Global dollar credit and carry trades: a firm-level analysis*

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Abstract

We conduct a firm-level analysis of borrowing in US dollars by non-financial corporates from outside the United States. The dataset combines bond issuance data with firm-level financial information. We find that firms with already high cash holdings are more likely to issue US dollar-denominated bonds, and that the proceeds of the bond issue add to cash holdings. The tendency to add cash is more pronounced during periods when the dollar carry trade is more favourable and is prevalent for emerging market firms.

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1 Introduction

The global role of the US dollar is reflected in the prevalence of debt instruments issued in US dollars by borrowers from outside the United States. The US dollar is the global unit of account in debt contracts in that borrowers borrow in dollars and lenders lend in dollars, whether the borrower or lender is located in the United States or not. McCauley, McGuire and Sushko (2015) estimate that the outstanding USD-denominated debt of non-banks located outside the United States stood at $9.2 trillion at the end of September 2014, having grown from $6 trillion at the beginning of 2010. The component of this global dollar credit that has seen the fastest increase has been in the stock of corporate bonds issued by emerging market firms, responding to the surge in demand by yield-hungry fixed income investors.

Why do so many non-US firms issue bonds denominated in US dollars? In spite of the importance of this question, little has been documented on the determinants of the currency denomination of corporate bond issuance. The objective of this paper is to shed light on this topic by examining two specific questions that are amenable to an empirical investigation using firm-level issuance and balance sheet information.

First, what motivates a non-US firm to issue US dollar bonds? Specifically, what are the determinants of corporate bond issuance in US dollars in terms of the balance sheet characteristics of the firms involved and financial conditions? Second, what do the corporate borrowers do with the proceeds of the bond issuance? In particular, are there any systematic differences between corporate borrowers in emerging economies and in advanced economies?

In order to address these two questions, we construct a comprehensive database that combines bond issuance data with firm-level balance sheet data of non-US firms from 47 countries over the 2002–14 period. The answers to our pair of questions suggest that non-financial firms from emerging market economies (EMEs) have used US dollar bond issuance to take on financial exposures that have attributes of a dollar carry trade, in addition to any use of such funds for real investment. In this respect, our results add to the evidence that favourable global financial conditions have been important determinants of firms' financing decisions, especially for firms

from emerging economies whose dollar bond issuance activity has been a defining feature of the post-crisis period in international capital markets.

Figure 1 overleaf gives an initial snapshot of the issuance activity by firms in our sample of non-financial firms from outside the United States. Our sample encompasses non-financial firms from both advanced and emerging economies. The increase in issuance by firms from emerging economies is especially noteworthy in Figure 1. The annual gross issuance by these firms more than doubled between 2008 and 2013. The size of the bubbles in the lower panels of Figure 1 indicates the gross issuance amount of USD-denominated bonds, while the height of the bubbles gives the average maturity of the issued bonds weighted by the face value of the issuance. The lower left-hand panel is for the whole sample, while the lower right-hand panel is for the emerging market firms only. The size and maturity of issuance follow the pattern of risk-taking in financial markets, with periods of easy financing conditions being associated with larger issuance as well as longer maturities.

Our firm-level data have an important advantage in addressing questions of carry trades as compared to the official balance of payments data. Official data on capital flows are compiled on a locational basis, with the balance of payments border serving as the boundary of what constitutes external or internal exposure. However, the prevalence of offshore issuance activity, whereby overseas subsidiaries are used as financing vehicles of the firm, means that the traditional balance of payments border may not be the appropriate boundary for measuring firms' international financial activity.

The practice of using offshore affiliates as financing vehicles has been especially important for emerging market firms. Between 2009 and 2013, almost half of the international debt securities issued by emerging market non-bank private corporations were issued using the firms' offshore affiliates (Chui et al (2014)). Having obtained funds abroad, the foreign affiliate of an EME corporation could transfer funds to its home country through a variety of channels, for instance by lending directly to its own headquarters (see Avdjiev et al (2014)). To the extent that these flows are driven by financial operations rather than real activities, they should be understood by the financial motives.

