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

Annie Soyean Lee*
Steve Pak Yeung Wu†

This version: 12/16/2022

Abstract

The substantial increase in corporate debt over the past decade revived macro stability concerns of foreign currency liability in emerging countries. We empirically study the use of proceeds from debt issuance in different currencies using a Korean firm-level dataset, which provides information on the currency denomination of *both* assets and liabilities of firms. We find strong evidence of firms' engagement in carry trades and precautionary saving. The empirical relationship depends heavily on the currency denomination and the maturity of the debt. A sectoral heterogeneity is documented where financially dependent or export-exposed sectors engage more in carry trades.

JEL Classification Codes: F3, F4, G1

Keywords: Carry trade, currency mismatch, foreign currency debt

*Email: annie.lee.econ@gmail.com, Johns Hopkins University
†Email: stevepywu@gmail.com, University of California, San Diego

1 Introduction

The level of international debt rose substantially in the past decade since the 2008 Global Financial Crisis. Emerging market corporate debt is the main driver of the surge. According to the Bank for International Settlements (BIS) data, the size of external corporate dollar debt in developing countries went up from USD 4.7 trillion in 2009 to USD 7.2 trillion by the end of 2019. The rise of external corporate debt, especially in foreign currency, in emerging countries raises concerns for policymakers about macroeconomic vulnerability and financial fragility.[1] To gauge the macroeconomic implications of the seemingly alarming high indebtedness, an important question to understand is the usage of the debt proceeds. If firms mostly invest their debt proceeds into productive projects, it is in fact a good use of the international financial market and is reassuring. On the other hand, if firms engage in carry trades by borrowing in foreign currency and lending in domestic currency, they are accumulating the currency mismatch on their balance sheets, which makes them more prone to financial disruptions upon a sudden stop of foreign capital inflows.

Data limitation is a challenge to question as information about currency composition of firms' balance sheet is needed. Existing studies focus on the liability side of firms because of extensive data available at the transaction level. However, researchers either do not see the currency composition of *assets* (e.g., Bruno and Shin (2017), Huang et al. (2018) and Acharya and Vij (2020)) or oftentimes only have the data for a very small set of very big firms (Allayannis et al. (2003) and Hardy and Saffie (2019)). In this paper, we overcome these issues by employing a dataset of South Korean firms, which enables us to see the currency denomination of detailed *asset* and liability items for more than 22,000 firms, 10 times more than listed firms in South Korea.

With this dataset, we provide direct evidence of how firms spend their proceeds of foreign currency (FC) and local currency (LC) debt. We find that the empirical relationship depends heavily on the currency denomination and the maturity of the debt and summarize seven empirical findings.

Our first five findings are summarized in Table 1. Using panel regression analysis, we investigate how LC and FC liquid assets change when a firm increases its debt liability in different currencies and at different maturities. First, we see that increase in long-term and short-term LC (LT LC and ST LC) debt are associated with a significant reduction in LC liquid assets, FC liquid assets, and dividend payouts. These empirical patterns are consistent with the pecking order theory of corporate finance. A firm will draw on internal funds first, since it is the cheapest form of financing, and only search for external financing, when internal funds are depleted. The theory will predict a negative correlation between liability and liquid assets, reflecting firms' financing behavior of drawing down internal funds while raising outside funding, and that is exactly what we see in the data with local currency liability.

[1] For example, "India's corporate sector, which has borrowed heavily in foreign currency, is not immune to this vulnerability. Corporate sector debt has risen very rapidly, nearly doubling in the last 5 years to about $120 billion," said Christine Lagarde in her address at the Reserve Bank of India seated alongside RBI Governor Raghuram Rajan in 2015. See also IMF Global Financial Stability Report (IMF (2015)).

Table 1: Summary of the first five empirical findings

Debt type	Local currency liquid assets	Foreign currency liquid assets	Investment	Consistent hypothesis
Short-term local currency (ST LC)	-	-	+	Borrow to invest
Long-term local currency (LT LC)	-	-	+	Borrow to invest
Short-term foreign currency (ST FC)	+	+	-	Carry trade + precautionary
Current portion of short-term foreign currency	flat	+	flat	Precautionary
Long-term foreign currency (LT FC)	-	+	+	Borrow to invest + precautionary

Second, incurring foreign currency liability is associated with very different patterns, and it is maturity-dependent. We show that an increase in *short-term* foreign currency debt (ST FC) is associated with an increase in LC liquid assets, which is in complete contrast to the negative relationship that the pecking order theory predicts. On the other hand, an increase in *long-term* foreign currency debt (LT FC) is still associated with a reduction in LC liquid assets. The positive association of LC liquid assets and ST FC debt is consistent with what we may see if firms are conducting carry trades. Firms borrow at a lower interest rate in foreign currency and deposit them at a higher interest rate in local currency assets. This carry trade behavior has been long conjectured by the literature and described as firms acting like financial intermediary or "shadow banking." (Bruno and Shin (2017)). We are the first paper to provide concrete evidence on firms' engagement in carry trades because our dataset provides the currency denomination of the *assets* which was unavailable in datasets employed in previous studies.

Third, we emphasize the rise in LC liquid assets with ST FC debt comes only when there are cash inflows from ST FC debt issuance. We identify this by comparing two similar account items: ST FC debt and the current portion of LT FC debt. An increase in the current portion of long-term debt is simply a change in liability from long-term debt to short-term debt on the balance sheet when the long-term debt is maturing within a year.[2] Therefore, it increases short-term liability exactly like short-term debt, but there is no relevant increase in bond proceeds or assets. In the regression analysis, we do not find an increase in LC liquid assets when there is an increase in the current portion of LT FC debt. Therefore, when ST FC liability is increased due to the LT FC debt getting closer to its maturity date (current portion of LT FC debt), we do not see "carry trades". The increase in LC liquid assets is due to the *issuance*, where firms shift the debt proceeds to higher interest-bearing LC liquid assets.

Fourth, we document that there is an increase in FC liquid assets when there is an increase in *long-term* and *short-term* foreign currency debt (LT FC), which is aligned with what a strong precautionary saving motive would result in. When firms borrow in foreign currency, they are

[2] Accounting-wise, the current portion of long-term debt is a separate balance sheet item from short-term debt.

subject to exchange rate risk. Maintaining FC liquid assets helps to buffer and smooth out some short-term distress and liquidity needs. We further identify the increase in FC liquid assets is not just a mechanical increase in FC assets due to FC debt proceeds by looking at the current portion of LT FC debt. An increase in the current portion of LT FC debt is not associated with debt proceeds in the same period but an increase in FC liquid assets is observed.

Fifth, investment increases with debt issuance, except for ST FC debt which has a statistically significant negative association with debt issuance. A positive association of investment and debt represents a "borrow to invest" incentive, the main incentive for firms to borrow in virtually all of corporate finance theories. Importantly, the negative association of ST FC debt and investment again stresses the key motive for issuing ST FC debt is not borrow to invest, but rather borrow to conduct carry trades.

Sixth, to explore the carry trade and precautionary motives further, we analyze the heterogeneity across time. Carry trade is more favorable when the interest rate differential between the US and Korea is high. During these periods, we observe that the increase in LC liquid assets is more pronounced when firms issue ST FC debt. Similarly, higher U.S. dollar and Korean Won exchange rate volatility increases the precautionary motive. The accumulation of FC liquid assets, when issuing FC debt, is higher at times with high exchange rate volatility.

Finally, exploring sectoral heterogeneity in their engagement in carry trade and precautionary saving to highlight the macroeconomic consequence of firms' FC borrowing, we find that firms that belong to sectors more reliant on external financing or those in the exporting sectors seem to engage more in carry trades but also concurrently show higher precautionary saving motives. The former fact can be worrisome as firms are exposed to the currency mismatch on their balance sheets, increasing its macroeconomic vulnerability to a large depreciation.

Our findings pose a new challenging tradeoff for emerging economy policymakers. Financing internationally is known to have the benefit of a lower interest rate cost and diversification of funding sources. When firms borrow internationally in foreign currency and lend in local currency to domestic market, they create a "shadow banking" system that is less regulated and transmit external conditions to domestic markets.[3] While the precautionary saving and export hedging behavior provide some reassuring evidence, the carry trade activities conducted by firms in financially dependent sector could indicate risk-taking in a highly leveraged manner.

Related Literature.

This paper is related to a broader literature that investigates the interplay of international capital market and emerging market corporate leverage. Motivated the currency crisis in the 1990s, early work such as Aguiar (2005), Dominguez and Tesar (2006), and Bleakley and Cowan (2008) investigate the consequences of debt denominated in foreign currency, especially after large depreciations.[4] The recent global corporate debt surge raises the concern about the interplay of international market fluctuation, corporate fragility, and leverage (McCauley et al. (2015), Chui et al.

[3]International borrowing by emerging market firms are dominated by foreign currency borrowing. See evidence from Burger et al. (2012), Du and Schreger (2017), Maggiori et al. (2020) and Wu (2021).

[4]See also Kim et al. (2015), Kim and Lee (2021) and Hardy (2018) for recent studies with more granular level of data.

(2016), Alfaro et al. (2017), Alfaro et al. (2019), Abraham et al. (2020) and Kalemli-Ozcan et al. (2021)). Di Giovanni et al. (2021) explore the spillovers of international market fluctuation to domestic credit. Burger et al. (2012) and Hale et al. (2020) unveil the determinants of the international local currency corporate bond market. Du and Schreger (2017), Bevilaqua et al. (2020) and Wu (2021) provide evidence of linkage between corporate leverage and sovereign risk. Didier et al. (2021) and Calomiris et al. (2019) look at the firm responses after accessing the international capital market. We contribute to the literature by showing the corporate asset and liability currency dimension responses to international market conditions.

This paper is closely related to a growing empirical international capital market literature that studies the currency denomination of firms' debt issuance. Some papers argue that the currency choice in debt issuance is driven by natural hedging motives of firms. Kedia and Mozumdar (2003), Jiao et al. (2021), and Colacito et al. (2022) show empirically that the currency choice in debt issuance is driven by motives to lower their operational exchange rate risk exposure. On the other hand, other papers argue that the role of operational hedging in foreign currency debt issuance might be rather limited. For instance, Alfaro et al. (2021) use the Chilean administrative data and show that natural hedging is limited; large firms actively use foreign exchange derivatives to lower their operational exposure to exchange rate risk. In the other strand of literature, papers such as Bruno and Shin (2017), Huang et al. (2018), Acharya and Vij (2020) and Hardy and Saffie (2019) find that emerging market debt issuance increases when the carry trade environment is more favorable.[5] They document firms behave increasingly more like financial intermediaries. Bruno and Shin (2017), Hardy and Saffie (2019) and Huang et al. (2018) also point to an increase in cash, accounts receivable, and other receivables respectively come with foreign currency debt issuance. In a related note, Liao (2020) shows that corporate debt issuance flow can be predicted and explained with the covered interest rate parity deviation measured at the firm-level. We advance the understanding along this dimension by showing explicitly how different liquid asset items in different currencies change in response to debt issuance *in different currencies* and at different maturities for a large set of firms.

This paper draws linkage between international capital market and the literature of corporate cash hoarding (Opler et al. (1999), Graham and Harvey (2001) and Bates et al. (2009)). Recent papers focus on cash hoarding due to a precautionary saving motive upon a rise in uncertainty (Arellano et al. (2019), Xiao (2020)). We contribute to the literature by showing a strong precautionary saving behavior even in normal times for emerging country firms but also different precautionary saving behaviors depending on the currency denomination and the maturity of debt issuance.

Layout. Section 2 introduces our dataset. Section 3 presents our baseline analysis and provides evidence of the first three empirical facts. Section 3.1 uses the current-portion of FC LT debt to contrast it with the result with FC ST debt. Section 3.2 splits the sample. Section 4 shows the heterogeneity across time and across sectors. Section 5 provides regression results of variables other than liquid assets. Section 6 presents longer horizon effects and we conclude in Section 7.

[5] Carry trade is highly related to the concept of uncovered interest parity deviation. See Engel (2014) and Lustig et al. (2011).

2 Data description and stylized aggregate patterns

We employ an extensive Korean firm-level dataset to ultimately answer what firms do with their debt issuance in different currencies and at different maturities. The dataset is from the NICE (National Information & Credit Evaluation, formerly the Korea Information Service Inc., KIS). Our dataset includes firms with assets over 10 billion Korean Won as of 2018,[6] who are subject to the external audits and need to report their balance sheet information to the Financial Supervisory Commission.[7] We focus on the sample period from 2001 to 2017. The KISVALUE dataset includes around 23,000 firms and the number of listed firms is 2,040 firms as of 2017. The majority of firms in the dataset are non-listed small and medium-sized firms. We exclude financial firms in our analysis.[8] Firms are allowed to enter, to exit, and to pause reporting for a number of years during the sample period if their assets go below the threshold. The total number of employees covered by the dataset is 3,525,241 as of 2017, which represents 16.8% of the aggregate employment in all sectors excluding the financial sector.[9] Given that around 25.4% of the employment in Korea comes from the self-employment in 2017, the KISVALUE covers a substantial fraction of the employment when we exclude self-employment.

To further elaborate how well our firm-level data from the KISVALUE are capturing the aggregate dynamics of the key variables that we are interested in, we compare the aggregated firm-level data and the aggregate data counterpart from the Bank of Korea Financial Statement Analysis Data. The aggregate data from the Bank of Korea include all firms who submitted their financial statements to the National Tax Service for corporate tax returns, excluding self-employed businesses and finance and insurance companies.[10] The key variables that we looked at are: cash, accounts receivable, short-term debt, long-term debt, and total assets.[11] We summed over the firm-level variables in a given year and normalized the computed aggregate variables by the aggregated total assets. We then compare the aggregate values computed from our micro-level data with those from the Bank of Korea. Figure 1 shows the dynamics of the key variables that we are interested in. The time-series patterns of our aggregated micro-level data are very much aligned with the actual aggregate data patterns for most of the years even though the aggregate Bank of Korea data include every single non-financial firms, paying corporate taxes. Moreover, when we compare the total

[6] The threshold was lower in the past. For example, as reported by Kim et al. (2015), the threshold was 7 billion Korean won in 1999.

[7] All the balance sheet information for each company in a given year after 2000 can be found at http://dart.fss.or.kr. The NICE has compiled the publicly accessible information in the readily accessible form.

[8] Specifically, we exclude firms that are in these three sectors: "Financial Institutions, Except Insurance and Pension Funding", "Insurance and Pension Funding" and "Activities Auxiliary to Financial Service and Insurance Activities."

