvol_{t-1}$		-0.728*		-0.652**	-0.225*	-0.0182	-0.310**
		(0.433)		(0.260)	(0.126)	(0.0526)	(0.154)
Observations	2346	2346	2346	2346	2487	2487	2487
R^2	0.0192	0.0220	0.0251	0.0346	0.0274	0.00816	0.0183
Firms	116	116	116	116	121	121	121
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

- With larger carry trade incentives, firms increase their ST FX liabilities
- ...but unwind those positions in the next period

Result 3: Change in Short Term Liabilities

	Short Term Peso Liabilities		Short Term FX Liabilities				
	(1)	(2)	(3) All	(4) All	(5) Loan	(6) Bond	(7) Trade
IRD_t	0.601	0.229	1.415***	0.846***	0.391**	0.0191	0.308***
	(0.464)	(0.456)	(0.352)	(0.321)	(0.168)	(0.0889)	(0.109)
IRD_{t-1}	-0.563	-0.199	-1.387***	-0.946***	-0.436**	0.00173	-0.383***
	(0.446)	(0.450)	(0.345)	(0.325)	(0.196)	(0.0822)	(0.104)
$XRvol_t$		0.877*		1.421**	0.676***	-0.0340	0.262**
		(0.520)		(0.548)	(0.196)	(0.253)	(0.124)
$XRvol_{t-1}$		-0.728*		-0.652**	-0.225*	-0.0182	-0.310**
		(0.433)		(0.260)	(0.126)	(0.0526)	(0.154)
Observations	2346	2346	2346	2346	2487	2487	2487
R^2	0.0192	0.0220	0.0251	0.0346	0.0274	0.00816	0.0183
Firms	116	116	116	116	121	121	121
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

- Response driven by loans and trade credit
- Firms can use these instruments to react to short term opportunities

Result 3: Change in Short Term Liabilities

	Short Term Peso Liabilities		Short Term FX Liabilities				
	(1)	(2)	(3) All	(4) All	(5) Loan	(6) Bond	(7) Trade
IRD_t	0.601	0.229	1.415***	0.846***	0.391**	0.0191	0.308***
	(0.464)	(0.456)	(0.352)	(0.321)	(0.168)	(0.0889)	(0.109)
IRD_{t-1}	-0.563	-0.199	-1.387***	-0.946***	-0.436**	0.00173	-0.383***
	(0.446)	(0.450)	(0.345)	(0.325)	(0.196)	(0.0822)	(0.104)
$XRvol_t$		0.877*		1.421**	0.676***	-0.0340	0.262**
		(0.520)		(0.548)	(0.196)	(0.253)	(0.124)
$XRvol_{t-1}$		-0.728*		-0.652**	-0.225*	-0.0182	-0.310**
		(0.433)		(0.260)	(0.126)	(0.0526)	(0.154)
Observations	2346	2346	2346	2346	2487	2487	2487
R^2	0.0192	0.0220	0.0251	0.0346	0.0274	0.00816	0.0183
Firms	116	116	116	116	121	121	121
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes	Yes	Yes	Yes

- Bond credit takes more time to initiate
- Firms cannot respond to short term opportunities

Result 3: Change in FX Position

Assets Instruments Deriv

	All Firms			Non-Exporters		
	(1)	(2)	(3)	(4)	(5)	(6)
IRD_t	0.944**	0.921**		0.826***	1.072**	
	(0.362)	(0.367)		(0.306)	(0.412)	
IRD_{t-1}	-0.582	-0.749*		-0.557*	-0.847*	
	(0.376)	(0.394)		(0.311)	(0.435)	
$XRvol_t$		0.183	0.319		-0.551	-0.366
		(0.663)	(0.611)		(0.636)	(0.602)
$XRvol_{t-1}$		0.705	0.854		0.690	0.883
		(0.622)	(0.607)		(0.784)	(0.756)
Δ IRD_t			0.823**			0.946**
			(0.374)			(0.418)
Observations	2346	2346	2346	1393	1393	1393
R^2	0.0163	0.0178	0.0175	0.0142	0.0173	0.0164
Firms	116	116	116	72	72	72
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes	Yes	Yes