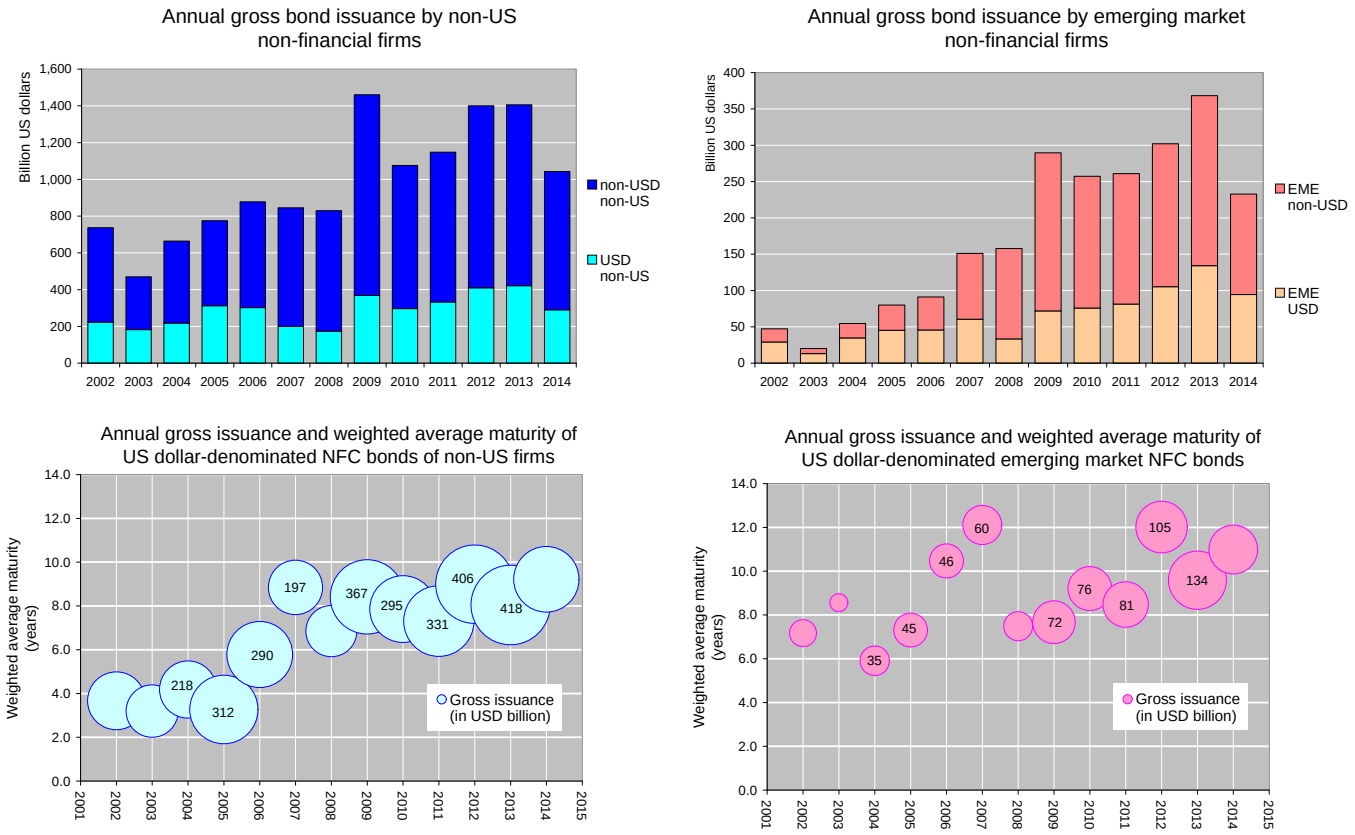

Figure 1: **Annual gross bond issuance of non-US firms.** The top-left panel shows annual gross bond issuance proceeds of non-US firms. The top-right panel is for the subset of emerging market firms. The lower panels show US dollar-denominated issuance. The lower-left is for whole sample of non-US firms, while the lower right is for emerging market subsample. The size of the bubble indicates the gross issuance amount while the height of the bubble indicates the weighted average maturity of the bonds issued. See text for sample details.

