Carry Trades and Precautionary Saving: The Use of Proceeds from Foreign Currency Debt Issuance

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Motivation

- Conventional wisdom: Depreciation of its currency boosts **net exports** and aggregate demand
  $\Rightarrow$ **expansionary** depreciation (Mundell & Fleming)

- On the other hand, with **liability dollarization**, depreciation leads to a **balance sheet deterioration**
  $\Rightarrow$ **contractionary** depreciation (Cespedes, Chang, Velasco, 2004)

- Therefore, the **currency denomination** of corporate liabilities can have a large impact on both financial and macroeconomic aspects of emerging economies.
  – corporate $ debt $\Uparrow$ to **4.7 trillion USD in 2016** (doubled from 2008).

- However, the effect of $ liabilities depends a lot on **how firms use their proceeds from $ debt issuance**.

What firms do with their foreign currency borrowing?

What the literature is missing

- The recent literature points to **"carry trade" activities** of firms when borrowing in $.

- Firms **borrow in USD** but **deposit in their own local currency (LC)**:
  Bruno & Shin (2017), Huang, Panizza & Portes (2020), Hardy & Saffie (2019)

- However, the currency composition of firms' assets are **not observed** in the datasets that previous studies used

- Only conjecture from **observing ⇑ liquid assets** (cash or its equivalents, account receivables, $\cdots$) after $ debt issuance

What our paper does to fill the gap

- Fill the gap in the literature by introducing a Korean firm-level dataset with 23,000 firms

- Only 10% are listed firms, and many are private small/medium-sized firms

- **Currency & maturity** information about **both assets and liabilities**

- That is, we can see if **local currency (LC) or foreign currency (FC) liquid assets have increased after \$ debt issuance**

Debt type	Local Currency Liquid Assets	Foreign Currency Liquid Assets	Investment	Consistent Hypothesis
Local Currency (LT LC /ST LC)	—	—	+	Pecking order Borrow to invest
Long-term Foreign Currency (LT FC)	—	+	+	Borrow to invest + Precautionary
Short-term Foreign Currency (ST FC)	+	+	—	Carry trade + Precautionary
Current Portion of LT Foreign Currency (ST FC)	flat	+	flat	Precautionary

- **Maturity and currency both matter**

Literature review

- **Currency denomination of firms' debt issuance**
  - **Natural hedging**
    Kedia & Mozumdar (2003), Jiao et al. (2021), Colacito et al. (2022)
  - **Carry trade**
    Bruno & Shin (2017), Huang et al. (2018), Acharya & Vij (2020), Hardy & Saffie (2019)

- **Corporate cash holdings**:
  - **International financial market & corporate cash holdings:**
    Opler et al. (1999), Graham & Harvey (2001), Bates et al. (2009)
  - **Uncertainty & cash hoarding:**
    Arellano et al. (2019), Xiao (2020)

- **Corporate leverage & macro/financial market stability**:
  - **Macroeconomic consequences of FC debt:**
    Aguiar (2005), Dominguez & Tesar (2006), Bleakley & Cowan (2008), Kim et al. (2015), Kim & Lee (2022), Wu (2021)
  - **International market spillover to domestic market:**
    McCauley et al. (2015), Chui et al. (2016), Alfaro et al. (2017), Alfaro et al. (2019), Abraham et al. (2020), Kalemli-Ozcan et al. (2021), Di Giovanni et al. (2021)

Dataset

KISVALUE dataset of firm-level B/S data

- Contains a rich set of B/S items of 23,000 firms in 2001–2017
  1. **currency composition & maturity of their liabilities + assets**:
     foreign currency vs. domestic currency, short-term vs. long-term
  2. not only large listed but small and medium-sized **non-listed** non-financial firms.