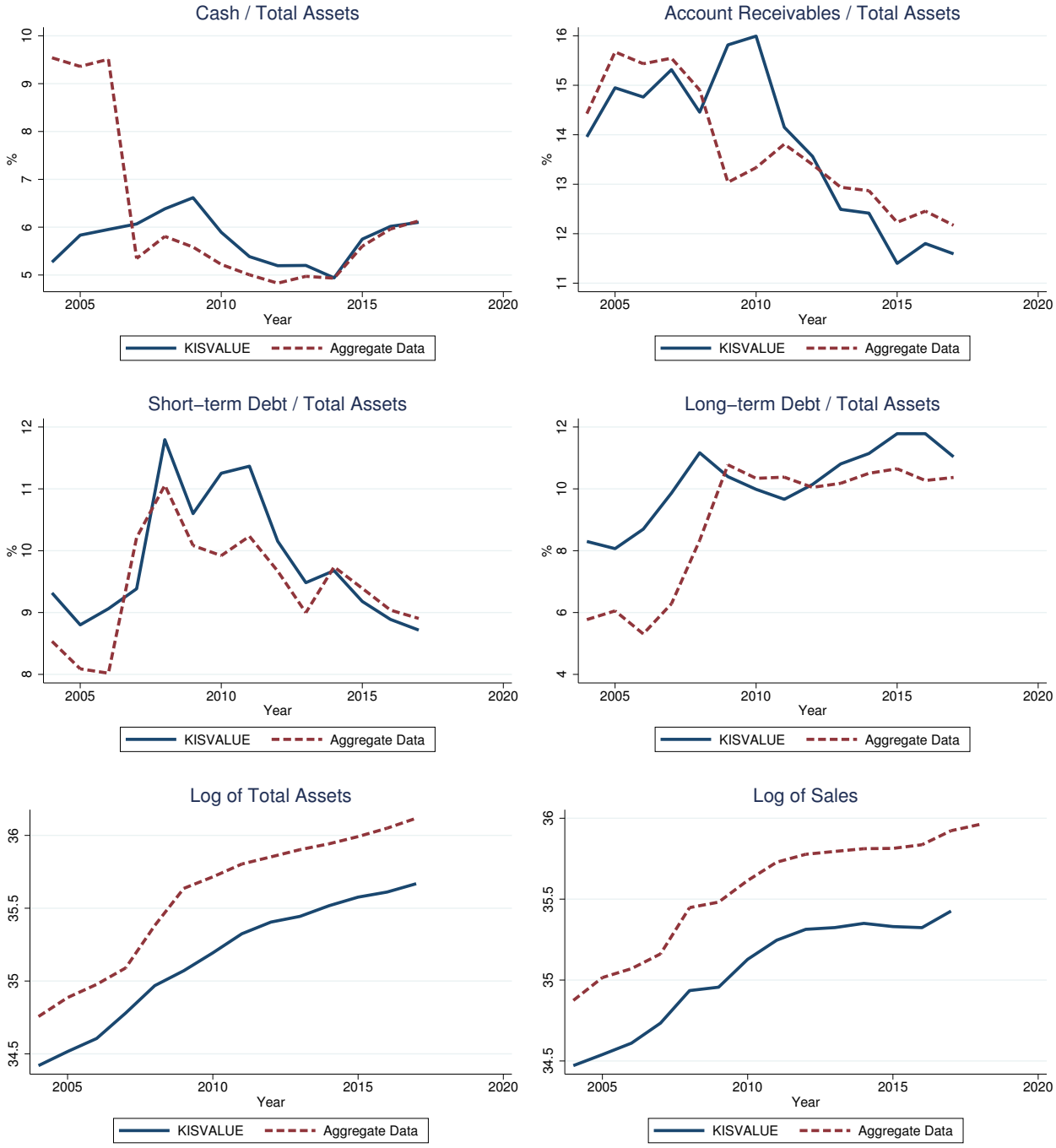
[9] The data of number of workers employed in all sectors excluding the financial sector are from the Survey of Business Activities, the Bank of Korea. The survey is for all the firms with employees greater than equal to one, i.e. the self-employeed workers are also included.

[10] Non-business holding companies and special purpose enterprises (SPC, PFV) are excluded as well.

[11] The Bank of Korea does not provide the currency split of the aggregate short-term and long-term borrowing; therefore, the aggregate short-term and long-term debt include both local-currency and foreign-currency borrowing.

assets, our dataset covers around 56.8 – 73.4 % of the aggregate total assets.[12]

Figure 1: Firm-level data and aggregate data



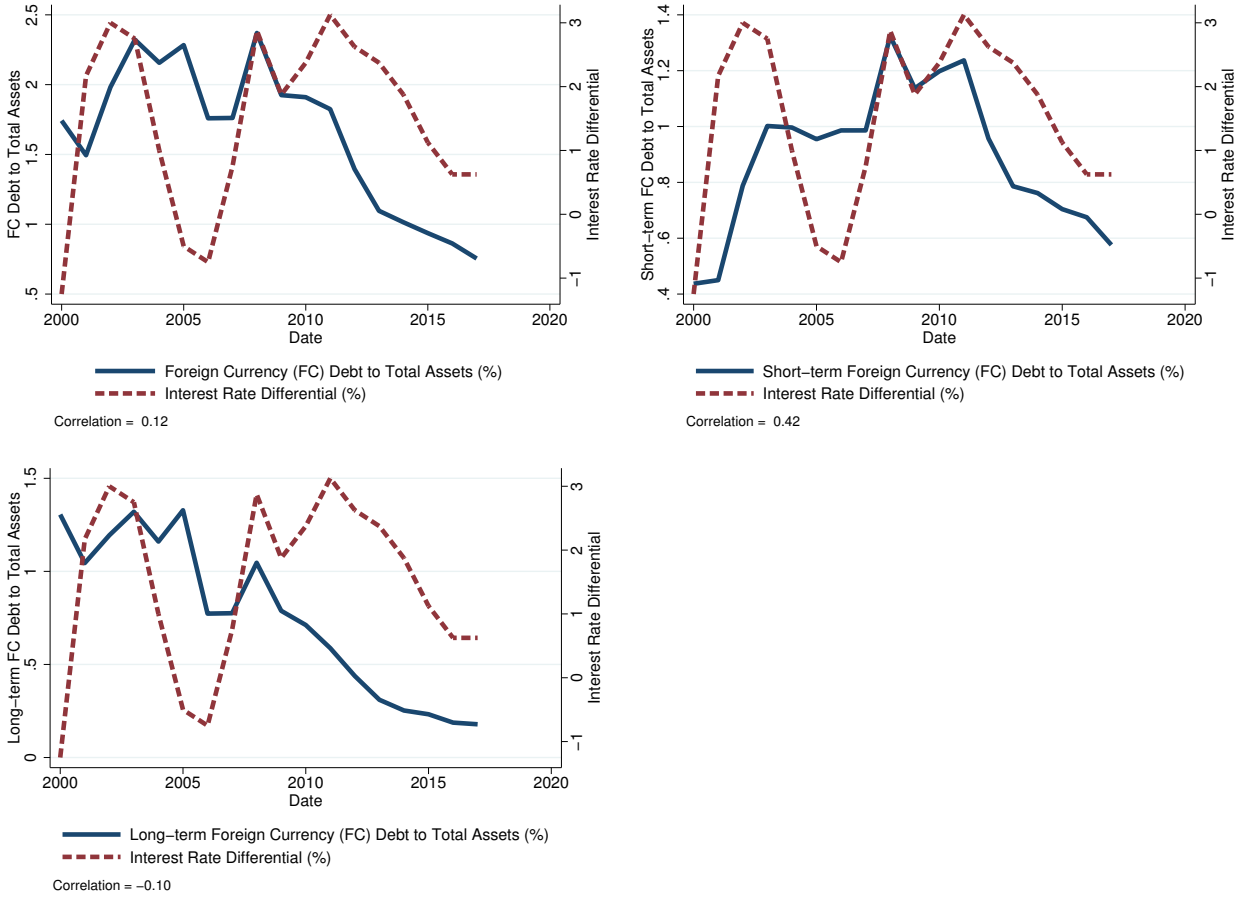
Source: Aggregate data are from Bank of Korea Financial Statement Analysis Data. KISVALUE data are the total sum of all firms in the KISVALUE dataset.

Figure 2 shows some suggestive evidence of carry trade activities in the aggregate level. We see that firms borrow more in foreign currency when the interest rate differential between Korea

[12]The coverage ratio is reported in the Appendix A. Summary statistics are reported in Appendix B.

and the US increases i.e., when the carry trade is more favorable. The correlation between foreign currency debt to total assets and the interest rate differential is 0.12 and higher for short-term foreign currency debt at 0.42. We do not see the same pattern for the issuance of long-term foreign currency debt, where the correlation is negative at -0.1.

Figure 2: Interest Rate Differential and Foreign Currency Corporate Debt



Notes: All the balance sheet data are aggregated from the Korean firm-level data in KISVALUE. All ratios are multiplied by 100. Interest rate differential is the money market rate in Korea minus that in the United States. The money market rates are from the IMF dataset.

The KISVALUE dataset can not only explain the aggregate dynamics of key variables, but it also has a number of other advantages over other datasets typically used in the literature. First, as aforementioned, the dataset includes the detailed information on the currency composition of items in the assets and liabilities on the balance sheet. Secondly, it contains information about the maturity of debt along with the currency composition. Lastly, the dataset contains non-listed small and medium-sized firms. The very fact that our dataset includes smaller non-listed firms allows us to investigate the heterogeneous incentives of issuing foreign currency debt across sectors, where some of those sectors are populated by smaller firms. Key firm-level variables that we employ are: short-term and long-term debt and liquid assets – cash, short-term financial instruments and accounts receivable – in local and foreign currency. These variables allow us to disentangle

different incentives when issuing LC vs. FC debt and short-term vs. long-term debt. We also employ the investment and dividend payout variables to test if the "borrow to invest" channel is relevant for firms' borrowings.

3 Baseline regression analysis

Section 3 presents empirical results analyzing how debt issuance in different currencies at different maturities is associated with liquid assets in different currencies. We find a strong evidence for precautionary saving when firms borrow in foreign currency. Moreover, firms who borrow in foreign currency at short-term maturity seem to engage in "carry trades". We also examine the heterogeneity of those two motives across time and sectors to assess its impact on the macroeconomic stability.

It is useful to review an accounting relationship before our regression analysis. We follow Kim and Weisbach (2008) and Bruno and Shin (2017) to define the total sources of funds for a firm to be the sum of funds from operations, sale of property, plant, and equipment, debt issuance, and sale of common and preferred stock. The total sources of funds include everything from both internal cash flows from operations and external financing. We can then separate out the variables of our interest, the debt in different currencies and different maturities from the total sources of funds.

For each firm i at time t:

$$\text{Total Sources of Fund}_{i,t} = LT\ FCdebt_{i,t} + LT\ LCdebt_{i,t} + ST\ FCdebt_{i,t} + ST\ LCdebt_{i,t} + OS_{i,t}$$

where $OS_{i,t}$ is the total cashflow from other sources (excluding those from debt financing). Our main interest in the analysis is how much different types of liquid assets may change when there is one unit of cash inflow from debt issuance, holding the cashflow from other sources constant. That is, we explore the equilibrium empirical relationships between liquid assets in different currencies, and debt issuance in different currencies and at different maturities.

We now turn to the baseline regression analysis to understand how debt issuance is associated with changes in liquid asset holdings. The regression specification looks at how liquid assets change when there is an increase debt in different currencies and at different maturities, controlling for cashflow from other sources and firm size. All the regressions in the main text are restricted to sample with net positive issuance ($debt_t > debt_{t-1}$) firm-year so we can confirm there is a debt issuance.[13] We estimate the following regression:

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

where $y_{i,t}$ is a measure of liquid assets: cash holdings (Cash), short-term financial instruments

[13] None of the results are driven by these. In the Appendix C, we show that all the results carryover if we relax this restriction and include all sample period for all firms.

(Short-term FI), and accounts receivable (AR) in foreign currency (FC) and in local currency (LC), respectively (six variables in total, three in LC, three in FC). We consider cash holdings and short-term financial instruments as these are the liquid assets that should change if there is a carry trade activity, and they are the variables of interest in the literature.[14] We also consider accounts receivable as Huang et al. (2018) and Hardy and Saffie (2019) argue it captures firms' extension of short-term credit to other firms, acting like inter-firm loans. *LT* and *ST* on the right hand side stand for long-term and short-term debt (e.g. a variable $LT\ FCdebt_{i,t}$ is the long-term foreign currency debt for firm i at time t.) All the variables are normalized by the total assets of the firm at time $t-1$. where α_c, α_t are sector and time fixed effects respectively (193 sectors and 17 years). The regression standard errors are clustered at the sector level. In the dataset, all variables are reported in Korean Won. The year-end exchange rate is employed whenever it is necessary for firms to convert their FC assets or liabilities to Korean Won values, following the accounting reporting standards in Korea.

Pecking order hypothesis. The regression coefficients can be directly interpreted as when there is a one unit increase the debt, it is associated with β won change in $y_{i,t}$. Table 2 reports the coefficient estimates for Equation (1). The first and second row of column (1) show that when local currency debt increases, regardless of their maturities, it is associated with a significant reduction in LC cash in the same year. To be specific, the first coefficient of -0.042 indicates for each unit of Korean Won raised, firms reduce 4.2 cent of Korean won cash holdings on average. This is consistent with the "pecking order" theory of corporate finance, where a firm should draw on internal funds first before borrowing externally. It could possibly be the case where a firm makes a big investment (of amount Z) with limited cash on hand (X) where Z>X and therefore it raises debt debt proceed externally (Y) and $X+Y \geq Z$. It could also be that a firm makes some payments using cash earlier in the year and finds itself lacking liquidity so it issues debt later in the year. The first and second row of columns (2)-(6) show similar patterns for LC short-term financial instruments, LC accounts receivable, FC Cash, FC short-term financial instruments, and FC accounts receivable, respectively. The pattern is in general stronger when there is an increase in long-term LC debt and slightly weaker for short-term LC debt.

Precautionary saving hypothesis. The empirical correlation is different with FC debt. The regression coefficients of FC cash, FC short-term financial instruments, and FC accounts receivable, reported in columns (4) to (6), on LT FC debt (third row) are estimated positive and statistically significant. This pattern is consistent with a precautionary saving hypothesis.[15] A firm raises external funds and saves some of the proceeds either due to the concern about future illiquid states or later use. We do not see the same significant positive coefficients of LC liquid assets in columns (1)-(3) on LT FC debt. In fact, we see significant negative coefficients of LC accounts receivable

[14] Liquid assets are the most focus of this paper. We provide more results for other variables (investment and dividend payouts) in Section 5.

[15] Recent literature emphasizes a precautionary saving or borrow to save behavior. For example, in closed economy setting, Xiao (2020) documents a borrow to save behavior when uncertainity rises in the US. In our sample, we do not see a switch sign in crisis time as in the US. Also, Bianchi et al. (2018) argues precautionary saving can rationalize the sovereign behavior of holding large amount of foreign reserves (liquid assets) when having large external liability in emerging countries.