Result 3: Change in FX Position

Assets Instruments Deriv

	All Firms			Non-Exporters		
	(1)	(2)	(3)	(4)	(5)	(6)
IRD_t	0.944**	0.921**		0.826***	1.072**	
	(0.362)	(0.367)		(0.306)	(0.412)	
IRD_{t-1}	-0.582	-0.749*		-0.557*	-0.847*	
	(0.376)	(0.394)		(0.311)	(0.435)	
$XRvol_t$		0.183	0.319		-0.551	-0.366
		(0.663)	(0.611)		(0.636)	(0.602)
$XRvol_{t-1}$		0.705	0.854		0.690	0.883
		(0.622)	(0.607)		(0.784)	(0.756)
Δ IRD_t			0.823**			0.946**
			(0.374)			(0.418)
Observations	2346	2346	2346	1393	1393	1393
R^2	0.0163	0.0178	0.0175	0.0142	0.0173	0.0164
Firms	116	116	116	72	72	72
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes	Yes	Yes

- Net FX position increases with carry trade incentives

Result 3: Change in FX Position

Assets Instruments Deriv

	All Firms			Non-Exporters		
	(1)	(2)	(3)	(4)	(5)	(6)
IRD_t	0.944**	0.921**		0.826***	1.072**	
	(0.362)	(0.367)		(0.306)	(0.412)	
IRD_{t-1}	-0.582	-0.749*		-0.557*	-0.847*	
	(0.376)	(0.394)		(0.311)	(0.435)	
$XRvol_t$		0.183	0.319		-0.551	-0.366
		(0.663)	(0.611)		(0.636)	(0.602)
$XRvol_{t-1}$		0.705	0.854		0.690	0.883
		(0.622)	(0.607)		(0.784)	(0.756)
Δ IRD_t			0.823**			0.946**
			(0.374)			(0.418)
Observations	2346	2346	2346	1393	1393	1393
R^2	0.0163	0.0178	0.0175	0.0142	0.0173	0.0164
Firms	116	116	116	72	72	72
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes	Yes	Yes

- Net FX position increases with carry trade incentives
- ...and unwinds the next quarter...

Result 3: Change in FX Position

Assets Instruments Deriv

	All Firms			Non-Exporters		
	(1)	(2)	(3)	(4)	(5)	(6)
IRD_t	0.944**	0.921**		0.826***	1.072**	
	(0.362)	(0.367)		(0.306)	(0.412)	
IRD_{t-1}	-0.582	-0.749*		-0.557*	-0.847*	
	(0.376)	(0.394)		(0.311)	(0.435)	
$XRvol_t$		0.183	0.319		-0.551	-0.366
		(0.663)	(0.611)		(0.636)	(0.602)
$XRvol_{t-1}$		0.705	0.854		0.690	0.883
		(0.622)	(0.607)		(0.784)	(0.756)
Δ IRD_t			0.823**			0.946**
			(0.374)			(0.418)
Observations	2346	2346	2346	1393	1393	1393
R^2	0.0163	0.0178	0.0175	0.0142	0.0173	0.0164
Firms	116	116	116	72	72	72
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes	Yes	Yes

- FX positions change when the interest rate gap changes
-

Result 3: Change in FX Position

Assets Instruments Deriv

	All Firms			Non-Exporters		
	(1)	(2)	(3)	(4)	(5)	(6)
IRD_t	0.944**	0.921**		0.826***	1.072**	
	(0.362)	(0.367)		(0.306)	(0.412)	
IRD_{t-1}	-0.582	-0.749*		-0.557*	-0.847*	
	(0.376)	(0.394)		(0.311)	(0.435)	
$XRvol_t$		0.183	0.319		-0.551	-0.366
		(0.663)	(0.611)		(0.636)	(0.602)
$XRvol_{t-1}$		0.705	0.854		0.690	0.883
		(0.622)	(0.607)		(0.784)	(0.756)
Δ IRD_t			0.823**			0.946**
			(0.374)			(0.418)
Observations	2346	2346	2346	1393	1393	1393
R^2	0.0163	0.0178	0.0175	0.0142	0.0173	0.0164
Firms	116	116	116	72	72	72
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes	Yes	Yes

- FX positions change when the interest rate gap changes
- This behavior prevelant among non-exporting firms!