- Representative dataset:
  1. The average coverage ratios are above 60% for the variables of interests[1]

	Cash	ST Debt	LT Debt	AR	Total Assets	Sales
	62.8	68.1	78.4	65.2	65.3	62.2

  2. The dynamics of these variables are fairly close to the aggregate counterparts from BoK. ▸ Dynamics

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[1] The coverage ratios are computed as the ratio of KISVALLUE aggregates across firms to the aggreagate data from BoK in the same year

Baseline specification

- We estimate a regression similar to Bruno and Shin (2017) :

$$
\begin{aligned}
\frac{y_{i,t}}{TA_{i,t-1}} = \quad & \beta^{LTFC} \frac{LT\ FCdebt_{i,t}}{TA_{i,t-1}} + \beta^{LTLC} \frac{LT\ LCdebt_{i,t}}{TA_{i,t-1}} \\
& + \beta^{STFC} \frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}} + \beta^{STLC} \frac{ST\ LCdebt_{i,t}}{TA_{i,t-1}} \\
& + \gamma_1 \frac{OS_{i,t}}{TA_{i,t-1}} + \gamma_2 lnTA_{i,t-1} + \alpha + \alpha_c + \alpha_t + \epsilon_{i,t}
\end{aligned}
\tag{1}
$$

  where $y_{i,t}$ is cash & cash equivalents (Cash), ST financial instruments (ST FI), and accounts receivables (AR) in LC or FC

- **Key innovation is that we see the currency denomination of LHS**
- Focus only on cash & cash equivalents in this presentation (results are similar for ST FI and AR)

Baseline results

	LC Cash	FC Cash	CapEx
$\frac{LT\ LCdebt_{i,t}}{TA_{i,t-1}}$	-0.042***	-0.009***	0.103***
$\frac{ST\ LCdebt_{i,t}}{TA_{i,t-1}}$	-0.071***	-0.007***	0.055***
$\frac{LT\ FCdebt_{i,t}}{TA_{i,t-1}}$	0.008	0.016**	0.081***
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}}$	0.106***	0.031***	-0.023***
Adjusted R^2	0.101	0.049	0.088
Obs.	145698	145979	145480

- LC debt $\uparrow \Rightarrow$ Cash $\downarrow$ and investment $\uparrow$ (pecking order theory)

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- LC debt $\uparrow \Rightarrow$ Cash $\downarrow$ and investment $\uparrow$ (pecking order theory)

FC debt depends on **maturity**

- LT FC debt $\uparrow \Rightarrow$ FC Cash $\uparrow$ and investment $\uparrow$ (precautionary)

Baseline results

	LC Cash	FC Cash	CapEx
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- LC debt $\uparrow \Rightarrow$ Cash $\downarrow$ and investment $\uparrow$ (pecking order theory)

FC debt depends on **maturity**

- LT FC debt $\uparrow \Rightarrow$ FC Cash $\uparrow$ and investment $\uparrow$ (precautionary)
- ST FC debt $\uparrow \Rightarrow$ LC Cash $\uparrow$ and investment $\downarrow$ (carry trade), FC Cash $\uparrow$ (precautionary)

▶ Exports ▶ GFC ▶ Local Projection: LC Liquid Assets ▶ Local Projection: FC Liquid Assets

- We show that the increase in LC cash is associated with proceeds of debt issuance by comparing:

Current portion of LT FC debt ↑	ST FC debt ↑
↑ in maturing debt in $t + 1$	
no cash inflow at t	**↑ cash inflow at t**

With current portion of LT debt

	LC Cash	FC Cash	CapEx
$\frac{LT\ LCdebt_{i,t}}{TA_{i,t-1}}$	-0.042***	-0.009***	0.103***
$\frac{ST\ LCdebt_{i,t}}{TA_{i,t-1}}$	-0.071***	-0.007***	0.055***
$\frac{LT\ FCdebt_{i,t}}{TA_{i,t-1}}$	0.012	0.016**	0.083***
$\frac{Current\ LT\ FCdebt_{i,t}}{TA_{i,t-1}}$	-0.007	0.016*	0.071***
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}}$	0.106***	0.031***	-0.022***
Adjusted R^2	0.101	0.049	0.088
Obs.	145698	145979	145480

- No LC cash increase without cash inflow at t, unlike ST FC debt

(i) Do we see more carry trades when the interest rate differential is high?