Table 2: Baseline regressions: association of liquid assets with debt in different currencies and maturities (Equation (1))

	Local Currency Liquid Assets			Foreign Currency Liquid Assets		
	Cash	Short term FI	AR	Cash	Short term FI	AR
	(1)	(2)	(3)	(4)	(5)	(6)
$\frac{LT\ LCdebt_{i,t}}{TA_{i,t-1}}$	-0.042***	-0.039***	-0.107***	-0.009***	-0.001***	-0.019***
	(0.009)	(0.003)	(0.016)	(0.001)	(0.000)	(0.003)
$\frac{ST\ LCdebt_{i,t}}{TA_{i,t-1}}$	-0.071***	-0.044***	-0.031***	-0.007***	-0.001**	0.003
	(0.007)	(0.003)	(0.008)	(0.001)	(0.000)	(0.002)
$\frac{LT\ FCdebt_{i,t}}{TA_{i,t-1}}$	0.008	0.007	-0.067***	0.016**	0.003*	0.026***
	(0.011)	(0.007)	(0.013)	(0.006)	(0.002)	(0.006)
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}}$	0.106***	0.098***	0.033	0.031***	0.004***	0.095***
	(0.012)	(0.008)	(0.020)	(0.005)	(0.001)	(0.015)
$lnTA_{i,t-1}$	-0.015***	-0.005***	-0.025***	0.000	0.000	0.005***
	(0.001)	(0.001)	(0.002)	(0.000)	(0.000)	(0.001)
$\frac{OS_{i,t}}{TA_{i,t-1}}$	0.066***	0.051***	-0.034***	0.005***	0.001***	0.000
	(0.007)	(0.006)	(0.011)	(0.001)	(0.000)	(0.003)
Adjusted R^2	0.101	0.064	0.287	0.049	0.006	0.099
Within R^2	0.050	0.024	0.044	0.012	0.001	0.029
Obs.	145698	145881	144269	145979	145984	145918

Notes: The table show results from annual panel regressions. The sample period is 2001-2017. The dependent variables are the column header (normalized by total assets at $t-1$), which are cash, short term financial instruments, accounts receivable in local currency (LC) and foreign currency (FC). *TA* is total assets and *OS* is the cashflow from other sources. Regression are restricted to firm-year with positive increase in debt level. Regressions without the restriction are reported in the Appendix C. All regressions include sector and year fixed effects. Standard errors in parentheses are clustered at the sector level. * p<0.1, ** p<0.05, *** p<0.01.

on LT FC debt, consistent with the "pecking order" theory that we mentioned above. Note that we do not see the same precautionary saving behavior when raising debt in LC. This empirical pattern indicates that the potential risk that induces the precautionary behavior is likely to be related to the exchange rate risk. We provide more evidence on this linkage with exchange rate risk in Section 4.

Carry trade hypothesis. More interestingly, we find that the coefficients of all six liquid asset types on ST FC debt (fourth row) are all estimated to be positive. It indicates that when a firm raises ST FC debt, it often increases both its LC and FC liquid assets. Unlike the relationship seen between LC debt and liquid assets, this association contradicts the predictions of the "pecking order" theory. While the increase in FC liquid assets is consistent with the precautionary saving motive, the increase in LC liquid assets is consistent with the carry trade motive. Firms borrow in foreign currency and save in local currency to earn the excess return that could arise from the interest rate differential – either covered or uncovered interest parity deviation.[16] Numerically, we observe, for each unit of Korean Won the firms raised by issuing ST FC debt, they increase local currency Cash, short term FI and AR items by 10.6 cents, 9.8 cents and 3.3 cents on average, respectively. Note that the increase of 10.6 cents for cash is the largest coefficient among all the coefficients, indicating the carry trade effect could be quantitatively large.

To summarize, we find that, consistent with the pecking order story, when firms raise debt in LC, its internal liquid assets go down. On the other hand, firms' liquid asset management varies on the maturity of debt when firms borrow in FC. We see a precautionary saving behavior for both short-term and long-term FC borrowing, which raises FC liquid assets. We additionally find an increase in LC liquid assets when firms raise funds by issuing short-term FC debt, consistent with a carry trade hypothesis.

3.1 Using current portion of long-term debt for identification

We corroborate firms' precautionary saving and engagement in carry trade by looking at the current portion of long-term debt. Accounting-wise, long-term debt can be dissected into long-term debt with more than one year of remaining maturity and the current portion of long-term debt, i.e., the long-term debt issued in the past that is to mature in less than a year. The current portion of long-term debt shares the same remaining maturity as short-term debt, but the decision of the amount of this debt issuance is not made at year t and there are no bond proceeds received at year t. This analysis enables us to differentiate the liquid asset response to liability coming due soon from that of the cash inflows of bond proceeds.[17]

In Table 3, we separate the LT FC debt in Table 2 into long-term debt (maturity>1 year) and the current portion of long-term debt (maturity$\leq$1 year). The increase in the current portion of LT FC debt behaves similar to that of ST FC debt: when it increases, we see higher levels of FC liquid assets (columns 4-6). Therefore, the increase in FC liquid assets is not purely a mechanical increase due to new bond proceed from debt issuance. It is in response to imminent repayment due in the

[16] See Salomao and Varela (2018) and Liao (2020) for empirical evidence of firms capital structure responses to uncovered interest parity deviation and covered interest parity deviation.

[17] For example, an increase in ST FC debt has the same increase in liquid FC liability with an increase in current portion of FC long-term debt, but there is no increase in assets for the latter because there are no bond proceeds.

near future.

When looking at the regressions of LC liquid assets in columns (1)-(3) on the current portion of FC long term debt, the coefficients are not positive as we have seen that on ST FC debt. In fact, the coefficient of LC cash on the current portion LT FC debt is negative and those of LC short term financial instruments and LC accounts receivable on the current portion of LT FC debt is negative and statistically significant. It implies that an increase in liability that is maturing in the near future without new bond proceeds does not come with increase in LC liquid assets. This result indicates that increase in LC liquid assets could be driven by shifting some of the new FC bond proceeds to LC liquid assets, related to a carry trade behavior, rather than merely capturing some mechanical increase in liquid assets due to an increase in liability that is due soon.

To sum up, from the empirical correlations that we document between liquid assets and the current portion of long-term FC debt, we can confirm that the accumulation of FC liquid assets is related to saving for the repayment of FC debt approaching its maturity, and the accumulation of LC liquid assets is related to an usage of actual FC debt proceeds.

Table 3: Identification using current portion of long term debt

	Local Currency Liquid Assets			Foreign Currency Liquid Assets		
	Cash	Short term FI	AR	Cash	Short term FI	AR
	(1)	(2)	(3)	(4)	(5)	(6)
$\frac{LT\ LCdebt_{i,t}}{TA_{i,t-1}}$	-0.042***	-0.040***	-0.109***	-0.009***	-0.001***	-0.019***
	(0.009)	(0.003)	(0.016)	(0.001)	(0.000)	(0.003)
$\frac{ST\ LCdebt_{i,t}}{TA_{i,t-1}}$	-0.071***	-0.044***	-0.031***	-0.007***	-0.001**	0.003
	(0.007)	(0.003)	(0.008)	(0.001)	(0.000)	(0.002)
$\frac{LT\ FCdebt_{i,t}}{TA_{i,t-1}}$	0.012	0.019***	-0.035**	0.016**	0.004*	0.027***
	(0.012)	(0.007)	(0.015)	(0.006)	(0.002)	(0.006)
$\frac{\text{current portion } FCdebt_{i,t}}{TA_{i,t-1}}$	-0.007	-0.045***	-0.193***	0.016*	-0.000	0.025**
	(0.020)	(0.013)	(0.031)	(0.008)	(0.001)	(0.012)
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}}$	0.106***	0.098***	0.033	0.031***	0.004***	0.095***
	(0.012)	(0.008)	(0.020)	(0.005)	(0.001)	(0.015)
$lnTA_{i,t-1}$	-0.015***	-0.005***	-0.025***	0.000	0.000	0.005***
	(0.001)	(0.001)	(0.002)	(0.000)	(0.000)	(0.001)
$\frac{OS_{i,t}}{TA_{i,t-1}}$	0.066***	0.051***	-0.034***	0.005***	0.001***	0.000
	(0.007)	(0.006)	(0.011)	(0.001)	(0.000)	(0.003)
Adjusted R^2	0.101	0.064	0.287	0.049	0.006	0.099
Within R^2	0.050	0.024	0.044	0.012	0.001	0.029
Obs.	145740	145923	144310	146021	146026	145960

Notes: The table show results from annual panel regressions. The sample period is 2001-2017. The dependent variables are the column header (normalized by total assets at $t-1$), which are cash, short term financial instruments, accounts receivable in local currency (LC) and foreign currency (FC). *TA* is total assets and *OS* is the cashflow from other sources. Regression are restricted to firm-year with positive increase in debt level. Regressions without the restriction are reported in the Appendix C. All regressions include sector and year fixed effects. Standard errors in parentheses are clustered at the sector level. * p<0.1, ** p<0.05, *** p<0.01.

3.2 Pre and post 2008

The Global Financial Crisis (GFC) in 2008 resulted in a rise in volatility, a very low world interest rate environment, and disruptions in financial markets. Recent literature raises the concern of non-financial carry trade in the post GFC period.[18] In this section, we split the sample to pre- and post-2008 and see if there is a systematic change before and after the crisis. In Table 4, we conduct the same regression as in Equation (1) but we allow for different coefficients for the debt variables pre- and post-2008.[19] By and large, all the empirical findings documented in the section above are present in both pre- and post-2008 period. All the coefficients of liquid assets on LC debt are estimated to be negative, except for pre-2008 correlation of FC accounts receivable and ST LC debt, albeit not significant at 5% level. For foreign currency debt, the coefficient of LC accounts receivable on ST FC debt and that of FC short-term financial instruments on LT FC debt in pre-2008 are insignificant but positive signs are the same as the post-2008 coefficient.

Overall, we observe consistent patterns both pre- and post-2008: an increase in LC debt is associated with lower liquid assets, an increase in ST FC debt is associated with higher liquid assets, and an increase LT FC debt is associated with higher FC liquid assets and lower LC liquid assets. The pattern is slightly stronger in the post-2008 sample.

[18] See Caballero et al. (2016) and Bruno and Shin (2017).

[19] Year 2008 is included in the pre-2008 period.

Table 4: Split sample regressions: pre- and post-2008

	Local Currency Liquid Assets			Foreign Currency Liquid Assets		
	Cash	Short term FI	AR	Cash	Short term FI	AR
	(1)	(2)	(3)	(4)	(5)	(6)
$\frac{LT\ LCdebt_{i,t}}{TA_{i,t-1}}\ pre2008$	-0.036***	-0.031***	-0.106***	-0.005***	-0.001***	-0.016***
	(0.006)	(0.003)	(0.014)	(0.001)	(0.000)	(0.003)
$\frac{LT\ LCdebt_{i,t}}{TA_{i,t-1}}\ post2008$	-0.046***	-0.043***	-0.109***	-0.010***	-0.001***	-0.020***
	(0.011)	(0.004)	(0.018)	(0.002)	(0.000)	(0.004)
$\frac{ST\ LCdebt_{i,t}}{TA_{i,t-1}}\ pre2008$	-0.060***	-0.029***	-0.008	-0.003***	-0.001**	0.002
	(0.006)	(0.004)	(0.011)	(0.001)	(0.000)	(0.003)
$\frac{ST\ LCdebt_{i,t}}{TA_{i,t-1}}\ post2008$	-0.078***	-0.054***	-0.045***	-0.009***	-0.001**	0.004*
	(0.009)	(0.005)	(0.009)	(0.002)	(0.000)	(0.003)
$\frac{LT\ FCdebt_{i,t}}{TA_{i,t-1}}\ pre2008$	0.007	0.011	-0.056***	0.010***	0.002	0.026***
	(0.011)	(0.009)	(0.014)	(0.004)	(0.002)	(0.006)
$\frac{LT\ FCdebt_{i,t}}{TA_{i,t-1}}\ post2008$	0.006	-0.003	-0.082***	0.024**	0.005**	0.025***
	(0.012)	(0.008)	(0.020)	(0.010)	(0.002)	(0.007)
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}}\ pre2008$	0.114***	0.076***	0.017	0.025***	0.005***	0.080***
	(0.015)	(0.010)	(0.023)	(0.007)	(0.002)	(0.013)
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}}\ post2008$	0.100***	0.113***	0.043*	0.035***	0.004**	0.105***
	(0.012)	(0.011)	(0.023)	(0.005)	(0.002)	(0.020)
$lnTA_{i,t-1}$	-0.015***	-0.005***	-0.025***	0.000	0.000	0.005***
	(0.001)	(0.001)	(0.002)	(0.000)	(0.000)	(0.001)
$\frac{OS_{i,t}}{TA_{i,t-1}}$	0.067***	0.052***	-0.032***	0.006***	0.001***	-0.000
	(0.007)	(0.006)	(0.011)	(0.001)	(0.000)	(0.003)
Adjusted R^2	0.101	0.065	0.287	0.051	0.006	0.099
Within R^2	0.050	0.025	0.045	0.013	0.001	0.030
Obs.	145740	145923	144310	146021	146026	145960

Notes: The table show results from annual panel regressions. The sample period is 2001-2017. The dependent variables are the column header (normalized by total assets at $t-1$), which are cash, short term financial instruments, accounts receivable in local currency (LC) and foreign currency (FC). *TA* is total assets and *OS* is the cashflow from other sources. Regression are restricted to firm-year with positive increase in debt level. Regressions without the restriction are reported in the Appendix C. All regressions include sector and year fixed effects. Standard errors in parentheses are clustered at the sector level. * p<0.1, ** p<0.05, *** p<0.01.

4 Incentives of carry trade and precautionary saving

4.1 Incentives across time

In this section, we investigate the incentives of carry trade and precautionary saving across time. In particular, we consider two modifications from the baseline regression.

For the regressions of LC liquid assets as dependent variables, to further investigate the carry trade behavior, we add an interaction term of short term FC debt and the money market interest rate differential between Korea and the US:

$$\begin{aligned}\frac{y_{i,t}}{TA_{i,t-1}} = \quad & \beta^{LTFC}\frac{LT\ FCdebt_{i,t}}{TA_{i,t-1}} + \beta^{LTLC}\frac{LT\ LCdebt_{i,t}}{TA_{i,t-1}} \\ & + \beta^{STFC}\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}} + \beta^{STLC}\frac{ST\ LCdebt_{i,t}}{TA_{i,t-1}} \\ & + \gamma_1\frac{OS_{i,t}}{TA_{i,t-1}} + \gamma_2 lnTA_{i,t-1} + \alpha + \alpha_c + \alpha_t + \varepsilon_{i,t} \\ & + \delta_1\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}} \times (i_t^{KRW} - i_t^{USD})\end{aligned} \tag{2}$$

where i_t^{KRW} and i_t^{USD} are the money market rate of Korea and the US respectively.

For the regressions of FC liquid assets as dependent variables, to further investigate the precautionary saving behavior, we add an interaction term of FC debt and exchange rate volatility measures

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

where $3mFXvol_t$ and $1yFXvol_t$ are implied volatility imputed from 3m and 1y at-the-money exchange rate options.

To be clear, the first three lines of Equations (2) and (3) are the same as Equation (1), and we just add interaction terms with $(i_t^{KRW} - i_t^{USD} \equiv i_t^{diff})$ or $(FXvol_t)$. We investigate whether an increase in the interest rate differential and an increase in exchange rate volatility could lead to changes in the correlation between FC liability and liquid assets, strengthening or weakening firms' carry trade and precautionary saving motives. We conjecture that holding everything else constant, an increase in interest rate differential increases the ex-ante carry trade profits and results in a higher holding of LC liquid assets ($\delta_1 > 0$ in Equation (2)). Also, an increase in exchange rate volatility increases the precautionary needs and results in a higher holding of FC liquid assets ($\delta_1, \delta_2 > 0$ in Equation (3)).[20]

Table 5 reports the regression results of Equations (2) and (3). For LC liquid assets, consistent with our conjecture, we see positive estimates of the interaction term between ST FC debt and the interest rate differential. When the interest rate differential is high, which indicates a favorable condition for carry trade, a rise in ST FC debt is associated with a significantly higher LC cash and

[20] All these regressions include time fixed effect, therefore the standalone term of $(i_t^{KRW} - i_t^{USD})$ and $(FXvolatility_t)$ are absorbed by the time fixed effect.