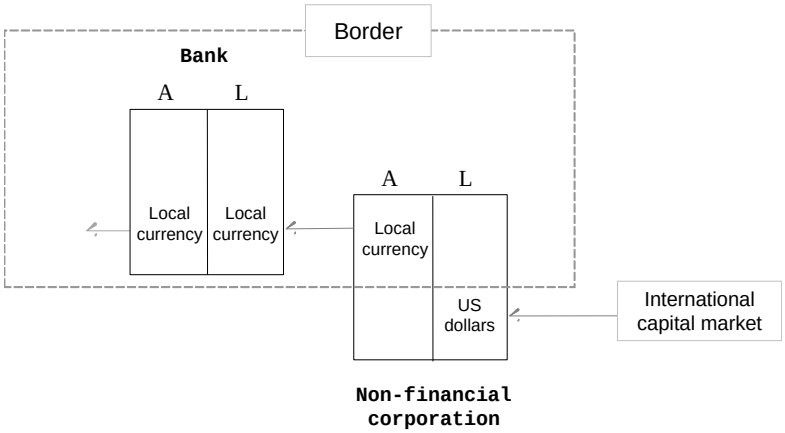

Figure 2: Example of non-financial corporation acting as a surrogate intermediary by borrowing through an offshore subsidiary and transferring the proceeds to headquarters (source: Chung et al (2015)).

Figure 2 taken from Chung et al (2015) illustrates one example, where a non-financial firm taps the international capital markets through a bond issued by its offshore subsidiary, which then lends the proceeds to headquarters through a within-company loan. Figure 2 depicts the headquarters firm providing funding to a local bank, but the financing could equally be provided to a non-bank financial intermediary – for instance, a "shadow bank" that performs bank-like intermediation functions, and which operates outside the regulated banking sector. The funds brought onshore could also be used by the firm to supply credit to another firm by buying its commercial paper or other financial instruments. Irrespective of the specific form of the financial asset, the practice of bringing funds onshore will affect domestic credit conditions.

The importance of taking account of offshore issuance of bonds is illustrated in Figure 3, which plots BIS data on the amount outstanding of international debt securities of emerging market non-bank private sector borrowers. The nationality series measures the total outstanding debt securities of borrowers whose ultimate parent is an emerging market firm, while the residence series takes account only of the residence of the borrowing entity. Thus, the bonds issued by the financial subsidiary of an emerging market firm registered in the Cayman Islands are included in the nationality series, but not in the residence series. The nationality series is almost twice the size of the residence series, indicating that our procedure of consolidating the

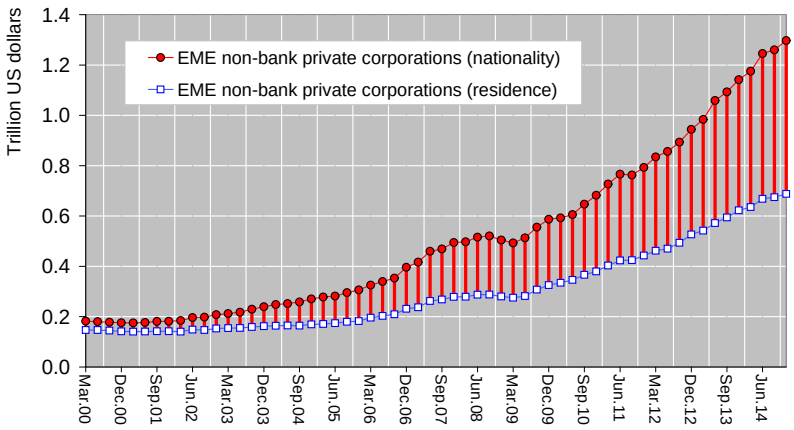

Figure 3: Emerging market non-bank private sector international debt securities outstanding by residence and by nationality (source: BIS international debt securities tables 11C, 11D, 12C and 12D).

borrowing at the ultimate parent level provides a more accurate picture of the activities (and hence the exposures) of emerging market borrowers.