$$
\begin{aligned}
\frac{\text{LC Liquid Assets}_{i,t}}{TA_{i,t-1}} = \quad & \beta^{LTFC} \frac{LT\ FCdebt_{i,t}}{TA_{i,t-1}} + \beta^{LTLC} \frac{LT\ LCdebt_{i,t}}{TA_{i,t-1}} \\
& + \beta^{STFC} \frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}} + \beta^{STLC} \frac{ST\ LCdebt_{i,t}}{TA_{i,t-1}} \\
& + \gamma_1 \frac{OS_{i,t}}{TA_{i,t-1}} + \gamma_2 \ln TA_{i,t-1} + \alpha + \alpha_c + \alpha_t + \epsilon_{i,t} \\
& + \delta_1 \frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}} \times \left(i_t^{KRW} - i_t^{USD} \right)
\end{aligned}
\tag{2}
$$

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& + \delta_1 \frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}} \times (i_t^{KRW} - i_t^{USD})
\end{aligned}
\tag{2}
$$

(ii) Is precautionary saving more pronounced when the exchange rate volatility is high?

$$
\begin{aligned}
\frac{\text{FC Liquid Assets}_{i,t}}{TA_{i,t-1}} = \quad & \beta^{LTFC} \frac{LT\ FCdebt_{i,t}}{TA_{i,t-1}} + \beta^{LTLC} \frac{LT\ LCdebt_{i,t}}{TA_{i,t-1}} \\
& + \beta^{STFC} \frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}} + \beta^{STLC} \frac{ST\ LCdebt_{i,t}}{TA_{i,t-1}} \\
& + \gamma_1 \frac{OS_{i,t}}{TA_{i,t-1}} + \gamma_2 \ln TA_{i,t-1} + \alpha + \alpha_c + \alpha_t + \epsilon_{i,t} \\
& + \delta_1 \frac{LT\ FCdebt_{i,t}}{TA_{i,t-1}} \times (1yFXvol_t) + \delta_2 \frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}} \times (3mFXvol_t)
\end{aligned}
\tag{3}
$$

Across time results

	LC Cash	FC Cash
$\dfrac{LT\ LCdebt_{i,t}}{TA_{i,t-1}}$	-0.042***	-0.009***
$\dfrac{ST\ LCdebt_{i,t}}{TA_{i,t-1}}$	-0.071***	-0.007***
$\dfrac{LT\ FCdebt_{i,t}}{TA_{i,t-1}}$	0.008	0.016**
$\dfrac{ST\ FCdebt_{i,t}}{TA_{i,t-1}}$	0.090***	0.031***
$\dfrac{ST\ FCdebt_{i,t}}{TA_{i,t-1}} \times i_t^{diff}$	0.009**	
$\dfrac{LT\ FCdebt_{i,t}}{TA_{i,t-1}} \times (1yFXvol_t)$		-0.0000
$\dfrac{ST\ FCdebt_{i,t}}{TA_{i,t-1}} \times (3mFXvol_t)$		0.002***
Adjusted R^2	0.101	0.050
Obs.	145740	146021

- More carry trade when interest rate diff $\Uparrow$

Across time results

	LC Cash	FC Cash
$\frac{LT\ LCdebt_{i,t}}{TA_{i,t-1}}$	-0.042***	-0.009***
$\frac{ST\ LCdebt_{i,t}}{TA_{i,t-1}}$	-0.071***	-0.007***
$\frac{LT\ FCdebt_{i,t}}{TA_{i,t-1}}$	0.008	0.016**
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}}$	0.090***	0.031***
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}} \times i_t^{diff}$	0.009**	
$\frac{LT\ FCdebt_{i,t}}{TA_{i,t-1}} \times (1yFXvol_t)$		-0.0000
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}} \times (3mFXvol_t)$		0.002***
Adjusted R^2	0.101	0.050
Obs.	145740	146021

- More carry trade when interest rate diff $\Uparrow$
- More precautionary when exchange rate vol $\Uparrow$

Incentives across sectors

- Which sectors engage in more carry trades?
- Follow Rajan and Zingales (1998) to compute

$$FinDep_i = \frac{\sum\limits_{t=0}^{T}\text{increase is investment assets}_{i,t} \text{ - cashflow from operation}_{i,t}}{\sum\limits_{t=0}^{T}\text{increase is investment assets}_{i,t}}$$

and take a median across firms in each sector

- and similarly using the input-output table,

$$ExportShare_c = \frac{\sum\limits_{t=0}^{T}\text{sector export}_{c,t}}{\sum\limits_{t=0}^{T}\text{sector output}_{c,t}} \text{ and } ImportShare_c = \frac{\sum\limits_{t=0}^{T}\text{sector import}_{c,t}}{\sum\limits_{t=0}^{T}\text{sector output}_{c,t}}.$$