LC short term financial instruments. The coefficient of LC accounts receivable on the interaction term is positive but insignificant.

On the other hand, when exchange rate volatility is high, a rise in ST FC debt comes with a significantly higher FC cash and FC short term financial instruments. This is aligned with our predictions that the precautionary motive is higher when exchange rate volatility increases. The coefficient for FC accounts receivable is negative but insignificant.

The coefficients on LT FC debt are mixed. First, the level effect without interaction (fourth row) is positively significant for FC Cash and FC accounts receivable. Second, the interaction with 1 year option implied exchange rate volatility (sixth row) is insignificant for FC cash and FC accounts receivable and the correlation with FC short term financial instruments are significant at 10% level. This indicates for long term debt, the level effect is strong but the increase in exchange rate volatility has a limited incremental effect on the precautionary saving. This is reasonable as long term debt is often less sensitive to short-term fluctuations.

Table 5: Across time heterogeneity: interaction with interest rate differential and exchange rate volatility (Equations (2), (3))

	Local Currency Liquid Assets			Foreign Currency Liquid Assets		
	Cash	Short term FI	AR	Cash	Short term FI	AR
	(1)	(2)	(3)	(4)	(5)	(6)
$\frac{LT\ LCdebt_{i,t}}{TA_{i,t-1}}$	-0.042***	-0.039***	-0.107***	-0.009***	-0.001***	-0.019***
	(0.009)	(0.003)	(0.016)	(0.001)	(0.000)	(0.003)
$\frac{ST\ LCdebt_{i,t}}{TA_{i,t-1}}$	-0.071***	-0.044***	-0.031***	-0.007***	-0.001**	0.003
	(0.007)	(0.003)	(0.008)	(0.001)	(0.000)	(0.002)
$\frac{LT\ FCdebt_{i,t}}{TA_{i,t-1}}$	0.008	0.007	-0.067***	0.017**	0.001	0.041***
	(0.011)	(0.007)	(0.013)	(0.007)	(0.003)	(0.014)
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}}$	0.090***	0.064***	0.029	0.013***	-0.001	0.101***
	(0.012)	(0.008)	(0.025)	(0.004)	(0.003)	(0.021)
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}} \times i_t^{diff}$	0.009**	0.019***	0.002			
	(0.004)	(0.004)	(0.006)			
$\frac{LT\ FCdebt_{i,t}}{TA_{i,t-1}} \times (1yFXvol_t)$				-0.0000	0.000*	-0.0001
				(0.0001)	(0.000)	(0.0001)
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}} \times (3mFXvol_t)$				0.002***	0.001**	-0.001
				(0.000)	(0.000)	(0.001)
$lnTA_{i,t-1}$	-0.015***	-0.005***	-0.025***	0.000	0.000	0.005***
	(0.001)	(0.001)	(0.002)	(0.000)	(0.000)	(0.001)
$\frac{OS_{i,t}}{TA_{i,t-1}}$	0.066***	0.051***	-0.034***	0.005***	0.001***	0.000
	(0.007)	(0.006)	(0.011)	(0.001)	(0.000)	(0.003)
Adjusted R^2	0.101	0.064	0.287	0.050	0.006	0.099
Within R^2	0.050	0.024	0.044	0.012	0.002	0.029
Obs.	145740	145923	144310	146021	146026	145960

Notes: The table show results from annual panel regressions. The sample period is 2001-2017. The dependent variables are the column header (normalized by total assets at $t-1$), which are cash, short term financial instruments, accounts receivable in local currency (LC) and foreign currency (FC). $i_t^{diff} = i_t^{KRW} - i_t^{USD}$ is the money market interest rate differential. $1yFXvol$ and $3mFXvol$ are the implied volatility imputed from at-the-money exchange rate options. *TA* is total assets and *OS* is the cashflow from other sources. Regression are restricted to firm-year with positive increase in debt level. Regressions without the restriction are reported in the Appendix C. All regressions include sector and year fixed effects. Standard errors in parentheses are clustered at the sector level. * p<0.1, ** p<0.05, *** p<0.01.

4.2 Sectoral heterogeneity

We would like to investigate further and see if different sectors exhibit different degrees of carry trade and precautionary saving when borrowing in FC. This sectoral analysis is important to identify sectoral characteristics that engage more in carry trades and precautionary saving, and this understanding would be critical to assess the consequence of FC borrowing to the macroeconomic stability. For instance, if a service sector, whose business operations are mainly domestic, engage more in carry trades, then it could be a destabilizing factor for the macroeconomy upon a large depreciation shock. In this subsection, we focus on two types of sectoral heterogeneity: financial dependence and tradability. We find that sectors with higher financial dependence and higher export exposure engage more in both carry trade and precautionary saving.

We first focus on financial dependence. We measure external financial dependence as in the seminal work by Rajan and Zingales (1998). The external financial dependence of a firm i is calculated as

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

$FinDep_i$ captures the long-term shortfall in financing a firm i's investment needs with internal funds. We then take the median of firms' Rajan and Zingales (1998) measuresin a sector and constructs a financial dependence measure for each sector c, $FinDep_c$. It is meant to capture a long-run sectoral characteristic.[21]

We then modify Equation (1) with the interaction term of ST FC debt and$FinDep_c$:[22]

$$\begin{aligned} \frac{y_{i,t}}{TA_{i,t-1}} = \quad & \beta^{LTFC}\frac{LT\ FCdebt_{i,t}}{TA_{i,t-1}} + \beta^{LTLC}\frac{LT\ LCdebt_{i,t}}{TA_{i,t-1}} \\ & + \beta^{STFC}\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}} + \beta^{STLC}\frac{ST\ LCdebt_{i,t}}{TA_{i,t-1}} \\ & + \gamma_1\frac{OS_{i,t}}{TA_{i,t-1}} + \gamma_2 lnTA_{i,t-1} + \alpha + \alpha_c + \alpha_t + \varepsilon_{i,t} \\ & + \delta_1\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}} \times FinDep_c \end{aligned} \tag{4}$$

The regression results are reported in Table 6. The interaction term (δ_1 in Equation (4) is the one we are interested in. From columns (1)-(3), we see that firms in a higher financial dependence sector are on average hold higher LC liquid assets when borrowing in ST FC debt. The coefficient of cash on the interaction term is estimated to be positive and significant. This positive relationship provides evidence that firms in a higher financial dependence sector are more active in carry trade activities.

On the other hand, we also see, in columns (4)-(6), firms in a financial dependent sector hold more FC liquid assets, when borrowing in short-term FC debt. For the short term FC debt, two of

[21] The top 5 sectors with the highest financial dependence are: (i) extraction of crude petroleum and natural gas; (ii) heavy construction; (iii) amusement and theme park operation; (iv) research and experimental development on natural sciences and engineering; and (v) fishing and gathering of marine materials.

[22] The standalone effect of $FinDep_c$ is absorbed by fixed effects.

Table 6: Sectoral heterogeneity in financial dependence, Equation (4)

	Local Currency Liquid Assets			Foreign Currency Liquid Assets		
	Cash	Short term FI	AR	Cash	Short term FI	AR
	(1)	(2)	(3)	(4)	(5)	(6)
$\frac{LT\ LCdebt_{i,t}}{TA_{i,t-1}}$	-0.042***	-0.039***	-0.107***	-0.009***	-0.001***	-0.019***
	(0.009)	(0.003)	(0.016)	(0.001)	(0.000)	(0.003)
$\frac{ST\ LCdebt_{i,t}}{TA_{i,t-1}}$	-0.071***	-0.044***	-0.031***	-0.007***	-0.001**	0.003
	(0.007)	(0.003)	(0.008)	(0.001)	(0.000)	(0.002)
$\frac{LT\ FCdebt_{i,t}}{TA_{i,t-1}}$	0.008	0.007	-0.067***	0.016**	0.003*	0.026***
	(0.011)	(0.007)	(0.013)	(0.006)	(0.002)	(0.006)
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}}$	-0.025	0.064	-0.028	-0.000	-0.001	0.077
	(0.035)	(0.051)	(0.060)	(0.011)	(0.002)	(0.065)
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}} \times FinDep_c$	0.133***	0.035	0.062	0.031**	0.006**	0.018
	(0.037)	(0.052)	(0.063)	(0.012)	(0.002)	(0.066)
$lnTA_{i,t-1}$	-0.015***	-0.005***	-0.025***	0.000	0.000	0.005***
	(0.001)	(0.001)	(0.002)	(0.000)	(0.000)	(0.001)
$\frac{OS_{i,t}}{TA_{i,t-1}}$	0.066***	0.051***	-0.034***	0.005***	0.001***	0.000
	(0.007)	(0.006)	(0.011)	(0.001)	(0.000)	(0.003)
Adjusted R^2	0.101	0.064	0.287	0.050	0.006	0.099
Within R^2	0.050	0.024	0.044	0.012	0.001	0.029
Obs.	145740	145923	144310	146021	146026	145960

Notes: The table show results from annual panel regressions. The sample period is 2001-2017. The dependent variables are the column header (normalized by total assets at $t-1$), which are cash, short term financial instruments, accounts receivable in local currency (LC) and foreign currency (FC). $FinDep_c$ is sectoral financial dependence ratio constructed as in Rajan and Zingales (1998). *TA* is total assets and *OS* is the cashflow from other sources. Regression are restricted to firm-year with positive increase in debt level. Regressions without the restriction are reported in the Appendix C. All regressions include sector and year fixed effects. Standard errors in parentheses are clustered at the sector level. * p<0.1, ** p<0.05, *** p<0.01.

the three coefficients on $\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}} \times FinDep_c$ are estimated to be positive and significant. However, the size of the coefficient of FC cash is four times smaller than that of LC cash, hinting us that firms in a financial dependent sector on average exposes its balance sheets to higher exchange rate risk and actively participate in carry trades.

Next, we investigate if and how different trade exposure across sectors affects their carry trades and precautionary saving when borrowing in ST FC debt.[23] We construct a sectoral measure of trade exposure using the sectoral input-output matrix information from the Bank of Korea.[24] For each sector c, we take the sum across years of total sector export and total sector import. We then divide these terms by the sum across years total sector output to get the export share of output and import share of output for each sector, capturing a long-run trade exposure of each sector:

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

We then modified Equation (1) with the interaction terms of FC ST debt and $ExportShare_c$, and FC ST debt and $ImportShare_c$:[25]

The regression results are reported in Table 7. The coefficients on the interaction terms, λ_1 and λ_2 in Equation (5) are the ones we are interested in. In columns (1)-(3) of Table 7, we see that firms in a sector with a higher export share are likely to have higher LC liquid assets when borrowing in ST FC debt. The coefficient of LC accounts receivable on the interaction term is estimated to be positive and significant. This relationship supports that firms in sectors more reliant on export sales are more active in carry trade.[26] It is interesting to see that the carry trade is conducted via extending account receivables, acting like an inter-firm loan as None of the coefficients on the interaction term with an import share are significant.

$$\begin{aligned} \frac{y_{i,t}}{TA_{i,t-1}} = \quad & \beta^{LTFC} \frac{LT\ FCdebt_{i,t}}{TA_{i,t-1}} + \beta^{LTLC} \frac{LT\ LCdebt_{i,t}}{TA_{i,t-1}} \\ & + \beta^{STFC} \frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}} + \beta^{STLC} \frac{ST\ LCdebt_{i,t}}{TA_{i,t-1}} \\ & + \gamma_1 \frac{OS_{i,t}}{TA_{i,t-1}} + \gamma_2 lnTA_{i,t-1} + \alpha + \alpha_c + \alpha_t + \varepsilon_{i,t} \\ & + \lambda_1 \frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}} \times ExportShare_c \\ & + \lambda_2 \frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}} \times ImportShare_c \end{aligned} \tag{5}$$

On the other hand, we also see for columns (4)-(6) of Table 7, there are some positive coefficients estimated for λ_1 and λ_2, supporting higher precautionary saving when the firm is in an exporting sector and borrows in FC short-term debt. In columns (4) and (6), we observe an in-

[23] Recent paper by Jiao et al. (2021) uses the same dataset and explores the role of natural hedging on the determination of debt currency denomination.

[24] Sector classification in the input-output matrix is different from the sector classification in the KISVALUE dataset. We match the sector by hand and the matching is reported in the Appendix E.

[25] The standalone effects are absorbed by fixed effects.

[26] The sectors with the highest export share are: (i) air transport; (ii) water transport; (iii) electronic components; (iv) motor vehicles; and (v) electronic motors.

crease in FC cash and FC accounts receivable is higher when firms, in the sectors with high export exposure, borrow in ST FC debt. Again, none of the coefficients on the interaction term with an import share are estimated to be significant.

Overall, we find evidence that both firms in more financial dependent sectors and in more export exposed sectors are more active in carry trade and precautionary saving activities. The two sectoral indices measure different dimensions of heterogeneity and could have different policy implications. For example, carry trade activities of financial dependent sectors could be alarming, but carry trade by exporting sectors could be less concerning due to the natural hedging from their exporting revenue.

Table 7: Sectoral heterogeneity in export and import share, Equation (5)

	Local Currency Liquid Assets			Foreign Currency Liquid Assets		
	Cash	Short term FI	AR	Cash	Short term FI	AR
	(1)	(2)	(3)	(4)	(5)	(6)
$\frac{LT\ LCdebt_{i,t}}{TA_{i,t-1}}$	-0.042***	-0.039***	-0.107***	-0.009***	-0.001***	-0.019***
	(0.009)	(0.003)	(0.016)	(0.001)	(0.000)	(0.003)
$\frac{ST\ LCdebt_{i,t}}{TA_{i,t-1}}$	-0.071***	-0.044***	-0.031***	-0.007***	-0.001**	0.003
	(0.007)	(0.003)	(0.008)	(0.001)	(0.000)	(0.002)
$\frac{LT\ FCdebt_{i,t}}{TA_{i,t-1}}$	0.008	0.006	-0.068***	0.016**	0.003*	0.025***
	(0.011)	(0.007)	(0.013)	(0.006)	(0.002)	(0.005)
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}}$	0.106***	0.082***	-0.027	0.023**	0.002	0.017
	(0.022)	(0.012)	(0.038)	(0.010)	(0.003)	(0.025)
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}} \times ExportShare_c$	0.094	0.105	0.423***	0.044*	-0.009	0.309***
	(0.069)	(0.095)	(0.133)	(0.023)	(0.014)	(0.095)
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}} \times ImportShare_c$	-0.096	-0.005	-0.036	0.003	0.023	0.193
	(0.068)	(0.059)	(0.190)	(0.049)	(0.016)	(0.171)
$lnTA_{i,t-1}$	-0.015***	-0.005***	-0.025***	0.000	0.000	0.005***
	(0.001)	(0.001)	(0.002)	(0.000)	(0.000)	(0.001)
$(\frac{OS_{i,t}}{TA_{i,t-1}}$	0.066***	0.051***	-0.034***	0.005***	0.001***	0.000
	(0.007)	(0.006)	(0.011)	(0.001)	(0.000)	(0.003)
Adjusted R^2	0.101	0.064	0.287	0.050	0.006	0.101
Within R^2	0.050	0.024	0.044	0.012	0.002	0.032
Obs.	145740	145923	144310	146021	146026	145960

Notes: The table show results from annual panel regressions. The sample period is 2001-2017. The dependent variables are the column header (normalized by total assets at $t-1$), which are cash, short term financial instruments, accounts receivable in local currency (LC) and foreign currency (FC). $ExportShare_c$ and $ImportShare_c$ are sectoral export and import share of output constructed from Bank of Korea data. TA is total assets and OS is the cashflow from other sources. Regression are restricted to firm-year with positive increase in debt level. Regressions without the restriction are reported in the Appendix C. All regressions include sector and year fixed effects. Standard errors in parentheses are clustered at the sector level. * p<0.1, ** p<0.05, *** p<0.01.