Result 3: Change in Trade Credit

	Gross Trade Credit		Sales		Accounts Receivable to Sales Ratio	
	(1)	(2)	(3)	(4)	(5)	(6)
IRD_t	0.754***	0.637***	0.730***	0.355**	-0.0843	-0.267
	(0.241)	(0.203)	(0.159)	(0.152)	(1.295)	(1.230)
IRD_{t-1}	-0.907***	-0.495**	-0.689***	-0.135	-1.318	-1.025
	(0.228)	(0.214)	(0.162)	(0.172)	(0.926)	(0.866)
$XRvol_t$		0.0539		0.746***		0.349
		(0.372)		(0.250)		(1.391)
$XRvol_{t-1}$		-1.414***		-1.478***		-0.803
		(0.347)		(0.266)		(1.659)
Observations	2487	2487	2487	2487	2445	2445
R^2	0.0168	0.0243	0.163	0.186	0.0247	0.0249
Firms	121	121	121	121	119	119
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes	Yes	Yes

Result 3: Change in Trade Credit

	Gross Trade Credit		Sales		Accounts Receivable to Sales Ratio	
	(1)	(2)	(3)	(4)	(5)	(6)
IRD_t	0.754***	0.637***	0.730***	0.355**	-0.0843	-0.267
	(0.241)	(0.203)	(0.159)	(0.152)	(1.295)	(1.230)
IRD_{t-1}	-0.907***	-0.495**	-0.689***	-0.135	-1.318	-1.025
	(0.228)	(0.214)	(0.162)	(0.172)	(0.926)	(0.866)
$XRvol_t$		0.0539		0.746***		0.349
		(0.372)		(0.250)		(1.391)
$XRvol_{t-1}$		-1.414***		-1.478***		-0.803
		(0.347)		(0.266)		(1.659)
Observations	2487	2487	2487	2487	2445	2445
R^2	0.0168	0.0243	0.163	0.186	0.0247	0.0249
Firms	121	121	121	121	119	119
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes	Yes	Yes

- Trade credit networks expand and contract with the interest rate differential

Result 3: Change in Trade Credit

	Gross Trade Credit		Sales		Accounts Receivable to Sales Ratio	
	(1)	(2)	(3)	(4)	(5)	(6)
IRD_t	0.754***	0.637***	0.730***	0.355**	-0.0843	-0.267
	(0.241)	(0.203)	(0.159)	(0.152)	(1.295)	(1.230)
IRD_{t-1}	-0.907***	-0.495**	-0.689***	-0.135	-1.318	-1.025
	(0.228)	(0.214)	(0.162)	(0.172)	(0.926)	(0.866)
$XRvol_t$		0.0539		0.746***		0.349
		(0.372)		(0.250)		(1.391)
$XRvol_{t-1}$		-1.414***		-1.478***		-0.803
		(0.347)		(0.266)		(1.659)
Observations	2487	2487	2487	2487	2445	2445
R^2	0.0168	0.0243	0.163	0.186	0.0247	0.0249
Firms	121	121	121	121	119	119
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes	Yes	Yes

- Trade credit networks expand and contract with the interest rate differential
- ...as do sales

Result 3: Change in Trade Credit

	Gross Trade Credit		Sales		Accounts Receivable to Sales Ratio	
	(1)	(2)	(3)	(4)	(5)	(6)
IRD_t	0.754***	0.637***	0.730***	0.355**	-0.0843	-0.267
	(0.241)	(0.203)	(0.159)	(0.152)	(1.295)	(1.230)
IRD_{t-1}	-0.907***	-0.495**	-0.689***	-0.135	-1.318	-1.025
	(0.228)	(0.214)	(0.162)	(0.172)	(0.926)	(0.866)
$XRvol_t$		0.0539		0.746***		0.349
		(0.372)		(0.250)		(1.391)
$XRvol_{t-1}$		-1.414***		-1.478***		-0.803
		(0.347)		(0.266)		(1.659)
Observations	2487	2487	2487	2487	2445	2445
R^2	0.0168	0.0243	0.163	0.186	0.0247	0.0249
Firms	121	121	121	121	119	119
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes	Yes	Yes

- Share of sales made on credit does not change $\Rightarrow$ sales increase perhaps from lower prices
- Firm gets cheaper credit, charges lower implicit interest rate on trade credit, sales expand as does trade credit

Real Effects of *Increased* Short Term FX Exposure

UIP Exchange Rate

- We see that firms build up FX exposure when interest rate differential widens
- How does this affect real outcomes when the risk is realized?

$$Y_{it} = \alpha_i + \alpha_t + \underbrace{\beta_0 \Delta STFXP_i \times Shock_t}_{\text{Carry Trade Effect}} + \underbrace{\beta_1 STFXP_i \times Shock_t}_{\text{Balance Sheet Effect}} + X_{t-1}\beta + \epsilon \quad (3)$$