In our firm-level investigation of the determinants of US dollar bond issuance, we find that emerging market corporates tend to borrow more in US dollars when they already hold large cash balances, suggesting that cash needs for investment or other expenditure may not be the only motivation for bond issuance. When we examine the timing of the dollar bond issuance by EME corporates, we find that it is more prevalent during periods when the dollar carry trade is more favorable in terms of an appreciating local currency, high interest rate differential vis-à-vis the dollar, and when the exchange rate volatility is low. With regard to how the proceeds of the dollar bond issuance are used, we examine the consequences of bond issuance for corporate cash holdings, and find that the proceeds of bond issuance is more likely to end up being held in cash compared with other sources of financing for the firm, such as through operations or the sale of assets. Moreover, the greater tendency of the bond issuance to end up adding to cash holdings is more pronounced for USD-denominated bond issuance.

Irrespective of the motivation of the firms concerned, our evidence therefore points to the

greater incidence of financial decisions that bear an outward resemblance to carry trades. Since corporate cash holdings could be in the form of claims on banks, shadow banks or other financial intermediaries, the evidence points to non-financial firms playing the role of surrogate intermediaries, channeling external financial conditions into the domestic financial system (see Avdjiev et al (2014)).

However, there are notable differences between advanced economy firms and emerging market firms. Whereas EME firms are prone to the pattern whereby already cash-rich firms issue USD-denominated bonds, there is only weak evidence for such behaviour among advanced economy firms. Our firm-level data allow us to delve further into other distinctions. We look into firms that report sales in the United States and find that our results are not driven by firms with US sales. Additionally, firms that have high external financing needs, as measured by the Rajan and Zingales (1998) financial dependence variable, do not display the carry trade behaviour. Otherwise, EME corporates show a consistent pattern of engaging in carry trade-like behaviour irrespective of sector.

Experience of past emerging market crises has taught us that financial risk-taking fuelled by credit against the backdrop of currency appreciations and capital inflows often lead to financial disruption for emerging economies (Kaminsky and Reinhart (1999)). In the same vein, Gourinchas and Obstfeld (2012) find that the two most robust predictors of financial crises, both in advanced and emerging economies, are rapid domestic credit growth and a real appreciation of the currency. Borio (2014), Rey (2015), and Bruno and Shin (2015a, 2015b) point to the importance of global factors in understanding the external vulnerability of open economies. In particular, our study of the bond market takes account of the shift in the pattern of cross-border financial intermediation since 2009 from cross-border banking to the international capital markets, and the market for corporate bonds in particular (McCauley et al (2015)).

Our results are broadly consistent with these earlier studies and provide a point of contact between our firm-level investigation and the macroeconomic discussion on the role of global financial conditions in determining emerging market financial vulnerability. In this respect, the main contribution of our paper is to provide a more detailed picture of financing choices at the

firm level, opening up a whole new set of inquiries that are made possible by our firm-level dataset.

Our study points to a global liquidity effect coupled with country financial conditions as determinants of the dollar-carry trade. In addition to issuing more bonds, firms choose to issue in dollars to take advantage of a high Sharpe ratio associated with the dollar carry trade, i.e., a higher ratio of interest rate differential to exchange rate volatility. The fact that firms subsequently have a bigger propensity to save the dollar proceeds in cash raises the possibility that firms' choices are motivated, at least in part, by financial risk-taking rather than real risk-taking opportunities. We begin with a brief review of the related literature, and then describe our dataset and results.

2 Related literature

In contrast to the large macro literature on the influence of global financial conditions on corporate financing decisions, there have been fewer studies of the issue using firm-level data. Instead, detailed firm-level studies have typically been limited to a single country or to specific regions.

An early study with a global coverage is Gozzi, Levine and Schmukler (2010), which examines firm-level patterns in international financing decisions over the period 1991–2005. They find that debt issues in public markets are much more important as a source of finance for firms than equity issues, with debt accounting for 80% of the total funds raised through public markets. For firms from developing countries, the median issuance in the international markets is about 18 times larger than the median issuance in domestic markets, while for developed economies, international issuance is around twice the size of the domestic issuance. Didier, Levine, and Schmukler (2015) show a positive connection between capital raising activity and growth in terms of assets, sales, and employment at the firm level. In the context of equity markets, Claessens and Schmukler (2007) examine the determinants of firms' participation in international equity markets in terms of country and firm characteristics.