5 Other common uses of bond proceeds

In this section, we look at other common uses of bond proceed besides liquid assets, especially investment and dividend payout. We run the same regression as Equation (1) but with $y_{i,t}$ as capital expenditure (CapEx) and dividend payout (normalized by total assets at $t-1$). The regression estimates are reported in Table 8.

In column (1), we see that an increase in debt in general (first three columns) is associated with an increase in investment. The coefficients on LT LC, ST LC, LT FC debt are all estimated to be positive and significant. However, the coefficient on ST FC debt is negative and significant. This result indicates firms raising debt in ST FC are not mainly seeking external funds for investment purposes, reaffirming the carry trade hypothesis.

We also see consistent evidence of a reduction in dividend payout when debt increases, except for ST FC debt. The first three rows are estimated to be negative and significant. These are consistent with the pecking order theory in corporate finance that firms uses internal funds first and then draw on external funds to finance investment projects. The coefficient on ST FC debt is not significant and also positive. The stark difference in the result on ST FC debt again highlights the carry trade motive of ST FC debt issuance.

Table 8: Other uses of bond proceeds

	CapEx	Dividend Payout
	(1)	(2)
$\frac{LT\ LCdebt_{i,t}}{TA_{i,t-1}}$	0.103***	-0.002***
	(0.018)	(0.000)
$\frac{ST\ LCdebt_{i,t}}{TA_{i,t-1}}$	0.055***	-0.002***
	(0.007)	(0.000)
$\frac{LT\ FCdebt_{i,t}}{TA_{i,t-1}}$	0.081***	-0.001**
	(0.019)	(0.000)
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}}$	-0.023***	0.000
	(0.006)	(0.000)
$lnTA_{i,t-1}$	-0.002	0.001***
	(0.002)	(0.000)
$\frac{OS_{i,t}}{TA_{i,t-1}}$	-0.086***	0.003***
	(0.013)	(0.001)
Adjusted R^2	0.088	0.038
Within R^2	0.037	0.018
Obs.	145480	145984

Notes: The table show results from annual panel regressions. The sample period is 2001-2017. The dependent variables are the column header (normalized by total assets at $t-1$), which are capital expenditure (CapEx) and dividend payout. *TA* is total assets and *OS* is the cashflow from other sources. Regression are restricted to firm-year with positive increase in debt level. Regressions without the restriction are reported in the Appendix C. All regressions include sector and year fixed effects. Standard errors in parentheses are clustered at the sector level. * p<0.1, ** p<0.05, *** p<0.01.

6 Longer horizon effect

In this section, we investigate the longer term effect of debt issuance. This analysis helps us to ease the concern that the increase in liquid assets is driven by some mechanical effect that firms have not yet used the debt proceeds for other real purposes.[27] We will see all the previous results go through when we look at the longer horizon correlations. We estimate Equation (1) with a local projection method a la Jordà (2005). To be specific, we estimate the following regression:

$$\begin{aligned}\frac{y_{i,t+h}}{TA_{i,t-1}} = \quad & \beta^{LTFC}\frac{LT\ FCdebt_{i,t}}{TA_{i,t-1}} + \beta^{LTLC}\frac{LT\ LCdebt_{i,t}}{TA_{i,t-1}} \\ & + \beta^{STFC}\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}} + \beta^{STLC}\frac{ST\ LCdebt_{i,t}}{TA_{i,t-1}} \\ & + \gamma_1\frac{OS_{i,t}}{TA_{i,t-1}} + \gamma_2 lnTA_{i,t-1} + \alpha + \alpha_c + \alpha_t + \varepsilon_{i,t}\end{aligned} \tag{6}$$

for $h = 0, 1, 2, 3$. We estimate up to 3 years because we have a sample of 17 years and the typical maturity of a debt contract is roughly 3 years.

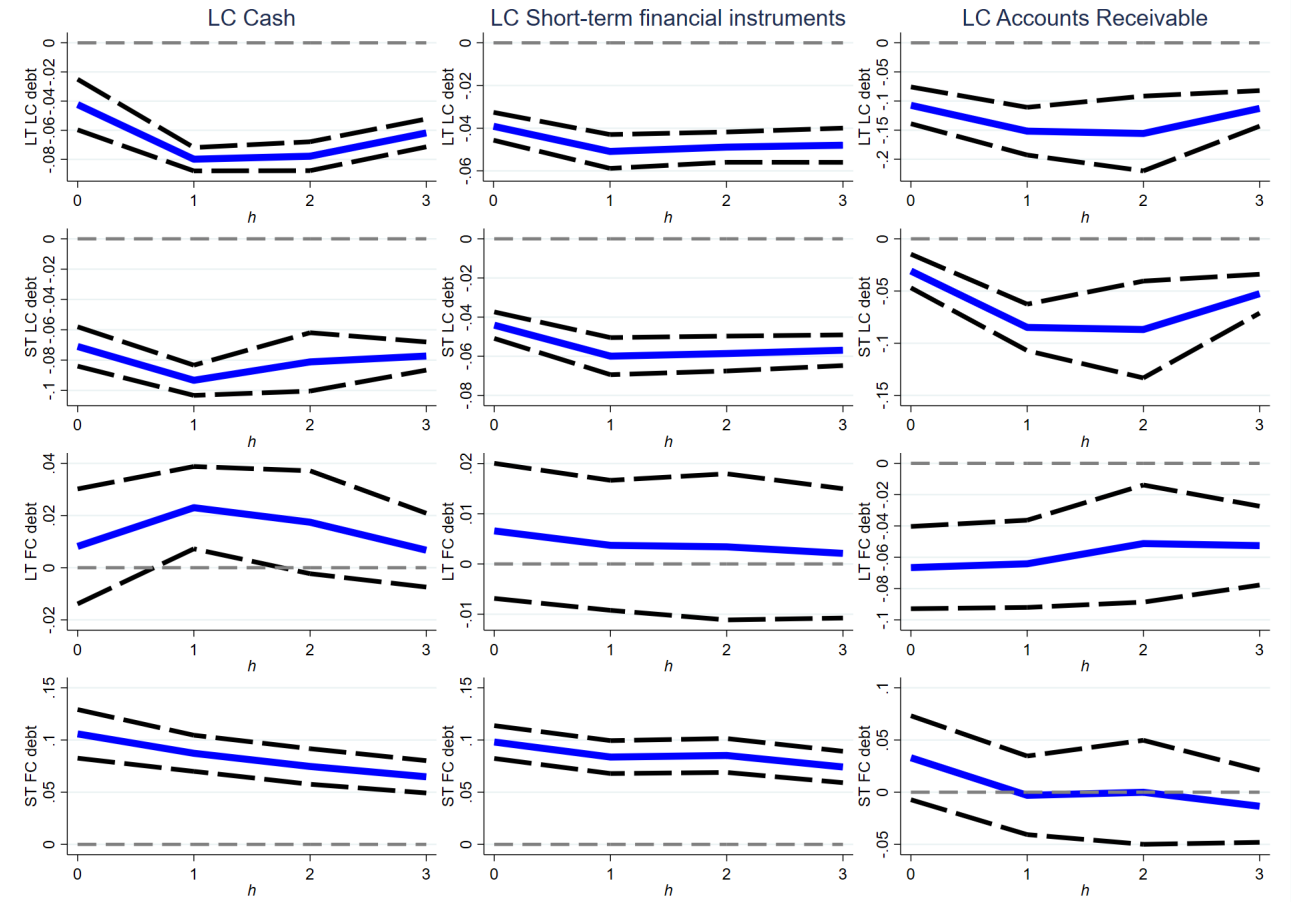
Figures 3 and 4 display the impulse responses when dependent variables are local currency assets and foreign currency assets respectively. For each figure, each of the three columns are considering cash, short-term financial instruments, and accounts receivable as the dependent variable, respectively. Each of the four rows are plotting the impulse responses when the regressors are LT LC debt, ST LC debt, LT FC debt, and ST FC debt, respectively. In all figures, we can see that the sign of the coefficient at $h = 0$ is the same as the coefficients at $h = 1, 2$ and 3. This indicates the association with liquid assets are persistent. For example, there is a long term increase in FC cash when there is an increase in LT FC debt. Therefore, it is unlikely that the increase in FC cash is just a reflection of unused bond proceeds after a debt issuance.

7 Conclusion

With detailed Korean firm-level data, we find a strong evidence that currency and maturity of debt matter for what firms do with their borrowing. While the pecking order theory prediction is aligned with a fall in liquid assets following a local currency debt issuance, we see a stark difference for foreign currency debt issuance. Foreign currency debt issuance especially at short-term exhibits a strong pattern of carry trade and precautionary saving behavior. The carry trade and precautionary saving behavior are the strongest when interest rate differentials and exchange rate volatility are high, respectively. Sectors that are financially dependent or export exposed have a stronger carry trade and precautionary saving behavior. Our analysis provides explicit micro evidence to different hypotheses of use of funds of debt issuance.

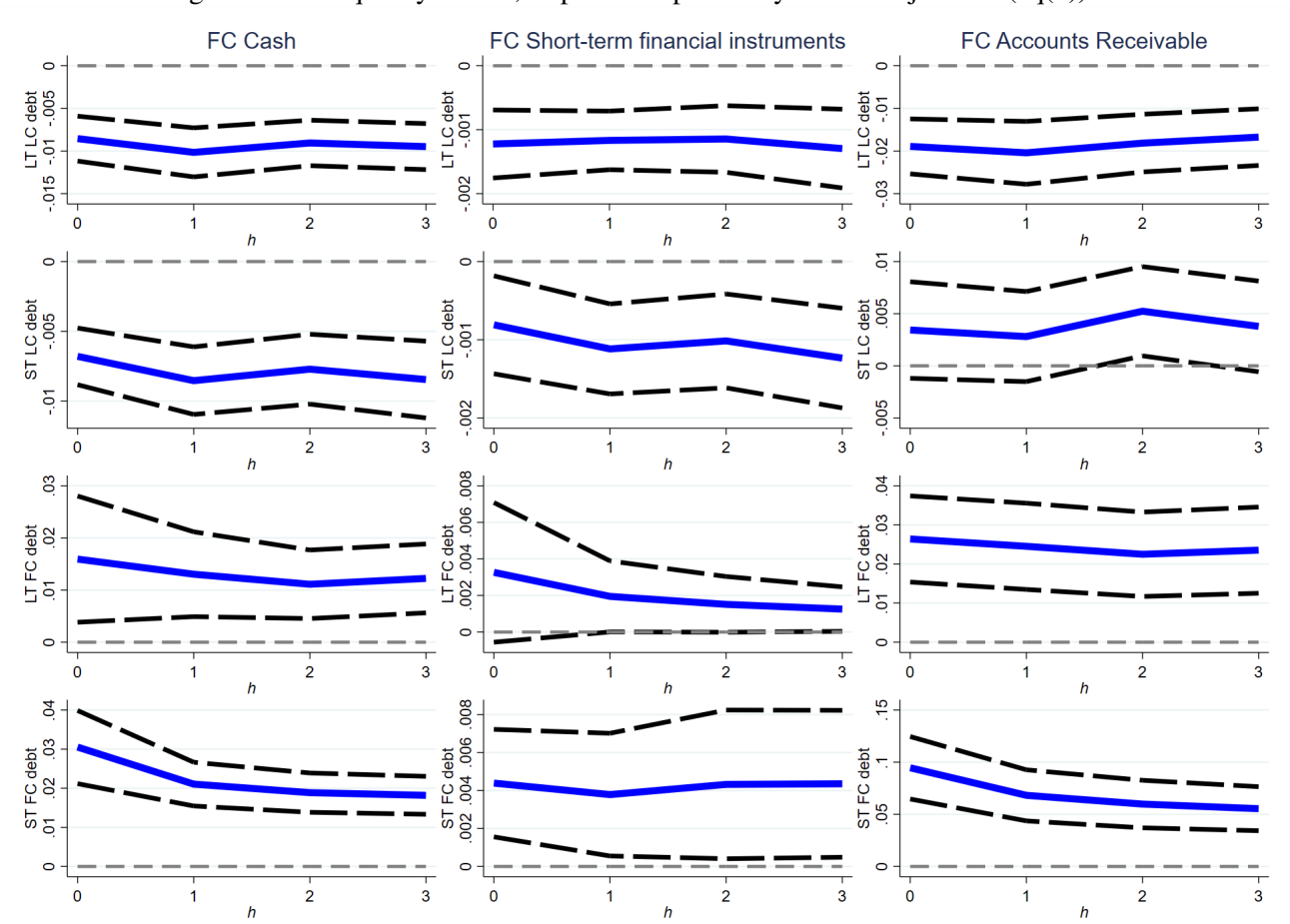
[27] We address the concern due to a mechanical effect driven by the exchange rate in Appendix D.

Figure 3: LC Liquidity Assets, Impulse Responses by Local Projections (eq(6))



Notes: The table show results from annual panel regressions. The sample period is 2001-2017. The dependent variables are the column header (normalized by total assets at $t-1$), which are cash, short term financial instruments, accounts receivable in local currency (LC) and foreign currency (FC). The regression control for lagged log total assets and cashflow from other sources (normalized by total assets at $t-1$). Regression are restricted to firm-year with positive increase in debt level. Regressions without the restriction are reported in the Appendix C. All regressions include sector and year fixed effects. 95% confidence interval from standard errors clustering at sector level are displayed as black dash lines.

Figure 4: FC Liquidity Assets, Impulse Responses by Local Projections (eq(6))



Notes: The table show results from annual panel regressions. The sample period is 2001-2017. The dependent variables are the column header (normalized by total assets at $t-1$), which are cash, short term financial instruments, accounts receivable in local currency (LC) and foreign currency (FC). The regression control for lagged log total assets and cashflow from other sources (normalized by total assets at $t-1$). Regression are restricted to firm-year with positive increase in debt level. Regressions without the restriction are reported in the Appendix C. All regressions include sector and year fixed effects. 95% confidence interval from standard errors clustering at sector level are displayed as black dash lines.

References

Abraham, F., Cortina Lorente, J. J., and Schmukler, S. L. (2020). Growth of global corporate debt: Main facts and policy challenges. *World Bank Policy Research Working Paper*, (9394).