- $Y \in \{\Delta \log(PPE), \Delta \log(Employment), Profits/Assets\}$
- $\Delta STFXP_i$ is the change in $\frac{STFXL - FXA}{Assets}$ between 2005q1 and 2008q4
  - 2005-2008 had a stable exchange rate, large IRD $\rightarrow$ large increase in short term FX positions
- $STFXP_i$ is the level of STFXP at 2008q4
- *Shock* takes a value of 0 during 2007-2008, 1 during 2009-2010, and 0 during 2011-2012

Real Effects of *Increased* Short Term FX Exposure

UIP Exchange Rate

- We see that firms build up FX exposure when interest rate differential widens
- How does this affect real outcomes when the risk is realized?

$$Y_{it} = \alpha_i + \alpha_t + \underbrace{\beta_0 \Delta STFXP_i \times Shock_t}_{\text{Carry Trade Effect}} + \underbrace{\beta_1 STFXP_i \times Shock_t}_{\text{Balance Sheet Effect}} + X_{t-1}\beta + \epsilon \quad (3)$$

- $Y \in \{\Delta \log(PPE), \Delta \log(Employment), Profits/Assets\}$
- $\Delta STFXP_i$ is the change in $\frac{STFXL - FXA}{Assets}$ between 2005q1 and 2008q4
  - 2005-2008 had a stable exchange rate, large IRD $\rightarrow$ large increase in short term FX positions
- $STFXP_i$ is the level of STFXP at 2008q4
- *Shock* takes a value of 0 during 2007-2008, 1 during 2009-2010, and 0 during 2011-2012

Result 4: Real Effects of Increased FX Exposure

	Investment		Employment		Profits	
	(1) Non-Exporter	(2) Exporter	(3) Non-Exporter	(4) Exporter	(5) Non-Exporter	(6) Exporter
STFXP Change$_i$ $\times$ Shock$_t$	-0.0505**	-0.0409*	-0.0399**	0.0406	-0.0287***	0.00545
	(0.0198)	(0.0219)	(0.0183)	(0.0241)	(0.00606)	(0.00848)
STFXP Level$_i$ $\times$ Shock$_t$	-0.0188	0.0312	0.0630*	-0.0337*	0.0143	-0.00279
	(0.0329)	(0.0187)	(0.0359)	(0.0174)	(0.0125)	(0.00655)
Observations	948	591	942	588	943	587
R^2	0.0253	0.0301	0.0469	0.0483	0.0672	0.121
Firms	53	34	53	33	53	33
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes
TimeFE	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes	Yes	Yes

Result 4: Real Effects of Increased FX Exposure

	Investment		Employment		Profits	
	(1) Non-Exporter	(2) Exporter	(3) Non-Exporter	(4) Exporter	(5) Non-Exporter	(6) Exporter
STFXP Change$_i$ × Shock$_t$	-0.0505**	-0.0409*	-0.0399**	0.0406	-0.0287***	0.00545
	(0.0198)	(0.0219)	(0.0183)	(0.0241)	(0.00606)	(0.00848)
STFXP Level$_i$ × Shock$_t$	-0.0188	0.0312	0.0630*	-0.0337*	0.0143	-0.00279
	(0.0329)	(0.0187)	(0.0359)	(0.0174)	(0.0125)	(0.00655)
Observations	948	591	942	588	943	587
R^2	0.0253	0.0301	0.0469	0.0483	0.0672	0.121
Firms	53	34	53	33	53	33
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes
TimeFE	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes	Yes	Yes

- Decreased investment common to both exporters and non-exporters

Result 4: Real Effects of Increased FX Exposure

	Investment		Employment		Profits	
	(1) Non-Exporter	(2) Exporter	(3) Non-Exporter	(4) Exporter	(5) Non-Exporter	(6) Exporter
STFXP Change$_i$ × Shock$_t$	-0.0505**	-0.0409*	-0.0399**	0.0406	-0.0287***	0.00545
	(0.0198)	(0.0219)	(0.0183)	(0.0241)	(0.00606)	(0.00848)
STFXP Level$_i$ × Shock$_t$	-0.0188	0.0312	0.0630*	-0.0337*	0.0143	-0.00279
	(0.0329)	(0.0187)	(0.0359)	(0.0174)	(0.0125)	(0.00655)
Observations	948	591	942	588	943	587
R^2	0.0253	0.0301	0.0469	0.0483	0.0672	0.121
Firms	53	34	53	33	53	33
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes
TimeFE	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes	Yes	Yes

- Decreased investment common to both exporters and non-exporters
- Non-exporting firms appear to be particularly damaged