The impact of exchange rates on debt composition and firms balance sheets has been exam-

ined by Galindo, Panizza and Schiantarelli (2003), who provide a survey of the early evidence. Harvey and Roper (1999) found that balance sheet effects driven by high leverage in foreign currency and subdued profitability played a significant role in propagating the Asian financial crisis. More recently, Bastos, Kamil, and Sutton (2015) document a surge in bond issuance by Latin American firms that has led to a compositional shift away from bank loans and toward bond financing, especially foreign-currency denominated bonds. Mizen et al (2015) examine the financing decisions of firms in seven emerging Asian economies and find that the decision to issue in onshore or offshore markets is driven by market development variables and openness of the capital account. Gozzi et al (2015) find that international bond issues are larger, tend to be denominated in foreign currency, and tend to entail lower yield spreads than issues at home.

Some early studies have investigated the link between currency denomination of debt and firm characteristics. Allayannis, Brown and Klapper (2003) examine a firm's choice between local, foreign, and synthetic local currency (hedged foreign currency) debt by using a data set of East Asian non-financial companies. They find evidence of idiosyncratic and common factors that determine each debt type's use, indicating the importance of examining debt at a disaggregated level. For instance, they find that the higher the difference in interest rates, the higher (lower) the level of foreign (local) currency debt – a finding consistent with our own finding to be reported below on the carry trade attributes of firms' positioning. See Munro and Wooldridge (2010) for additional evidence on swap-covered foreign currency borrowing.

In terms of global variables as determinants of firms' financing choices, Cipriani and Kaminsky (2007) show that the time-varying volatility of issuance in international financial markets co-move with macroeconomic and financial fundamentals in the United States. Bruno and Shin (2015a, 2015b) find that the leverage of global banks (mostly US and European) explain the fluctuations in cross-border banking.

More relevant for the findings to be reported in our paper is the shift in the pattern of financial intermediation from banks to the bond market. Shin (2013) has dubbed the recent period of active bond issuance by non-financial firms as the "second phase of global liquidity". The overall picture is that of a change in the pattern of financial intermediation, moving from

the banking to the non-banking intermediation, and from banks to asset managers and other long-term investors. Becker and Ivashina (2015) find that the reaching for yield in bond markets is procyclical, with risk-taking drying up in the second half of 2007, to reappear in 2009. Feyen et al (2015) and Carabarin et al (2015) have documented the role of global liquidity factors in corporate financing decisions through the bond market. Du and Schreger (2014) examine dollar bond issuance by corporates, but in relation to sovereign credit risk on local currency bonds.

As fixed income portfolios have grown in size since 2009, they are being reflected in the assets under management of the largest asset managers. Goldstein, Jiang and Ng (2015) and Shek, Shim and Shin (2015) have examined the financial stability implications of outflows from bond funds, and Ramos and Garcia (2015) focus on bond funds that specialize in emerging market bond funds, noting that in many cases such funds are illiquid and prone to fragility and amplification of shocks. More detailed evidence is presented by Turner (2014) and Chui, Fender and Sushko (2014), who document that after the Great Financial Crisis EME firms have taken advantage of easy global financial conditions to increase overseas borrowing and leverage through direct borrowing.

3 Data and sample

Our study rests on a comprehensive database that combines bond issuance information with firm-level financial information. Our data on bond issuance activity come from the SDC Platinum New Issues Database from Thomson Reuters, and the balance sheet information comes from Worldscope.

In keeping with the spirit of our exercise, we focus on non-financial corporates from outside the United States. In order to capture the offshore bond issuance activities of these firms, we consolidate bond issuance activity at the ultimate parent level on the basis of the ultimate parent CUSIP identifier as supplied by SDC. We capture the issuance activity of all affiliates of the non-financial corporate concerned, both financial and non-financial. The consolidation criterion used by SDC is based on a 50% ownership threshold to classify an ultimate parent

company. The ultimate parent is the company at the highest tier. For instance, if company B owns 50% or more of company A, and C owns 50% or more of company B, then C is deemed to be the ultimate parent of A. In keeping with our focus on non-financial firms, we exclude bond issuance for which the issuer's ultimate parent is a bank or financial institution (with SIC code 6). Similarly, we exclude public sector issuers.