Across sector regression

$$
\begin{aligned}
\frac{y_{i,t}}{TA_{i,t-1}} = \quad & \beta^{LTFC} \frac{LT\_FCdebt_{i,t}}{TA_{i,t-1}} + \beta^{LTLC} \frac{LT\_LCdebt_{i,t}}{TA_{i,t-1}} \\
& + \beta^{STFC} \frac{ST\_FCdebt_{i,t}}{TA_{i,t-1}} + \beta^{STLC} \frac{ST\_LCdebt_{i,t}}{TA_{i,t-1}} \\
& + \gamma_1 \frac{OS_{i,t}}{TA_{i,t-1}} + \gamma_2 \ln TA_{i,t-1} + \alpha + \alpha_c + \alpha_t + \epsilon_{i,t} \\
& + \delta_1 \frac{ST\_FCdebt_{i,t}}{TA_{i,t-1}} \times X_c
\end{aligned}
\tag{4}
$$

where X_c is financial dependence, export share or import share

Across sector results (financial dependence)

	LC Cash	FC Cash
$\frac{LT\ LCdebt_{i,t}}{TA_{i,t-1}}$	-0.042***	-0.009***
$\frac{ST\ LCdebt_{i,t}}{TA_{i,t-1}}$	-0.071***	-0.007***
$\frac{LT\ FCdebt_{i,t}}{TA_{i,t-1}}$	0.008	0.016**
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}}$	-0.025	-0.000
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}} \times FinDep_c$	0.133***	0.031**
Adjusted R2	0.101	0.050
N	145740	146021

- More financially dependent firms engage in carry trades
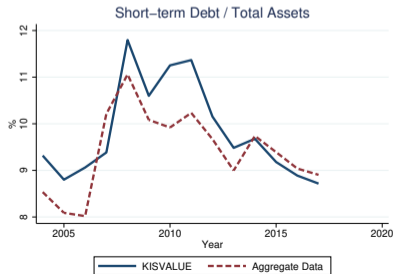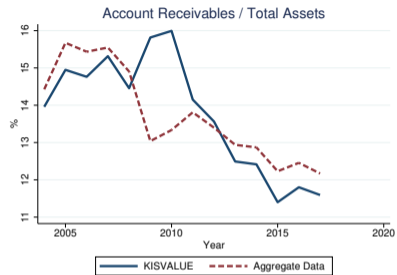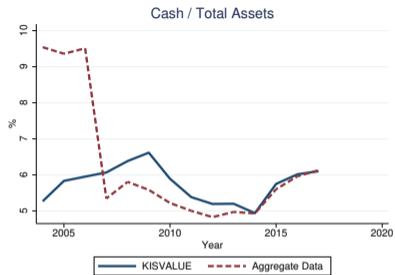
Across sector results (export and import)

	LC Cash	LC AR	FC Cash	FC AR
$\frac{LT\ LCdebt_{i,t}}{TA_{i,t-1}}$	-0.042***	-0.107***	-0.009***	-0.019***
$\frac{ST\ LCdebt_{i,t}}{TA_{i,t-1}}$	-0.071***	-0.031***	-0.007***	0.003
$\frac{LT\ FCdebt_{i,t}}{TA_{i,t-1}}$	0.008	-0.068***	0.016**	0.025***
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}}$	0.106***	-0.027	0.023**	0.017
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}} \times ExportShare_c$	0.094	0.423***	0.044*	0.309***
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}} \times ImportShare_c$	-0.096	-0.036	0.003	0.193
Adjusted R2	0.101	0.287	0.050	0.101
N	145740	144310	146021	145960

- More export-oriented firms engage in carry trade via AR rather than cash eqiv.

Conclusion

- Our key innovation comes with a unique Korean firm-level dataset that contains the **currency and maturity information about both assets and liabilities**.