Result 4: FX Exposure - Trade Credit

ST Assets

	(1) Borrowing	(2) Lending	(3) Gross	(4) Sales
STFXP Change$_i$ × Shock$_t$	0.00322	0.00649	0.0102	0.0197
	(0.00400)	(0.00461)	(0.00671)	(0.0176)
STFXP Level$_i$ × Shock$_t$	-0.00668	-0.00521	-0.0129	-0.00606
	(0.00518)	(0.00466)	(0.00805)	(0.0226)
Observations	1960	1960	1960	1959
R^2	0.0214	0.0190	0.0288	0.234
Firms	87	87	87	87
FirmFE	Yes	Yes	Yes	Yes
TimeFE	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes

- While real activity decreases for firms who increased exposure...
- ...the trade credit network (both borrowing and lending) remains robust

Result 4: FX Exposure - Trade Credit

ST Assets

	(1) Borrowing	(2) Lending	(3) Gross	(4) Sales
STFXP Change$_i$ × Shock$_t$	0.00322	0.00649	0.0102	0.0197
	(0.00400)	(0.00461)	(0.00671)	(0.0176)
STFXP Level$_i$ × Shock$_t$	-0.00668	-0.00521	-0.0129	-0.00606
	(0.00518)	(0.00466)	(0.00805)	(0.0226)
Observations	1960	1960	1960	1959
R^2	0.0214	0.0190	0.0288	0.234
Firms	87	87	87	87
FirmFE	Yes	Yes	Yes	Yes
TimeFE	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes

- While real activity decreases for firms who increased exposure...
- ...the trade credit network (both borrowing and lending) remains robust

Conclusion

- Firms borrow in FX and accumulate both FX and peso short term assets, mostly accounts receivable
- FX exposure and trade credit are both sensitive to changes in the peso-FX interest rate differential
- **Real effects via sales**
  - Firms may use cost savings from cheaper FX credit to reduce prices → boost sales
  - Do not change invoicing patterns (share of sales made on credit)
- **Real effects via currency risk and balance sheet shock**
  - Trade credit resilient, but investment declines
- The role of trade credit in overall macroeconomic and financial stability deserves greater scrutiny

Conclusion

- Firms borrow in FX and accumulate both FX and peso short term assets, mostly accounts receivable
- FX exposure and trade credit are both sensitive to changes in the peso-FX interest rate differential
- **Real effects via sales**
  - Firms may use cost savings from cheaper FX credit to reduce prices $\rightarrow$ boost sales
  - Do not change invoicing patterns (share of sales made on credit)
- **Real effects via currency risk and balance sheet shock**
  - Trade credit resilient, but investment declines
- The role of trade credit in overall macroeconomic and financial stability deserves greater scrutiny

Conclusion

- Firms borrow in FX and accumulate both FX and peso short term assets, mostly accounts receivable
- FX exposure and trade credit are both sensitive to changes in the peso-FX interest rate differential
- **Real effects via sales**
  - Firms may use cost savings from cheaper FX credit to reduce prices $\rightarrow$ boost sales
  - Do not change invoicing patterns (share of sales made on credit)
- **Real effects via currency risk and balance sheet shock**
  - Trade credit resilient, but investment declines
- The role of trade credit in overall macroeconomic and financial stability deserves greater scrutiny

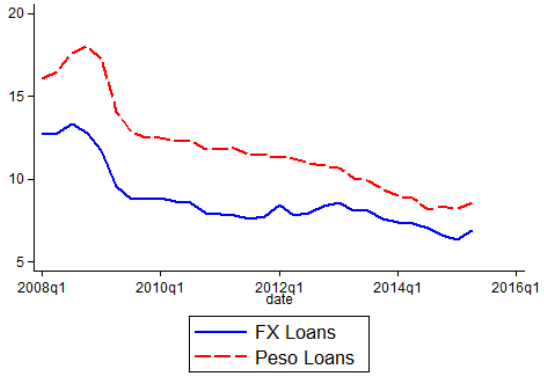
Conclusion

- Firms borrow in FX and accumulate both FX and peso short term assets, mostly accounts receivable
- FX exposure and trade credit are both sensitive to changes in the peso-FX interest rate differential
- **Real effects via sales**
  - Firms may use cost savings from cheaper FX credit to reduce prices $\rightarrow$ boost sales
  - Do not change invoicing patterns (share of sales made on credit)
- **Real effects via currency risk and balance sheet shock**
  - Trade credit resilient, but investment declines
- The role of trade credit in overall macroeconomic and financial stability deserves greater scrutiny