Acharya, V. V. and Vij, S. (2020). Foreign currency borrowing of corporations as carry trades: Evidence from india. Technical report, National Bureau of Economic Research.

Aguiar, M. (2005). Investment, devaluation, and foreign currency exposure: The case of mexico. *Journal of Development Economics*, 78(1):95–113.

Alfaro, L., Asis, G., Chari, A., and Panizza, U. (2017). Lessons unlearned? corporate debt in emerging markets. Technical report, National Bureau of Economic Research.

Alfaro, L., Asis, G., Chari, A., and Panizza, U. (2019). Corporate debt, firm size and financial fragility in emerging markets. *Journal of International Economics*, 118:1–19.

Alfaro, L., Calani, M., and Varela, L. (2021). Currency hedging: Managing cash flow exposure. Technical report, National Bureau of Economic Research.

Allayannis, G., Brown, G. W., and Klapper, L. F. (2003). Capital structure and financial risk: Evidence from foreign debt use in east asia. *Journal of Finance*, 58(6):2667–2710.

Arellano, C., Bai, Y., and Kehoe, P. J. (2019). Financial frictions and fluctuations in volatility. *Journal of Political Economy*, 127(5):2049–2103.

Bates, T. W., Kahle, K. M., and Stulz, R. M. (2009). Why do us firms hold so much more cash than they used to? *Journal of Finance*, 64(5):1985–2021.

Bevilaqua, J., Hale, G. B., and Tallman, E. (2020). Corporate yields and sovereign yields. *Journal of International Economics*, page 103304.

Bianchi, J., Hatchondo, J. C., and Martinez, L. (2018). International reserves and rollover risk. *American Economic Review*, 108(9):2629–70.

Bleakley, H. and Cowan, K. (2008). Corporate dollar debt and depreciations: much ado about nothing? *Review of Economics and Statistics*, 90(4):612–626.

Bruno, V. and Shin, H. S. (2017). Global dollar credit and carry trades: a firm-level analysis. *Review of Financial Studies*, 30(3):703–749.

Burger, J. D., Warnock, F. E., and Warnock, V. C. (2012). Emerging local currency bond markets. *Financial Analysts Journal*, 68(4):73–93.

Caballero, J., Panizza, U., and Powell, A. (2016). The second wave of global liquidity: Why are firms acting like financial intermediaries?

Calomiris, C. W., Larrain, M., Schmukler, S. L., and Williams, T. (2019). Search for yield in large international corporate bonds: Investor behavior and firm responses. Technical report, National Bureau of Economic Research.

Chui, M. K., Kuruc, E., and Turner, P. (2016). A new dimension to currency mismatches in the emerging markets-non-financial companies.

Colacito, R., Qian, Y., and Stathopoulos, A. (2022). Global sales, international currencies and the currency denomination of debt. *International Currencies and the Currency Denomination of Debt (February 1, 2022)*.

Di Giovanni, J., Kalemli-Ozcan, S., Ulu, M. F., and Baskaya, Y. S. (2021). International spillovers and local credit cycles. *Review of Economic Studies*, forthcoming.

Didier, T., Levine, R., Montanes, R. L., and Schmukler, S. L. (2021). Capital market financing and firm growth. *Journal of International Money and Finance*, 118:102459.

Dominguez, K. M. and Tesar, L. L. (2006). Exchange rate exposure. *Journal of International Economics*, 68(1):188–218.

Du, W. and Schreger, J. (2017). Sovereign risk, currency risk, and corporate balance sheets.

Engel, C. (2014). Exchange rates and interest parity. *Handbook of International Economics*, 4:453–522.

Graham, J. R. and Harvey, C. R. (2001). The theory and practice of corporate finance: Evidence from the field. *Journal of Financial Economics*, 60(2-3):187–243.

Hale, G. B., Jones, P. C., and Spiegel, M. M. (2020). Home currency issuance in international bond markets. *Journal of International Economics*, 122:103256.

Hardy, B. (2018). Foreign currency borrowing, balance sheet shocks and real outcomes. *Balance Sheet Shocks and Real Outcomes (November 22, 2018). BIS Working Paper*, (758).

Hardy, B. and Saffie, F. (2019). From carry trades to trade credit: Financial intermediation by nonfinancial corporations.

Huang, Y., Panizza, U., and Portes, R. (2018). Corporate foreign bond issuance and interfirm loans in china. Technical report, National Bureau of Economic Research.

IMF (2015). *Chapter 3. Corporate Leverage in Emerging Markets - a Concern?* International Monetary Fund, USA.

Jiao, Y., Kwon, O., Roh, J.-W., et al. (2021). International trade and the currency composition of corporate debt. Technical report, LeBow College of Business, Drexel University.

Jordà, Ò. (2005). Estimation and inference of impulse responses by local projections. *American Economic Review*, 95(1):161–182.

Kalemli-Ozcan, S., Liu, X., and Shim, I. (2021). Exchange rate fluctuations and firm leverage. *IMF Economic Review*, 69(1):90–121.

Kedia, S. and Mozumdar, A. (2003). Foreign currency–denominated debt: An empirical examination. *Journal of Business*, 76(4):521–546.

Kim, J. and Lee, A. S. (2021). Liability dollarization and exchange rate pass-through. *Available at SSRN 3941940*.

Kim, W. and Weisbach, M. S. (2008). Motivations for public equity offers: An international perspective. *Journal of Financial Economics*, 87(2):281–307.

Kim, Y. J., Tesar, L. L., and Zhang, J. (2015). The impact of foreign liabilities on small firms: Firm-level evidence from the korean crisis. *Journal of International Economics*, 97(2):209–230.

Liao, G. Y. (2020). Credit migration and covered interest rate parity. *Journal of Financial Economics*, 138(2):504–525.

Lustig, H., Roussanov, N., and Verdelhan, A. (2011). Common risk factors in currency markets. *Review of Financial Studies*, 24(11):3731–3777.

Maggiori, M., Neiman, B., and Schreger, J. (2020). International currencies and capital allocation. *Journal of Political Economy*, 128(6):2019–2066.

McCauley, R. N., McGuire, P., and Sushko, V. (2015). Global dollar credit: links to us monetary policy and leverage. *Economic Policy*, 30(82):187–229.

Opler, T., Pinkowitz, L., Stulz, R., and Williamson, R. (1999). The determinants and implications of corporate cash holdings. *Journal of Financial Economics*, 52(1):3–46.

Rajan, R. G. and Zingales, L. (1998). Financial dependence and growth. *American Economic Review*, 88(3):559.

Salomao, J. and Varela, L. (2018). Exchange Rate Exposure and Firm Dynamics. CEPR Discussion Papers 12654, C.E.P.R. Discussion Papers.

Wu, S. P. Y. (2021). Corporate balance sheets and sovereign risk premia. *Available at SSRN 3685278*.

Xiao, J. (2020). Borrowing to save and investment dynamics. *Available at SSRN 3478294*.

Appendix

A Coverage ratio of KISVALUE data

Table 9: Coverage Ratio of KISVALUE Dataset

Coverage Ratio (%)*							Number of firms
Year	Cash	ST Debt	LT Debt	AR	Total Assets	Sales	
2001	No aggregate data available from Bank of Korea						8180
2002	No aggregate data available from Bank of Korea						9688
2003	No aggregate data available from Bank of Korea						10666
2004	39.4	77.9	102.7	69.1	71.4	66.8	11072
2005	43.0	75.1	92.0	65.8	69.0	62.1	11534
2006	43.2	77.9	113.0	66.0	69.0	63.1	12086
2007	83.3	67.4	115.1	72.3	73.4	65.2	12886
2008	72.8	70.6	88.7	64.2	66.2	59.9	13638
2009	67.3	59.7	54.8	68.9	56.8	59.1	14193
2010	67.0	67.3	57.3	71.2	59.3	61.4	15097
2011	66.6	68.8	57.7	63.5	61.9	61.7	16029
2012	68.7	67.1	64.5	64.7	64.0	62.9	17397
2013	66.1	66.66	67.1	61.1	63.2	62.5	18765
2014	65.5	65.0	69.3	63.1	65.4	63.0	19895
2015	67.7	64.5	73.0	61.5	66.0	61.7	20760
2016	65.1	63.4	74.0	61.1	64.5	59.9	22160
2017	63.5	62.4	67.9	60.8	63.8	60.8	22666
Average	62.8	68.1	78.4	65.2	65.3	62.2	15100

*The coverage ratio is defined as the KISVALUE aggregate across firm in a particular year divided by the aggregate data from Bank of Korea in the same year.

B Summary statistics

Table 10: Summary statistics of main firm-level variables

Variable	Mean	Standard deviation	1% tile	Median	99%tile	No. of observation
LC Cash	.085	.124	.000031	.037	.616	256,392
LC Short term FI	.054	.111	0	.008	.561	257,001
LC AR	.198	.193	0	.152	.830	254,518
FC Cash	.007	.034	0	0	.147	257,399
FC Short term FI	.0007	.0121	0	0	.003	257,429
FC AR	.018	.063	0	0	.322	257,332
$\frac{LT\ LCdebt_{i,t}}{TA_{i,t-1}}$	.159	.221	0	.055	.897	256,392
$\frac{ST\ LCdebt_{i,t}}{TA_{i,t-1}}$	.182	.205	0	.116	.846	256,392
$\frac{LT\ FCdebt_{i,t}}{TA_{i,t-1}}$	.007	.045	0	0	.215	256,392
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}}$	.011	.050	0	0	.261	256,392
$TA_{i,t-1}$ (in KRW)	1.11e+11	1.30e+12	8.15e+08	1.90e+10	1.24e+12	256,392
$\frac{OS_{i,t}}{TA_{i,t-1}}$	.012	.096	-.219	0	.318	256,392

C All main text tables with all sample (not only issuance year)

Table 11: Baseline

	Local Currency			Foreign Currency		
	Cash	Short term FI	AR	Cash	Short term FI	AR
	(1)	(2)	(3)	(4)	(5)	(6)
$\frac{LTLCdebt_{i,t}}{TA_{i,t-1}}$	-0.106***	-0.087***	-0.093***	-0.014***	-0.002***	-0.020***
	(0.014)	(0.004)	(0.017)	(0.002)	(0.000)	(0.004)
$\frac{STLCdebt_{i,t}}{TA_{i,t-1}}$	-0.153***	-0.106***	-0.010	-0.014***	-0.001***	0.003
	(0.013)	(0.005)	(0.007)	(0.003)	(0.000)	(0.003)
$\frac{LTFCdebt_{i,t}}{TA_{i,t-1}}$	0.014	0.002	-0.062***	0.018**	0.003*	0.030***
	(0.013)	(0.007)	(0.013)	(0.007)	(0.002)	(0.006)
$\frac{STFCdebt_{i,t}}{TA_{i,t-1}}$	0.104***	0.107***	0.040**	0.028***	0.005***	0.101***
	(0.015)	(0.009)	(0.020)	(0.004)	(0.002)	(0.016)
$lnTA_{i,t-1}$	-0.015***	-0.004***	-0.016***	0.000	0.000*	0.004***
	(0.001)	(0.001)	(0.002)	(0.000)	(0.000)	(0.001)
$\frac{OS_{i,t}}{TA_{i,t-1}}$	0.073***	0.046***	-0.020***	0.006***	0.000	0.003
	(0.007)	(0.005)	(0.006)	(0.001)	(0.000)	(0.002)
Adjusted R2	0.184	0.099	0.322	0.061	0.007	0.108
Within R2	0.103	0.054	0.035	0.014	0.001	0.027
N	256331	256958	254479	257365	257396	257299

Notes: The table show results from annual panel regressions. The sample period is 2001-2017. The dependent variables are the column header (normalized by total assets at $t-1$), which are cash, short term financial instruments, accounts receivable in local currency (LC) and foreign currency (FC). *TA* is total assets and *OS* is the cashflow from other sources. Regressions include all firm-year sample (without the positive increase in debt level restriction). All regressions include sector and year fixed effects. Standard errors in parentheses are clustered at the sector level. * p<0.1, ** p<0.05, *** p<0.01.

Table 12: Split 2008

	Local Currency			Foreign Currency		
	Cash	Short term FI	AR	Cash	Short term FI	AR
	(1)	(2)	(3)	(4)	(5)	(6)
$\frac{LTLCdebt_{i,t}}{TA_{i,t-1}} pre2008$	-0.093***	-0.067***	-0.094***	-0.008***	-0.001***	-0.020***
	(0.010)	(0.004)	(0.015)	(0.001)	(0.000)	(0.003)
$\frac{LTLCdebt_{i,t}}{TA_{i,t-1}} post2008$	-0.111***	-0.096***	-0.093***	-0.017***	-0.002***	-0.020***
	(0.016)	(0.005)	(0.018)	(0.003)	(0.000)	(0.004)
$\frac{STLCdebt_{i,t}}{TA_{i,t-1}} pre2008$	-0.139***	-0.077***	0.005	-0.007***	-0.001***	-0.001
	(0.010)	(0.006)	(0.009)	(0.002)	(0.000)	(0.003)
$\frac{STLCdebt_{i,t}}{TA_{i,t-1}} post2008$	-0.162***	-0.122***	-0.019**	-0.018***	-0.002***	0.005
	(0.016)	(0.008)	(0.007)	(0.003)	(0.000)	(0.004)
$\frac{LTFCdebt_{i,t}}{TA_{i,t-1}} pre2008$	0.014	0.001	-0.054***	0.010**	0.002	0.031***
	(0.014)	(0.009)	(0.013)	(0.004)	(0.001)	(0.006)
$\frac{LTFCdebt_{i,t}}{TA_{i,t-1}} post2008$	-0.001	-0.014	-0.073***	0.023**	0.005**	0.031***
	(0.014)	(0.009)	(0.019)	(0.010)	(0.002)	(0.008)
$\frac{STFCdebt_{i,t}}{TA_{i,t-1}} pre2008$	0.123***	0.082***	0.030	0.022***	0.004***	0.088***
	(0.016)	(0.011)	(0.022)	(0.005)	(0.002)	(0.012)
$\frac{STFCdebt_{i,t}}{TA_{i,t-1}} post2008$	0.092***	0.122***	0.046**	0.033***	0.005**	0.110***
	(0.016)	(0.012)	(0.022)	(0.005)	(0.002)	(0.020)
$lnTA_{i,t-1}$	-0.015***	-0.004***	-0.016***	0.000	0.000*	0.004***
	(0.001)	(0.001)	(0.002)	(0.000)	(0.000)	(0.001)
$\frac{OS_{i,t}}{TA_{i,t-1}}$	0.075***	0.048***	-0.019***	0.007***	0.000*	0.002
	(0.007)	(0.005)	(0.006)	(0.001)	(0.000)	(0.002)
Adjusted R2	0.185	0.101	0.322	0.062	0.007	0.108
Within R2	0.103	0.056	0.035	0.015	0.001	0.027
N	256331	256958	254479	257365	257396	257299

Notes: The table show results from annual panel regressions. The sample period is 2001-2017. The dependent variables are the column header (normalized by total assets at $t-1$), which are cash, short term financial instruments, accounts receivable in local currency (LC) and foreign currency (FC). *TA* is total assets and *OS* is the cashflow from other sources. Regressions include all firm-year sample (without the positive increase in debt level restriction). All regressions include sector and year fixed effects. Standard errors in parentheses are clustered at the sector level. * p<0.1, ** p<0.05, *** p<0.01.