- The empirical relationship that we see from the data supports a widespread speculation in the literature that **firm engages in carry trade activities when borrowing in short-term**.

- We further show that the positive correlation between LC liquid assets and FC debt, supportive of carry trades, only arises **when debt is issued at short-term with actual cash inflows, not when debt matures soon**.

- Our sectoral analysis hints that more export-exposed and financially dependent sectors engage more in carry trades; the latter can be worrisome to emerging market policymakers.

Cash / Total Assets — Account Receivables / Total Assets — Short-term Debt / Total Assets — Long-term Debt / Total Assets. KISVALUE and Aggregate Data series plotted by Year.
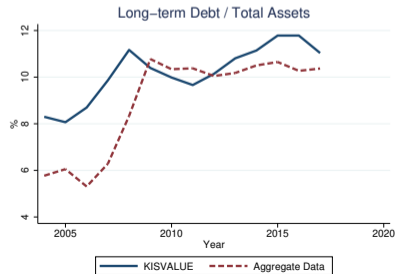
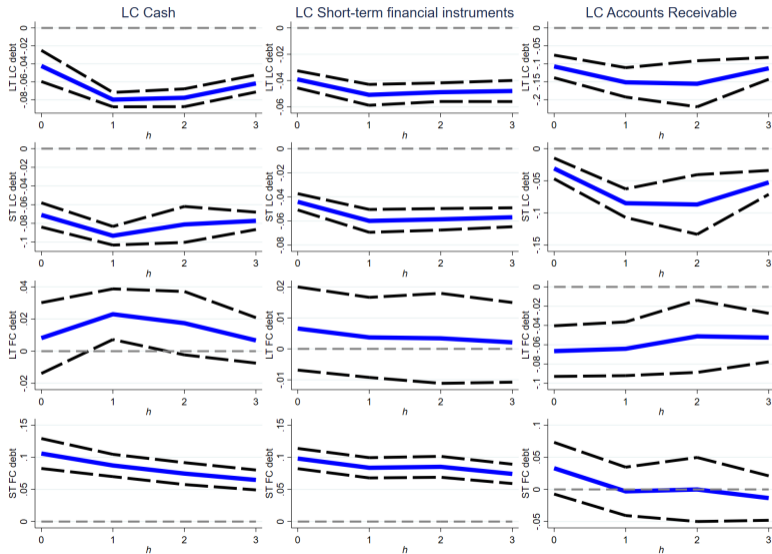|	LC Cash	FC Cash	CapEx
$\frac{LT\ LCdebt_{i,t}}{TA_{i,t-1}}$	-0.043***	-0.009***	0.079***
$\frac{ST\ LCdebt_{i,t}}{TA_{i,t-1}}$	-0.072***	-0.007***	0.047***
$\frac{LT\ FCdebt_{i,t}}{TA_{i,t-1}}$	0.008	0.016**	0.092***
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}}$	0.106***	0.030***	-0.014**
Export to Sales	0.015***	0.012***	0.006**
	(0.003)	(0.002)	(0.002)
Adjusted R^2	0.102	0.053	0.076
N	143961	144236	252739

	LC Cash	FC Cash
$\frac{LT\ LCdebt_{i,t}}{TA_{i,t-1}}$ pre2008	-0.036***	-0.005***
$\frac{LT\ LCdebt_{i,t}}{TA_{i,t-1}}$ post2008	-0.046***	-0.010***
$\frac{ST\ LCdebt_{i,t}}{TA_{i,t-1}}$ pre2008	-0.060***	-0.003***
$\frac{ST\ LCdebt_{i,t}}{TA_{i,t-1}}$ post2008	-0.078***	-0.009***
$\frac{LT\ FCdebt_{i,t}}{TA_{i,t-1}}$ pre2008	0.007	0.010***
$\frac{LT\ FCdebt_{i,t}}{TA_{i,t-1}}$ post2008	0.006	0.024**
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}}$ pre2008	0.114***	0.025***
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}}$ post2008	0.100***	0.035***
	(0.012)	(0.005)
Adjusted R^2	0.101	0.051
N	145740	146021

FC Cash   FC Short-term financial instruments   FC Accounts Receivable