We then match bond issuance data with firm balance sheet data in Worldscope (Compustat North America in the case of Canadian firms) on the basis of SDC's ultimate parent CUSIP identifier. If the matching by CUSIP is unsuccessful, we use the SEDOL identifier. As the SEDOL may provide an unreliable match if the firms have undergone mergers and acquisition transactions during the sample period, we take account of mergers and acquisition histories. Our matching algorithm proved successful. We matched 29,611 individual issuances (3,496 firms) from outside the United States. Failures to match were confined to 407 issuances (by 111 firms).

For our empirical investigation, we restrict the sample to firms from countries with at least one bond issuance over the sample period from each of two or more distinct firms. Our basic unit of analysis is the "issuance-year", corresponding to the firm-year pair in which the firm has issued one or more bonds during the year. If the firm has issued more than one bond during the year, we aggregate the proceeds for that year so that we maintain the annual frequency of the data.

After aggregating the proceeds at the fiscal year-end, we arrive at a sample of 11,173 issuance-years in our sample – of which 19% are issuance-years in which more than half of the proceeds of the bonds are in US dollars – for the following 47 countries: Argentina, Australia, Austria, Belgium, Brazil, Canada, Chile, China, Colombia, Cyprus, Czech Republic, Denmark, Finland, France, Germany, Greece, Hong Kong, India, Indonesia, Ireland, Israel, Italy, Japan, Korea, Malaysia, Mexico, the Netherlands, New Zealand, Norway, Pakistan, Peru, the Philippines, Poland, Portugal, Russia, Saudi Arabia, Singapore, South Africa, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, Ukraine, the United Arab Emirates, and the United Kingdom.

3.1 Summary statistics

Table 1, panel A, provides a more detailed breakdown of corporate issuance activity by year and by currency denomination. For our sample of 47 countries, we see an increase in the number of issuances, although the trend is not monotonic. Around 19% of issuance-years in our sample has a majority of bond proceeds denominated in US dollars.[1] We classify each issuance-year into two categories, depending on whether the majority of the issuance proceeds are in US dollars or not.

We turn to the financial characteristics of the firms in our sample. The variable $Size$ is the logarithm of total assets, $Leverage$ is total debt divided by total assets, PPE is the balance sheet item Property, Plants and Equipment scaled by total assets, and $Cash$ is the sum of cash and short-term assets scaled by total assets. There is no universally accepted convention on what types of instruments qualify as "cash and short-term assets". As well as bank deposits and shadow banking products, the holding of commercial paper or other instruments issued by corporates could qualify. In what follows, it would be important to bear in mind the variety of ways in which the borrowing firm's cash holdings can affect domestic credit conditions.

All variables are winsorized at the 1% level. Financial data are for the period 2001–13. The matching of bond and the firm-level financial variables results in a sample of 35,750 observations for 3,130 firms – for which we have accounting data on both total assets and cash over the sample period – and includes financial data for those years when a firms does not issue a bond.[2]

Panel B shows statistics restricted to the years when a firm issue at least one bond and accounting data on total assets and cash are available. We see significant differences in firm characteristics based on the issue's currency of denomination. Firms issuing primarily USD-denominated bonds have higher cash-to-assets ratios, are bigger in size, have a higher PPE ratio, but a lower leverage ratio.

[1] There is a large variation in the amount of proceeds issued by firms, with the median firm issuing 259 million in bond proceeds annually. Bond proceeds in US dollars are bigger (median value of 365 million) than non-USD issuance proceeds.

[2] For this augmented sample, the average ratio cash to total assets is 0.12. Firms are large in size (mean of 7757 USD million) and have a leverage ratio of 30%.

Table 1: **Summary statistics.** Panel A shows statistics for the sample of firms that issued a bond over 2002–14. It presents the total number of bond issuances and the percentage of issuance-years where US dollar proceeds exceeded 50 percent of total proceeds. Total Proceeds and Issuances are aggregated by fiscal year and at the ultimate parent level. Panel B provides summary statistics for those years when a firm issues at least one bond. USD Majority (Non-USD Majority) identifies observations when USD (non-USD)-denominated bond proceeds exceeded 50 percent of the total. Financial data cover the period 2001–13. See the Data section for the definition of the variables.