Table 13: With current portion

	Local currency			Foreign Currency		
	Cash	Short term FI	AR	Cash	Short term FI	AR
	(1)	(2)	(3)	(4)	(5)	(6)
$\frac{LTLCdebt_{i,t}}{TA_{i,t-1}}$	-0.106***	-0.088***	-0.094***	-0.014***	-0.002***	-0.020***
	(0.014)	(0.004)	(0.017)	(0.002)	(0.000)	(0.004)
$\frac{STLCdebt_{i,t}}{TA_{i,t-1}}$	-0.153***	-0.106***	-0.010	-0.014***	-0.001***	0.003
	(0.013)	(0.005)	(0.007)	(0.003)	(0.000)	(0.003)
$\frac{LTFCdebt_{i,t}}{TA_{i,t-1}}$	0.031**	0.031***	-0.032**	0.019***	0.004**	0.027***
	(0.015)	(0.007)	(0.015)	(0.007)	(0.002)	(0.006)
$\frac{\text{current portion } FCdebt_{i,t}}{TA_{i,t-1}}$	-0.048**	-0.098***	-0.159***	0.013	-0.000	0.039***
	(0.019)	(0.015)	(0.027)	(0.010)	(0.001)	(0.011)
$\frac{STFCdebt_{i,t}}{TA_{i,t-1}}$	0.104***	0.107***	0.040**	0.028***	0.005***	0.101***
	(0.015)	(0.009)	(0.020)	(0.004)	(0.002)	(0.016)
$lnTA_{i,t-1}$	-0.015***	-0.004***	-0.016***	0.000	0.000*	0.004***
	(0.001)	(0.001)	(0.002)	(0.000)	(0.000)	(0.001)
$\frac{OS_{i,t}}{TA_{i,t-1}}$	0.073***	0.046***	-0.020***	0.006***	0.000	0.003
	(0.007)	(0.005)	(0.006)	(0.001)	(0.000)	(0.002)
Adjusted R2	0.185	0.099	0.322	0.061	0.007	0.108
Within R2	0.103	0.055	0.035	0.014	0.001	0.027
N	256331	256958	254479	257365	257396	257299

Notes: The table show results from annual panel regressions. The sample period is 2001-2017. The dependent variables are the column header (normalized by total assets at $t-1$), which are cash, short term financial instruments, accounts receivable in local currency (LC) and foreign currency (FC). *TA* is total assets and *OS* is the cashflow from other sources. Regressions include all firm-year sample (without the positive increase in debt level restriction). All regressions include sector and year fixed effects. Standard errors in parentheses are clustered at the sector level. * p<0.1, ** p<0.05, *** p<0.01.

Table 14: Interaction with interest rate differential and exchange rate volatility

	Local Currency			Foreign Currency		
	Cash	Short term FI	AR	Cash	Short term FI	AR
	(1)	(2)	(3)	(4)	(5)	(6)
$\frac{LTLCdebt_{i,t}}{TA_{i,t-1}}$	-0.1056***	-0.0871***	-0.0930***	-0.0143***	-0.0015***	-0.0204***
	(0.0135)	(0.0040)	(0.0170)	(0.0023)	(0.0003)	(0.0037)
$\frac{STLCdebt_{i,t}}{TA_{i,t-1}}$	-0.1534***	-0.1060***	-0.0102	-0.0141***	-0.0013***	0.0026
	(0.0131)	(0.0050)	(0.0072)	(0.0025)	(0.0004)	(0.0031)
$\frac{LTFCdebt_{i,t}}{TA_{i,t-1}}$	0.0136	0.0022	-0.0616***	0.0229***	0.0005	0.0437***
	(0.0133)	(0.0075)	(0.0135)	(0.0066)	(0.0018)	(0.0140)
$\frac{STFCdebt_{i,t}}{TA_{i,t-1}}$	0.0761***	0.0684***	0.0469**	0.0094**	-0.0010	0.1011***
	(0.0156)	(0.0100)	(0.0228)	(0.0044)	(0.0019)	(0.0197)
$\frac{STFCdebt_{i,t}}{TA_{i,t-1}}$	0.0157***	0.0213***	-0.0038			
$\times(i_t^{KRW} - i_t^{USD})$	(0.0038)	(0.0038)	(0.0053)			
$\frac{LTFCdebt_{i,t}}{TA_{i,t-1}}$				-0.0000	0.0000	-0.0001
$\times(1yFXvolatility_t)$				(0.0001)	(0.0000)	(0.0001)
$\frac{STFCdebt_{i,t}}{TA_{i,t-1}}$				0.0017***	0.0005**	-0.0000
$\times(3mFXvolatility_t)$				(0.0003)	(0.0002)	(0.0010)
$lnTA_{i,t-1}$	-0.0146***	-0.0036***	-0.0161***	0.0002	0.0001*	0.0043***
	(0.0012)	(0.0007)	(0.0017)	(0.0002)	(0.0000)	(0.0007)
$(\frac{OS_{i,t}}{TA_{i,t-1}}$	0.0731***	0.0457***	-0.0203***	0.0060***	0.0002	0.0028
	(0.0067)	(0.0048)	(0.0065)	(0.0012)	(0.0002)	(0.0019)
Adjusted R2	0.1845	0.0988	0.3218	0.0607	0.0072	0.1077
Within R2	0.1027	0.0545	0.0348	0.0138	0.0014	0.0267
N	256331	256958	254479	257365	257396	257299

Notes: The table show results from annual panel regressions. The sample period is 2001-2017. The dependent variables are the column header (normalized by total assets at $t-1$), which are cash, short term financial instruments, accounts receivable in local currency (LC) and foreign currency (FC). *TA* is total assets and *OS* is the cashflow from other sources. Regressions include all firm-year sample (without the positive increase in debt level restriction). All regressions include sector and year fixed effects. Standard errors in parentheses are clustered at the sector level. * p<0.1, ** p<0.05, *** p<0.01.

Table 15: Sectoral heterogeneity in financial dependence, Equation (4)

	Local Currency Liquid Assets			Foreign Currency Liquid Assets		
	Cash	Short term FI	AR	Cash	Short term FI	AR
	(1)	(2)	(3)	(4)	(5)	(6)
$\frac{LT\ LCdebt_{i,t}}{TA_{i,t-1}}$	-0.092***	-0.079***	-0.090***	-0.012***	-0.001***	-0.017***
	(0.013)	(0.004)	(0.017)	(0.002)	(0.000)	(0.003)
$\frac{ST\ LCdebt_{i,t}}{TA_{i,t-1}}$	-0.132***	-0.096***	-0.013*	-0.012***	-0.001***	0.002
	(0.013)	(0.005)	(0.007)	(0.002)	(0.000)	(0.003)
$\frac{LT\ FCdebt_{i,t}}{TA_{i,t-1}}$	0.013	0.000	-0.065***	0.015**	0.003*	0.026***
	(0.013)	(0.007)	(0.014)	(0.006)	(0.002)	(0.005)
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}}$	0.095***	0.091***	0.034	0.024***	-0.002	0.091***
	(0.018)	(0.012)	(0.021)	(0.004)	(0.002)	(0.015)
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}} \times FinDep_c$	0.008	0.013*	0.003	0.001	0.007***	0.003
	(0.009)	(0.008)	(0.006)	(0.002)	(0.000)	(0.005)
$lnTA_{i,t-1}$	-0.018***	-0.004***	-0.022***	0.000	0.000	0.005***
	(0.001)	(0.001)	(0.002)	(0.000)	(0.000)	(0.001)
$\frac{OS_{i,t}}{TA_{i,t-1}}$	0.111***	0.000	-0.024**	0.000	0.000	0.000**
	(0.009)	(0.000)	(0.009)	(0.000)	(0.000)	(0.000)
Adjusted R^2	0.168	0.087	0.291	0.053	0.007	0.096
Within R^2	0.167	0.086	0.291	0.053	0.007	0.096
Obs.	255669	256282	253799	256680	256710	256613

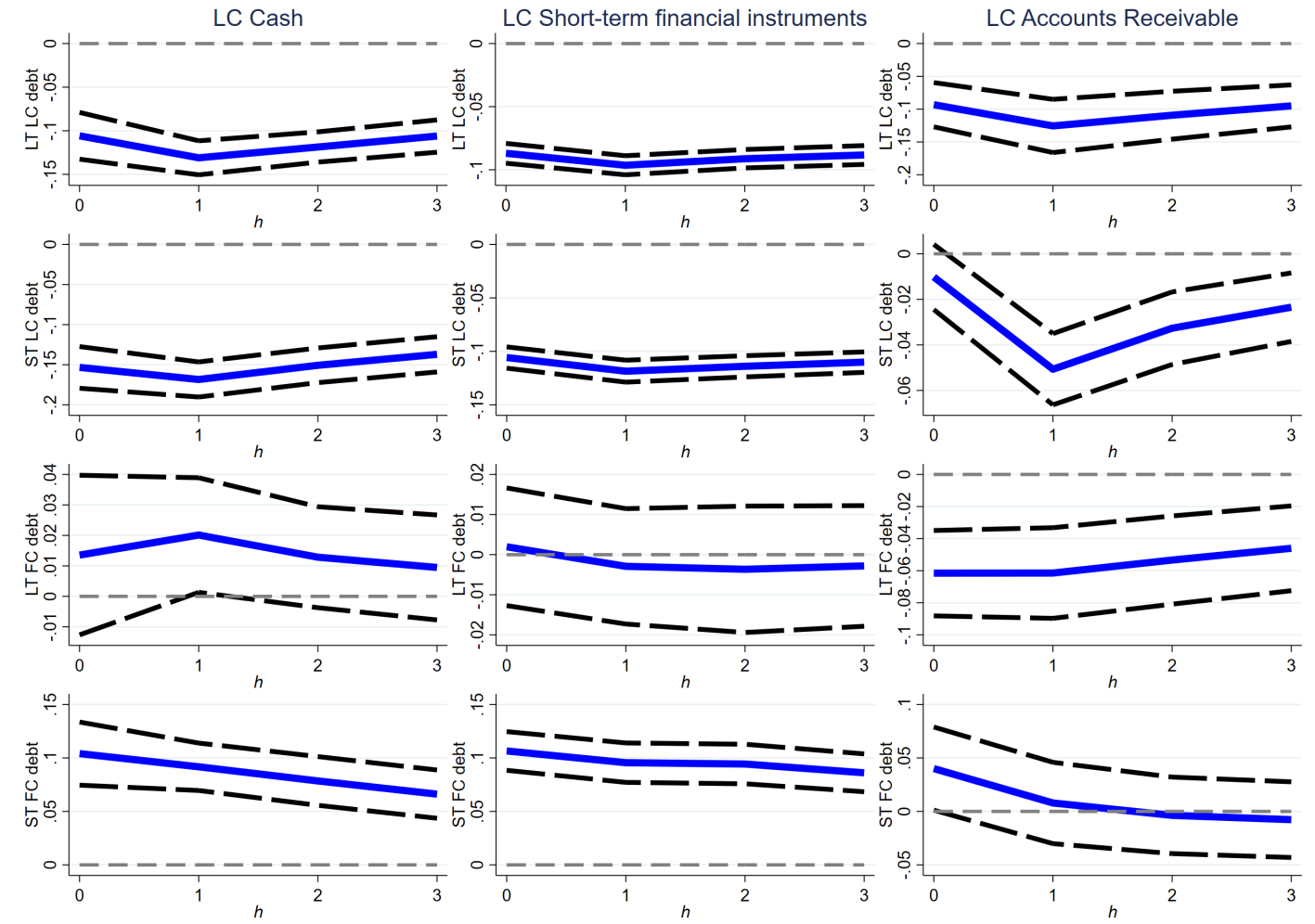
Notes: The table show results from annual panel regressions. The sample period is 2001-2017. The dependent variables are the column header (normalized by total assets at $t-1$), which are cash, short term financial instruments, accounts receivable in local currency (LC) and foreign currency (FC). $FinDep_c$ is sectoral financial dependence ratio constructed as in Rajan and Zingales (1998). *TA* is total assets and *OS* is the cashflow from other sources. All regressions include sector and year fixed effects. Standard errors in parentheses are clustered at the sector level. * p<0.1, ** p<0.05, *** p<0.01.

Table 16: Sectoral heterogeneity in export and import share, Equation (5)

	Local Currency Liquid Assets			Foreign Currency Liquid Assets		
	Cash	Short term FI	AR	Cash	Short term FI	AR
	(1)	(2)	(3)	(4)	(5)	(6)
$\frac{LT\ LCdebt_{i,t}}{TA_{i,t-1}}$	-0.092***	-0.079***	-0.090***	-0.012***	-0.001***	-0.017***
	(0.013)	(0.004)	(0.017)	(0.002)	(0.000)	(0.003)
$\frac{ST\ LCdebt_{i,t}}{TA_{i,t-1}}$	-0.132***	-0.096***	-0.013*	-0.012***	-0.001***	0.002
	(0.013)	(0.005)	(0.007)	(0.002)	(0.000)	(0.003)
$\frac{LT\ FCdebt_{i,t}}{TA_{i,t-1}}$	0.012	0.000	-0.067***	0.015**	0.003*	0.023***
	(0.013)	(0.007)	(0.014)	(0.006)	(0.002)	(0.005)
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}}$	0.087***	0.107***	-0.024	0.016**	0.004	0.010
	(0.021)	(0.014)	(0.040)	(0.007)	(0.004)	(0.023)
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}} \times ExportShare_c$	0.080	0.034	0.425***	0.016	-0.016	0.332***
	(0.068)	(0.089)	(0.153)	(0.021)	(0.017)	(0.096)
$\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}} \times ImportShare_c$	0.022	-0.052	-0.019	0.052	0.023	0.221
	(0.073)	(0.078)	(0.173)	(0.035)	(0.017)	(0.166)
$lnTA_{i,t-1}$	-0.018***	-0.004***	-0.022***	0.000	0.000	0.005***
	(0.001)	(0.001)	(0.002)	(0.000)	(0.000)	(0.001)
$(\frac{OS_{i,t}}{TA_{i,t-1}}$	0.111***	0.000	-0.023**	0.000	0.000	0.000**
	(0.009)	(0.000)	(0.009)	(0.000)	(0.000)	(0.000)
Adjusted R^2	0.168	0.087	0.292	0.053	0.007	0.098
Within R^2	0.167	0.086	0.291	0.053	0.007	0.097
Obs.	255669	256282	253799	256680	256710	256613