THANK YOU

Average Interest Rates, 2008q1-2015q2

Exchange Rate



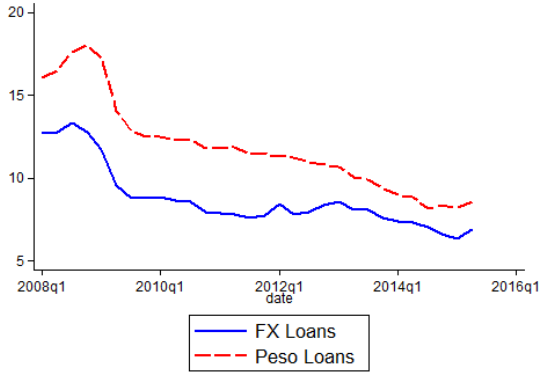
Interest Rate Differential vs UIP Deviations

Average Interest Rates by Currency

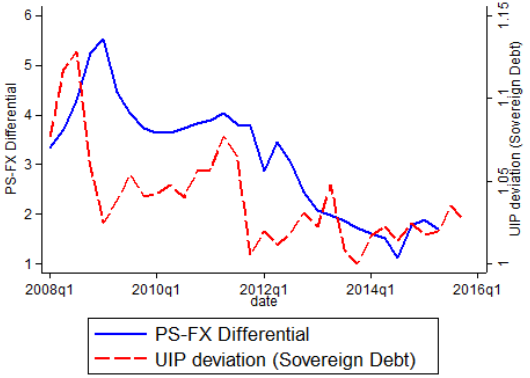
- FX loans are consistently cheaper than peso loans

Average Interest Rates, 2008q1-2015q2

Exchange Rate



Average Interest Rates by Currency

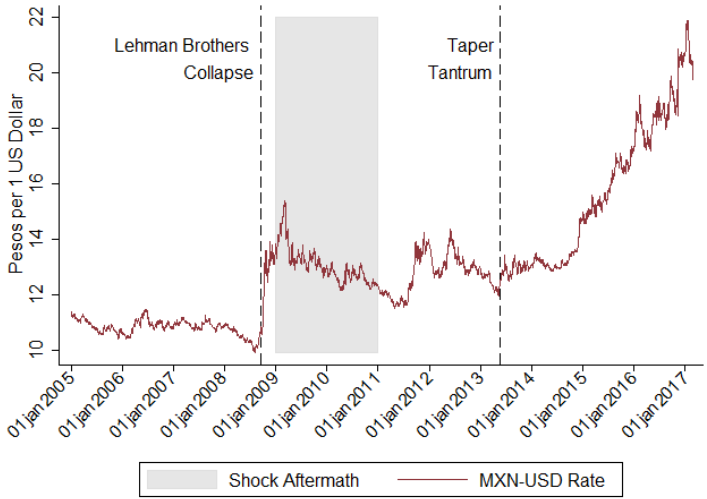


Interest Rate Differential vs UIP Deviations

- Firm IRD follows UIP deviations (calculated from sovereign bonds) with a lag

Depreciation Episode

Result 4 UIP IRD



Result 3: Change in Short Term Assets by Currency

Back

	Short Term FX Assets			Short Term Peso Assets		
	(1)	(2)	(3)	(4)	(5)	(6)
IRD_t	0.584***	0.470**	-0.0748	0.808**	0.288	0.489
	(0.219)	(0.214)	(0.285)	(0.320)	(0.325)	(0.361)
IRD_{t-1}	-0.709***	-0.806***	-0.197	-0.547*	-0.418	-0.461
	(0.218)	(0.223)	(0.287)	(0.324)	(0.340)	(0.400)
$XRvol_t$			1.238**			-0.576
			(0.504)			(0.501)
$XRvol_{t-1}$			-1.357**			-0.213
			(0.625)			(0.676)
Observations	2390	2348	2348	2390	2348	2348
R^2	0.00394	0.0109	0.0255	0.00287	0.0255	0.0262
Firms	123	117	117	123	117	117
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	No	Yes	Yes	No	Yes	Yes

Result 3: Change in Short Term Assets by Instrument

Back

	Financial Assets		Cash		Accounts Receivable		Inventories	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
IRD_t	0.500***	0.437**	-0.642***	-0.834***	0.305	0.389**	0.252*	0.265*
	(0.142)	(0.168)	(0.147)	(0.177)	(0.204)	(0.159)	(0.145)	(0.145)
IRD_{t-1}	-0.452***	-0.375**	0.107	0.145	-0.397**	-0.288*	-0.307**	-0.153
	(0.157)	(0.173)	(0.161)	(0.181)	(0.187)	(0.163)	(0.134)	(0.155)
$XRvol_t$		0.137		0.566***		-0.341		-0.157
		(0.186)		(0.133)		(0.298)		(0.273)
$XRvol_{t-1}$		-0.186		0.221**		-0.596**		-0.641***
		(0.201)		(0.112)		(0.251)		(0.211)
Observations	2487	2487	2471	2471	2487	2487	2487	2487
R^2	0.0241	0.0247	0.118	0.123	0.0105	0.0134	0.0345	0.0376
Firms	121	121	121	121	121	121	121	121
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

