Exchange Rate Risk in Public Firms

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Discussion by Felipe Saffie (Darden, UVA)

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- ▶ Propose the FX Transaction Income (Foreign Exchange Gain/loss) as **a summary statistic** of Exchange Rate Risk.

- ▶ **Results:**
    1. Aggregate: different countries show a different co-movement between ER and FX Transaction Income.
    2. Firm level: FX Transaction Income co-moves with financial and trade exposure to exchange rate.
    3. Firm level: Past correlation of FX Transaction Income and ER mediates the effect of ER fluctuations into current profits.

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<div align="center">

November 2023: ER=17

</div>

Account Receivable: +170	
Inventories -170	

FX Transaction Income: Example

▶ In November a Mexican firm sells 10 dollars worth of goods to an American firm that will pay in full in January.

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December 2023: ER=15

</div>

Account Receivable: -20	Unrealized FX Gain: -20

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January 2024: ER=20

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Cash: +200	Realized FX Gain: 50
Account Receivable: -150	

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Summary:

1. Foreign currency transaction and **Local currency accounting**.
2. **Delay** between the transaction and the settlement (e.g., trade credit or FX debt).
3. Net of financial hedges (full hedge would imply no total gain or loss).
4. Does not include natural operation hedge (e.g., revenues in dollars from exports).
5. Firms do not pay taxes on unrealized FX gains.

Delay and FX mismatch: Hardy and Saffie (2023)

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

	(1) Total	(2) FX	(3) Peso	(4) Cash	(5) AR	(6) Inv	(7) Oth
Cash Flow$_{it}$	0.525***	0.176**	0.349**	0.138*	0.131***	0.261**	0.00688
	(0.127)	(0.0700)	(0.157)	(0.0708)	(0.0395)	(0.118)	(0.0180)
Δ FX Liab$_{it}$	0.381***	0.215***	0.166***	0.0878***	0.150***	0.120***	0.0206***
	(0.0506)	(0.0330)	(0.0521)	(0.0198)	(0.0222)	(0.0286)	(0.00653)
Δ Peso Liab$_{it}$	0.438***	0.0351	0.403***	0.106***	0.149***	0.148***	0.0308***
	(0.0521)	(0.0238)	(0.0486)	(0.0216)	(0.0285)	(0.0340)	(0.00999)
Observations	3889	3889	3889	3868	3889	3889	3889
R^2	0.233	0.0662	0.130	0.0470	0.0696	0.115	0.00458
Firms	152	152	152	152	152	152	152
FirmFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
TimeFE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

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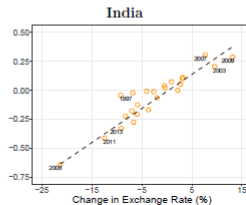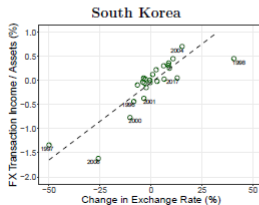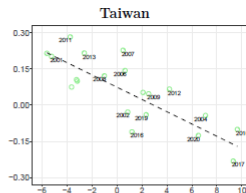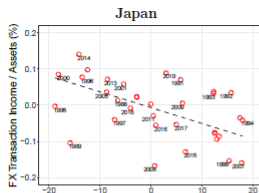▶ FX borrowing triggers currency mismatch.

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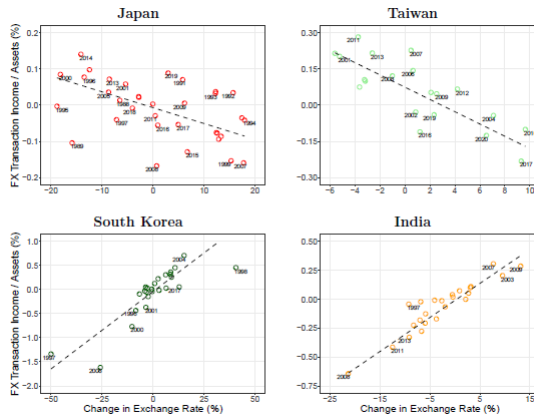
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▶ FX borrowing triggers currency mismatch.
▶ Delay: Account receivable is a key player in firms balance sheets.
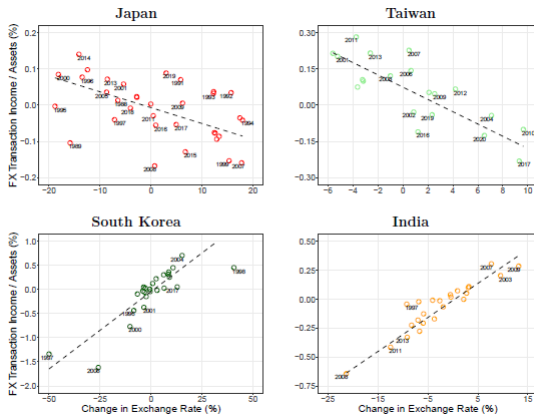
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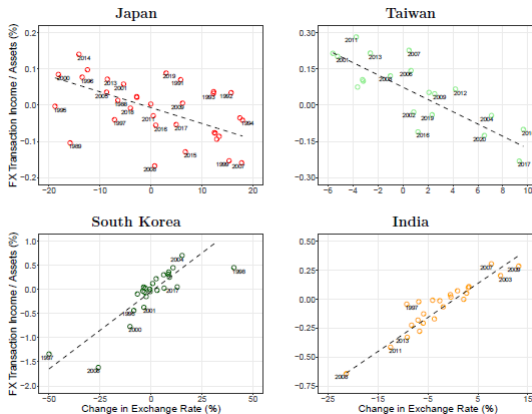
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- ▶ **Suggestion:** Compare aggregate FX with valuation changes from BOP/IIP.