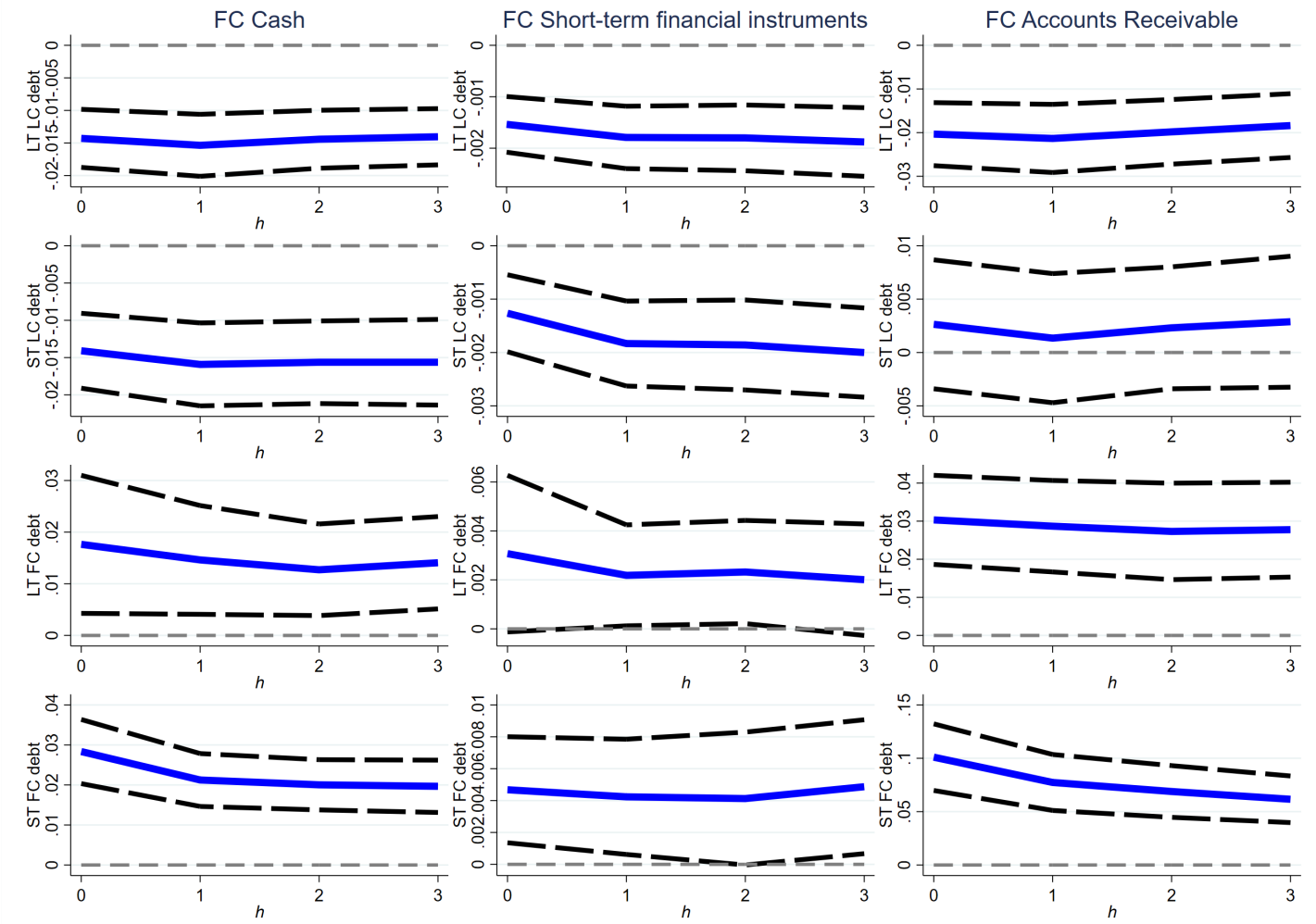
Notes: The table show results from annual panel regressions. The sample period is 2001-2017. The dependent variables are the column header (normalized by total assets at $t-1$), which are cash, short term financial instruments, accounts receivable in local currency (LC) and foreign currency (FC). $ExportShare_c$ and $ImportShare_c$ are sectoral export and import share of output constructed from Bank of Korea data. TA is total assets and OS is the cashflow from other sources. All regressions include sector and year fixed effects. Standard errors in parentheses are clustered at the sector level. * p<0.1, ** p<0.05, *** p<0.01.

Figure 5: LC Liquidity Assets, Impulse Responses by Local Projections



Notes: The table show results from annual panel regressions. The sample period is 2001-2017. The dependent variables are the column header (normalized by total assets at $t-1$), which are cash, short term financial instruments, accounts receivable in local currency (LC) and foreign currency (FC). The regression control for lagged log total assets and cashflow from other sources (normalized by total assets at $t-1$). Regressions include all firm-year sample (without the positive increase in debt level restriction). All regressions include sector and year fixed effects. 95% confidence interval from standard errors clustering at sector level are displayed as black dash lines.

Figure 6: LC Liquidity Assets, Impulse Responses by Local Projections



Notes: The table show results from annual panel regressions. The sample period is 2001-2017. The dependent variables are the column header (normalized by total assets at $t-1$), which are cash, short term financial instruments, accounts receivable in local currency (LC) and foreign currency (FC). The regression control for lagged log total assets and cashflow from other sources (normalized by total assets at $t-1$). Regressions include all firm-year sample (without the positive increase in debt level restriction). All regressions include sector and year fixed effects. 95% confidence interval from standard errors clustering at sector level are displayed as black dash lines.

D Baseline regression with additional control for exchange rates

One may concern about a mechanical effect is captured in the baseline regression. For example, if Korean Won depreciates relative to the US dollar, $\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}}$ will go up as the debt is denominated in US dollar and converted to Korean Won and the total asset is in Korean Won. At the same time, FC liquid asset items relative to total assets have the same property. $\frac{FCCash_{i,t}}{TA_{i,t-1}}$ will go up as the cash is denominated in US dollar. This could lead to mechanical positive correlation purely because of exchange rate fluctuations. It is particularly concerning for our regression estimates of FC debt on FC assets. We ease this concern by controlling for log of KRW - USD exchange rate (FX_t)). Define $ST\ FCdebt^{USD}_{i,t}$ as the FC debt in US dollar unit (before exchange rate conversion). Then $\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}}) = ST\ FCdebt^{USD}_{i,t} \times FX_t) - lnTA_{i,t-1} = ST\ FCdebt^{USD}_{i,t}) + FX_t) - lnTA_{i,t-1}$. Therefore, by controlling for FX_t), we can take out the exchange rate movement component. Since time series variable is absorbed by time fixed effect, our baseline regression has also partially address for this concern. In this section, we allow for sector specific FX_t) and FX_{t-1}). This allows us to capture sector specific accounting treatments and also exchange rate movement at $t-1$ that changes $lnTA_{i,t-1}$. Specifically, we modify the baseline regression 1 to :

$$\begin{aligned}\frac{y_{i,t}}{TA_{i,t-1}} = \quad & \beta^{LTFC}\frac{LT\ FCdebt_{i,t}}{TA_{i,t-1}} + \beta^{LTLC}\frac{LT\ LCdebt_{i,t}}{TA_{i,t-1}} \\ & + \beta^{STFC}\frac{ST\ FCdebt_{i,t}}{TA_{i,t-1}} + \beta^{STLC}\frac{ST\ LCdebt_{i,t}}{TA_{i,t-1}} \\ & + \gamma_1\frac{OS_{i,t}}{TA_{i,t-1}} + \gamma_2 lnTA_{i,t-1} + \alpha + \alpha_c + \alpha_t + \varepsilon_{i,t} \\ & \sum_{c=1}^{c=C}(\delta_c lnFX_t) + \sum_{c=1}^{c=C}(\lambda_c lnFX_{t-1})\end{aligned} \tag{7}$$

The regression is reported in Table 17. The regression results are completely consistent with our baseline.

Table 17: Baseline with sector specific FX_t) control

	Local Currency			Foreign Currency		
	Cash	Short term FI	AR	Cash	Short term FI	AR
	(1)	(2)	(3)	(4)	(5)	(6)
$\frac{LTLCdebt_{i,t}}{TA_{i,t-1}}$	-0.053***	-0.047***	-0.114***	-0.011***	-0.002***	-0.023***
	(0.010)	(0.004)	(0.016)	(0.002)	(0.000)	(0.004)
$\frac{STLCdebt_{i,t}}{TA_{i,t-1}}$	-0.090***	-0.055***	-0.034***	-0.009***	-0.001***	0.004
	(0.008)	(0.004)	(0.008)	(0.001)	(0.000)	(0.003)
$\frac{LTFCdebt_{i,t}}{TA_{i,t-1}}$	0.008	0.005	-0.063***	0.018***	0.003*	0.031***
	(0.011)	(0.007)	(0.013)	(0.007)	(0.002)	(0.006)
$\frac{STFCdebt_{i,t}}{TA_{i,t-1}}$	0.107***	0.097***	0.035*	0.033***	0.004***	0.102***
	(0.011)	(0.008)	(0.019)	(0.005)	(0.001)	(0.016)
$lnTA_{i,t-1}$	-0.013***	-0.005***	-0.019***	0.000	0.000	0.005***
	(0.001)	(0.001)	(0.002)	(0.000)	(0.000)	(0.001)
$\frac{OS_{i,t}}{TA_{i,t-1}}$	0.039***	0.027***	-0.028***	0.003***	0.001***	-0.002
	(0.005)	(0.004)	(0.007)	(0.001)	(0.000)	(0.002)
Adjusted R2	0.110	0.071	0.317	0.056	0.007	0.112
Within R2	0.058	0.029	0.048	0.016	0.004	0.038
N	145698	145881	144269	145979	145984	145918

Notes: The table show results from annual panel regressions. The sample period is 2001-2017. The dependent variables are the column header (normalized by total assets at $t-1$), which are cash, short term financial instruments, accounts receivable in local currency (LC) and foreign currency (FC). *TA* is total assets and *OS* is the cashflow from other sources. Regression are restricted to firm-year with positive increase in debt level. Regressions without the restriction are reported in the Appendix C. All regressions include sector and year fixed effects. Standard errors in parentheses are clustered at the sector level. * p<0.1, ** p<0.05, *** p<0.01.

E Sector matching with input-output matrix of Bank of Korea

In this section, we provide detail information on the matching of the KISVALUE sector with Bank of Korea input-output matrix sector. In the KISVALUE dataset, there are two sector definitions. The MiddleGrouping (67 sectors) and the NarrowGrouping (189 sectors). We make use of the MiddleGrouping in the sectoral heterogeneity (section 4.2) to construct sector specific financial dependence and export import exposure.

Table 18: KISVALUE sector and Bank of Korea sector

KISVALUE MidGrouping sector	Bank of Korea sector
A01000/Agriculture	Crops
A02000/Forestry	Forest products
A03000/Fishing	Fishery products
B05000/Mining of Coal, Crude Petroleum and Natural Gas	Mining of coal, crude petroleum and natural gas
B06000/Mining of Metal Ores	Metal ores
B07000/Mining of Non-metallic Minerals, Except Fuel	Non-metallic minerals
B08000/Mining support service activities	Mining of coal, crude petroleum and natural gas
C10000/Manufacture of Food Products	Other food products
C11000/Manufacture of Beverages	Beverages
C12000/Manufacture of Tobacco Products	Tobacco products
C13000/Manufacture of Textiles, Except Apparel	Apparels and other textiles
C14000/Manufacture of wearing apparel, Clothing Accessories and Fur Articles	Leather and fur products
C15000/Tanning and Dressing of Leather , Manufacture of Luggage and Footwear	Leather and fur products
C16000/Manufacture of Wood and of Products of Wood and Cork ; Except Furniture	Wood and wooden products
C17000/Manufacture of Pulp, Paper and Paper Products	Pulp and paper
C18000/Printing and Reproduction of Recorded Media	Printing and reproduction of recorded media
C19000/Manufacture of Coke, hard-coal and lignite fuel briquettes and Refined Petroleum Products	Coke and hard-coal
C20000/Manufacture of chemicals and chemical products (except pharmaceuticals, medicinal chemicals)	Basic chemical products
C21000/Manufacture of Pharmaceuticals, Medicinal Chemicals and Botanical Products	Drugs, cosmetics, and soap
C22000/Manufacture of Rubber and Plastic Products	Plastic products, Rubber products
C23000/Manufacture of Other Non-metallic Mineral Products	Other nonmetallic mineral products
C24000/Manufacture of Basic Metal Products	Pig iron and crude steel, Primary iron and steel products, Nonferrous metal ingots and primary nonferrous metal products
C25000/Manufacture of Fabricated Metal Products, Except Machinery and Furniture	Fabricated metal products except machinery and funiture
C26000/Manufacture of Electronic Components, Computer, Radio, Television and Communication Equipment and Apparatuses	Electronic components and accessories, Audio, video and communications equipment Computer and office equipment
C27000/Manufacture of Medical, Precision and Optical Instruments, Watches and Clocks	Precision instruments
C28000/Manufacture of electrical equipment	Electrical equipment, and supplies
C29000/Manufacture of Other Machinery and Equipment	Machinery and equipment of general purpose, Machinery and equipment of special purpose
C30000/Manufacture of Motor Vehicles, Trailers and Semitrailers	Motor vehicles and parts
C31000/Manufacture of Other Transport Equipment	Other transportation equipment
C32000/Manufacture of Furniture	Furniture

Table 19: KISVALUE sector and Bank of Korea sector (continued)

KISVALUE MidGrouping sector	Bank of Korea sector
C33000/Other manufacturing	Other manufactured products
D35000/Electricity, gas, steam and air conditioning supply	Electric utilities, Gas and water supply
D36000/Water Supply	Gas and water supply
E37000/Sewage, Wastewater and Human Waste Treatment Services	Sanitary services
E38000/Waste Collection, Disposal and Materials Recovery	Sanitary services
E39000/Remediation activities and other waste management services	Sanitary services
F41000/General Construction	Building construction and repair
F42000/Special Trade Construction	Civil engineering
G45000/Sale of Motor Vehicles and Parts	Wholesale and retail trade
G46000/Wholesale Trade and Commission Trade, Except of Motor Vehicles and Motorcycles	Wholesale and retail trade
G47000/Retail Trade, Except Motor Vehicles and Motorcycles	Wholesale and retail trade
H49000/Land Transport ; Transport Via Pipelines	Land transport
H50000/Water Transport	Water and air transport
H51000/Air Transport	Water and air transport
H52000/Storage and support activities for transportation	Strorage and support activities for transportation
I55000/Accommodation	Accommodation and food services
I56000/Food and beverage service activities	Accommodation and food services
J58000/Publishing activities	Publishing and cultural services
J59000/Motion picture, video and television programme production, sound recording and music publishing activities	Publishing and cultural services
J60000/Broadcasting	Broadcasting
J61000/Telecommunications	Communications services
J62000/Computer programming, System Integration and Management Services	Business services
J63000/Information service activities	Business services
L68000/Real Estate Activities	Real estate
L69000/Renting and leasing; except real estate	Other business services
M70000/Research and Development	Research and development
M71000/Professional Services	Other business services
M72000/Architectural, Engineering and Other Scientific Technical Services	Other business services
M73000/Professional, Scientific and Technical Services, n.e.c.	Other business services
N74000/Business Facilities Management and Landscape Services	Other business services
N75000/Business Support Services	Other business services
P85000/Education	Education
Q87000/Social Work Activities	Social work activities
R90000/Creative, Arts and Recreation Related Services	Publishing and cultural services
R91000/Sports activities and amusement activities	Amusement and sports activities
S95000/Maintenance and Repair Services	Other services
S96000/Other Personal Services Activities	Other services