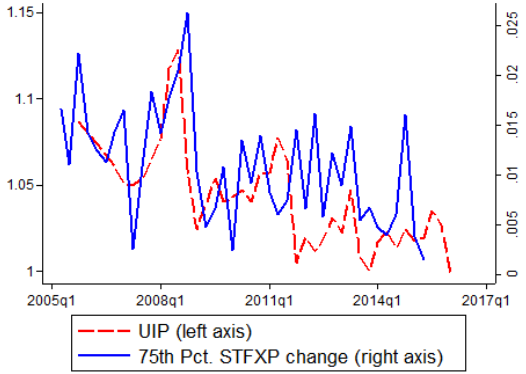
Result 3: Change in Derivatives Positions

Back

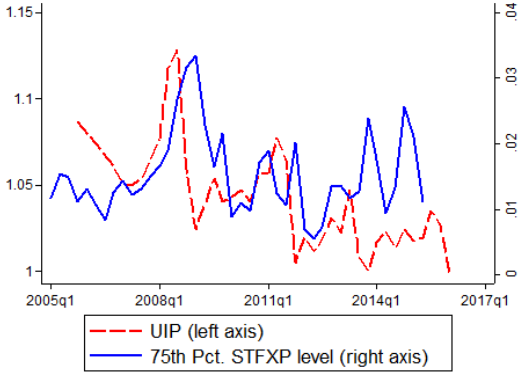
	Non-Exporters		Exporters	
	(1) Net	(2) Gross	(3) Net	(4) Gross
IRD_t	-0.00733	0.0335	-0.426**	0.463***
	(0.0694)	(0.0694)	(0.159)	(0.151)
IRD_{t-1}	-0.00845	-0.0145	0.397**	-0.460***
	(0.0945)	(0.0923)	(0.151)	(0.138)
$XRvol_t$	0.392**	0.219	-0.265	0.484**
	(0.178)	(0.189)	(0.208)	(0.205)
$XRvol_{t-1}$	-0.177	-0.183	-0.0408	-0.0903
	(0.122)	(0.118)	(0.154)	(0.138)
Observations	1519	1519	968	968
R^2	0.0282	0.0146	0.0704	0.0951
Firms	76	76	45	45
FirmFE	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes

UIP Deviations and Short Term FX Exposure

Exchange Rate Back



75th Percentile - Quarterly Change



75th Percentile - Level

- Short term FX positions increase with carry trade opportunities
- 2005-2008 had a stable exchange rate, large IRD $\rightarrow$ large increase in short term FX positions

Result 4: Carry Trade Impacts - Short Term Assets

Back

	(1) Cash and Financial	(2) Accounts Receivable	(3) ST FX	(4) ST Peso
$\text{Shock}_t \times \text{High AR}_i$	0.00576**	-0.0109***	-0.00285	0.00230
	(0.00263)	(0.00351)	(0.00326)	(0.00939)
$\text{STFXP Change}_i \times \text{Shock}_t$	-0.000219	0.000533	-0.0371	0.0348
	(0.00554)	(0.00417)	(0.0335)	(0.0304)
$\text{STFXP Change}_i \times \text{Shock}_t \times \text{High AR}_i$	-0.0391***	0.0480***	0.0940**	-0.0590
	(0.0113)	(0.0160)	(0.0420)	(0.0569)
$\text{STFXP Level}_i \times \text{Shock}_t$	0.00990	-0.00218	0.139**	-0.135**
	(0.00782)	(0.00457)	(0.0556)	(0.0534)
$\text{STFXP Level}_i \times \text{Shock}_t \times \text{High AR}_i$	0.00684	-0.0343**	-0.146**	0.146
	(0.0168)	(0.0154)	(0.0615)	(0.0910)
Observations	1945	1960	1920	1920
R^2	0.0287	0.0234	0.0337	0.0327
Firms	87	87	87	87
FirmFE	Yes	Yes	Yes	Yes
TimeFE	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes

Result 4: Carry Trade Impacts - Short Term Assets

Back

	(1) Cash and Financial	(2) Accounts Receivable	(3) ST FX	(4) ST Peso
$\text{Shock}_t \times \text{High AR}_i$	0.00576**	-0.0109***	-0.00285	0.00230
	(0.00263)	(0.00351)	(0.00326)	(0.00939)
$\text{STFXP Change}_i \times \text{Shock}_t$	-0.000219	0.000533	-0.0371	0.0348
	(0.00554)	(0.00417)	(0.0335)	(0.0304)
$\text{STFXP Change}_i \times \text{Shock}_t \times \text{High AR}_i$	-0.0391***	0.0480***	0.0940**	-0.0590
	(0.0113)	(0.0160)	(0.0420)	(0.0569)
$\text{STFXP Level}_i \times \text{Shock}_t$	0.00990	-0.00218	0.139**	-0.135**
	(0.00782)	(0.00457)	(0.0556)	(0.0534)
$\text{STFXP Level}_i \times \text{Shock}_t \times \text{High AR}_i$	0.00684	-0.0343**	-0.146**	0.146
	(0.0168)	(0.0154)	(0.0615)	(0.0910)
Observations	1945	1960	1920	1920
R^2	0.0287	0.0234	0.0337	0.0327
Firms	87	87	87	87
FirmFE	Yes	Yes	Yes	Yes
TimeFE	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes

- Carry trading firms that do a lot of trade credit lending draw down their cash and financial resources

Result 4: Carry Trade Impacts - Short Term Assets

Back

	(1) Cash and Financial	(2) Accounts Receivable	(3) ST FX	(4) ST Peso
$\text{Shock}_t \times \text{High AR}_i$	0.00576**	-0.0109***	-0.00285	0.00230
	(0.00263)	(0.00351)	(0.00326)	(0.00939)
$\text{STFXP Change}_i \times \text{Shock}_t$	-0.000219	0.000533	-0.0371	0.0348
	(0.00554)	(0.00417)	(0.0335)	(0.0304)
$\text{STFXP Change}_i \times \text{Shock}_t \times \text{High AR}_i$	-0.0391***	0.0480***	0.0940**	-0.0590
	(0.0113)	(0.0160)	(0.0420)	(0.0569)
$\text{STFXP Level}_i \times \text{Shock}_t$	0.00990	-0.00218	0.139**	-0.135**
	(0.00782)	(0.00457)	(0.0556)	(0.0534)
$\text{STFXP Level}_i \times \text{Shock}_t \times \text{High AR}_i$	0.00684	-0.0343**	-0.146**	0.146
	(0.0168)	(0.0154)	(0.0615)	(0.0910)
Observations	1945	1960	1920	1920
R^2	0.0287	0.0234	0.0337	0.0327
Firms	87	87	87	87
FirmFE	Yes	Yes	Yes	Yes
TimeFE	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes

- Carry trading firms that do a lot of trade credit lending draw down their cash and financial resources
- ...but if anything they *increase* their trade credit lending

Result 4: Carry Trade Impacts - Short Term Assets

Back

	(1) Cash and Financial	(2) Accounts Receivable	(3) ST FX	(4) ST Peso
$\text{Shock}_t \times \text{High AR}_i$	0.00576**	-0.0109***	-0.00285	0.00230
	(0.00263)	(0.00351)	(0.00326)	(0.00939)
$\text{STFXP Change}_i \times \text{Shock}_t$	-0.000219	0.000533	-0.0371	0.0348
	(0.00554)	(0.00417)	(0.0335)	(0.0304)
$\text{STFXP Change}_i \times \text{Shock}_t \times \text{High AR}_i$	-0.0391***	0.0480***	0.0940**	-0.0590
	(0.0113)	(0.0160)	(0.0420)	(0.0569)
$\text{STFXP Level}_i \times \text{Shock}_t$	0.00990	-0.00218	0.139**	-0.135**
	(0.00782)	(0.00457)	(0.0556)	(0.0534)
$\text{STFXP Level}_i \times \text{Shock}_t \times \text{High AR}_i$	0.00684	-0.0343**	-0.146**	0.146
	(0.0168)	(0.0154)	(0.0615)	(0.0910)
Observations	1945	1960	1920	1920
R^2	0.0287	0.0234	0.0337	0.0327
Firms	87	87	87	87
FirmFE	Yes	Yes	Yes	Yes
TimeFE	Yes	Yes	Yes	Yes
FirmControls	Yes	Yes	Yes	Yes

- The increased trade credit is likely denominated in FX