A. Sample Issuances

Year Issue	USD Majority %	Total Issuances
2002	16.95%	755
2003	21.64%	513
2004	22.44%	673
2005	20.38%	628
2006	21.41%	682
2007	20.35%	737
2008	15.03%	792
2009	18.34%	1047
2010	19.05%	1008
2011	17.72%	1027
2012	19.28%	1110
2013	18.93%	1247
2014	15.83%	954
Total	18.80%	11173

B. Sample Issuances

	USD Majority		Non-USD Majority			
Variable	Obs	Mean	Obs	Mean	Diff.	p-value
Cash	1705	0.113	7753	0.094	-0.019	0.000
Total Assets (USD millions)	1705	19130.7	7753	16864.5	-2266.2	0.022
Leverage	1705	0.293	7753	0.349	0.056	0.000
PPE	1702	0.421	7733	0.403	-0.018	0.004

Table 2: **Summary statistics.** This table presents the number of issuance years in each country of the sample, indicating the currency break-down of the issuance. 100 percent USD (USD greater than 50 percent) identifies observations when USD-denominated bond proceeds are 100 (greater than 50) percent of the total. Classification of advanced and emerging economies follows the IMF definition.

Country	Annual issuances	100% USD	USD > 50%		Annual issuances	100% USD	USD > 50%
Emerging				Advanced			
Argentina	21	8	8	Australia	233	106	126
Brazil	441	90	101	Austria	48	1	3
Chile	134	30	30	Belgium	66	5	11
China	649	109	109	Canada	1,106	461	519
Colombia	31	13	14	Cyprus	3	0	0
India	555	19	21	Czech Rep.	10	0	1
Indonesia	110	28	28	Denmark	27	3	3
Malaysia	225	13	14	Finland	79	5	6
Mexico	226	67	72	France	467	39	46
Pakistan	19	2	2	Germany	341	28	38
Peru	30	19	19	Greece	78	53	54
Philippines	98	21	21	Hong Kong	168	75	79
Poland	6	0	0	Israel	48	47	47
Russia	176	45	45	Italy	151	19	28
Saudi Arabia	13	1	1	Japan	2,312	21	59
South Africa	39	16	17	Netherlands	138	49	65
Thailand	242	8	8	New Zealand	67	11	12
Turkey	15	13	13	Norway	53	17	18
Ukraine	5	4	4	Portugal	45	5	5
UAE	14	10	12	Ireland	37	24	26
				Singapore	193	23	23
				South Korea	1,222	52	61
				Spain	133	11	16
				Sweden	125	16	17
				Switzerland	198	26	35
				Taiwan	195	2	2
				UK	581	205	261
Total EME	3,049	516	539	Total AE	8,124	1,304	1,561
Grand total	11,173	1,820	2,100				

Table 2 shows the issuance data broken down by the home country of the issuing firm. There is considerable heterogeneity in the frequency of annual bond issuances. Japan has the largest number of issuance-years. Our sample consists of 27 advanced economies (as classified by the IMF) out of a total of 47 countries. We also report the number of issuance-years in US dollars, defined as those observations in which the entire or the majority of the firm's issuance proceeds are in US dollars. We see that when a firm chooses to issue in US dollars, usually all the proceeds are in US dollars. We also see that USD-denominated proceeds are more common in some countries than others.

Appendix A reports the issuance of dollar bonds by industry sector, separately for emerging and advanced economy firms. For EME firms, the oil and gas sector (SIC code 13) accounts for over 23% of total issuance. The telecoms and utilities sectors also represent a large portion of the issuance activity.

To the extent that the cash flows of the telecoms and utilities sectors are mainly in domestic currency, the issuance of US dollar bonds entails some currency exposure for the issuing firms. Even in the case of the oil and gas sector, although the output is priced in US dollars, the negative correlation between the oil price and the dollar entails some currency exposure ex post; in those states of the world in which the dollar is strong, cash flows are weak.