Determinants of FX Transaction Risk

$$\frac{\text{FX Transaction Income}_{i,t}}{\text{Assets}_{i,t}} = \alpha_i + \beta \Delta s_t + \Gamma' \left(\Delta s_t \times X_{i,t} \right) + \varepsilon_{i,t}. \qquad (1)$$

| | FX Transaction Income / Assets (basis points) | | | | | |
| | USA | EUR | JPN | TWN | KOR | IND |
	(1)	(2)	(3)	(4)	(5)	(6)
Exchange rate change Δs_t (%)	−1.33***	−0.55***	−0.71***	−4.07***	−0.74	1.76***
	(0.25)	(0.11)	(0.09)	(0.32)	(0.53)	(0.46)
$\Delta s_t \times$Industry Net Exports / Output	1.29	−0.50	−6.39***	−13.28***	−11.85***	−3.36**
	(1.71)	(0.80)	(0.60)	(0.92)	(1.38)	(1.24)
$\Delta s_t \times$Log Assets (std.)	0.88***	0.36***	−0.03	1.77***	0.36*	0.06
	(0.25)	(0.08)	(0.07)	(0.22)	(0.18)	(0.14)
$\Delta s_t \times$Cash / Assets (std.)	−0.01	−0.26***	−0.22***	−2.34***	−1.19***	−0.24**
	(0.15)	(0.08)	(0.06)	(0.42)	(0.16)	(0.10)
$\Delta s_t \times$Net Trade Credit / Assets (std.)	0.04	−0.11	−0.01	−1.39***	−1.46***	−0.68**
	(0.20)	(0.08)	(0.04)	(0.18)	(0.27)	(0.24)
$\Delta s_t \times$Foreign Currency Debt / Assets	1.29	2.52	−4.09	35.97***	60.22***	17.37***
	(7.02)	(1.57)	(10.00)	(4.90)	(3.44)	(2.95)
Firm FEs?	Y	Y	Y	Y	Y	Y
Observations	10,248	20,936	36,589	22,394	21,249	22,983
R^2	0.22	0.14	0.21	0.39	0.25	0.24

▶ Use industry trends to absorb the average effect.
▶ Use net financial exposure (asset minus liability) instead of only liabilities.

A new measure of FX risk

$$\frac{\text{Pre-tax Income}_{i,t}}{\text{Assets}_{i,t-1}} = \alpha_i + \theta_{Industry(i),t} + \Delta s_t \times \sum_{k=2}^{4} \lambda_k \mathbb{1}_{\text{FX exposure quartile }(i,t-1)=k} + \Gamma' X_{i,t-1} + \varepsilon_{i,t}.$$

	Pre-tax Income / Lagged Assets (basis points)					
	USA	EUR	JPN	TWN	KOR	IND
	(1)	(2)	(3)	(4)	(5)	(6)
Δ Exchange Rate (%) × 1(2nd FX loading quartile)	4.38	4.82*	2.29**	6.81***	−2.42	0.33
	(6.12)	(2.41)	(1.01)	(2.35)	(2.43)	(1.61)
Δ Exchange Rate (%) × 1(3rd FX loading quartile)	7.34	5.55**	2.69**	8.70***	2.42	1.80
	(5.89)	(2.28)	(1.00)	(1.65)	(1.83)	(2.00)
Δ Exchange Rate (%) × 1(4th FX loading quartile)	9.97	2.65	2.42**	4.61*	8.19***	4.39**
	(6.43)	(3.34)	(1.10)	(2.64)	(1.74)	(1.63)
Firm FEs?	Y	Y	Y	Y	Y	Y
Industry-Year FEs?	Y	Y	Y	Y	Y	Y
Lagged Controls:	Log Assets, Cash / Assets, Leverage, Market-to-Book					
Observations	12,940	13,009	28,301	20,652	25,237	16,054
R^2	0.73	0.68	0.60	0.64	0.53	0.68

▶ *For each country and each year, firms are sorted into quartiles, based on their FX transaction income in the previous year, in ascending order when $\Delta s_t > 0$ and descending order otherwise.*

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▶ Should we care about what Δs_{t-1} was? Is this a firm that benefits or is hurt by appreciations? Perhaps rank according to the previous 3 years correlations between FX transaction income and ER.

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▶ Could firms be hedging the realized losses (as they are the object of taxation) and not the unrealized ones? Should we separate that analysis?