4 Determinants of dollar bond issuance

4.1 Multinomial logit

We now examine the determinants of bond issuance, with a focus on the currency of the bond issuance and the existing cash holding of the firm. We classify each firm-year observation into one of three outcomes: (1) when the firm issues US dollar-majority bonds during that year, (2) when the firm issues bonds, but not a majority of dollar-denominated bonds and (3) when the firm does not issue a bond. We will use a multinomial logit analysis for the classification of the firm's issuance decision into the three categories.

In the multinomial logit, the explanatory variables include the variables *Size*, *Leverage*,

PPE and $Cash$. We include $GDP\ growth$ and $Inflation$ to introduce macroeconomic conditions of the firm's home country as a possible influence in the firm's issuance decision. As additional macro explanatory variables, we include the appreciation of the bilateral exchange rate against the US dollar ($\Delta Exchange\ Rate$) and profitability (ROA). $\Delta Exchange\ Rate$ is computed as the log difference of nominal exchange rate*(US CPI/local CPI). In what follows, all explanatory variables are lagged by one year to reduce endogeneity issues and are winsorized at the 1% level. We include industry fixed effects at the two digit SIC level, country level fixed effects, year fixed effects, and we cluster standard errors at the country level. Country variables are from the IMF's World Economic Outlook (WEO) or International Financial Statistics (IFS). CPI values for Argentina and China are from the OECD database.

Due to the unbalanced nature of the dataset and the variation in availability of financial data across countries and firms, we make a parsimonious selection of financial variables aimed at maximizing the sample size. At the same time, we run several robustness checks for different sample selection (for instance, we augment the sample with those firms that never issued a bond during the sample period), different specifications, and additional explanatory variables.

The equations are estimated using a panel of annual observations for all firms that had at least one bond issuance during the sample period 2002–14. The case of non bond issuances (3) is the reference case, so the coefficients in each column can be interpreted as the incremental impact on the probability of issuing a US dollar or non-US dollar denominated bond relative to not issuing any bond. A positive coefficient from the multinomial logit estimation means that as the regressor increases, firms are more likely to choose alternative (1) or (2) than alternative (3).

Table 3, column 1, shows that the coefficient on the variable $Cash$ is positive and statistically significant for the sample of firms issuing US dollar denominated bonds, and negative and significant for the sample of non-USD denominated debt. In other words, higher levels of existing cash holding increase the likelihood of issuing US dollar denominated bonds, relative to issuing non-US dollar denominated bonds or to issuing no bonds.

Of the explanatory variables, we see that only $Size$ is statistically significant across all spec-

Table 3: **Multinomial Logit.** This table shows results from multinomial logit regressions. The dependent variable takes three values (i) when the majority issue is in US dollars (ii) when the majority of issues is in non-US dollars and (iii) not issuing a bond (the base case). Standard errors are clustered at the country level. Cash is the ratio of cash and short-term assets to total assets. Exchange Rate is the log difference of the real exchange rate (LCU per USD) between t and t-1. Size is the logarithm of total assets, Leverage is the ratio of total debt divided by total assets, PPE is Property, Plants and Equipment scaled by total assets, ROA is return on assets, GDP growth and Inflation are the annual growth in GDP and inflation. All independent variables are lagged by one year. All regressions include country and year fixed effects. Regressions in columns 1 and 2 also include industry fixed effects. Symbols ***, **, and * indicate statistical significance at 1, 5, and 10 percent, respectively.

	(1)		(2)		(3)	
Sample	All		Emerging		Advanced	
Currency of the bond	USD	non-USD	USD	non-USD	USD	non-USD
Cash	0.6944*	-1.2494**	1.5450***	-0.7212***	0.6086	-1.8192**
	[0.3892]	[0.5837]	[0.5292]	[0.2600]	[0.4950]	[0.7559]
ΔExchange Rate	-0.6160	-0.0835	-1.2529**	-1.8986*	0.5473	0.6448
	[0.5327]	[0.7639]	[0.5271]	[1.0934]	[0.6488]	[0.4416]
Size	0.4683***	0.4969***	0.3996**	0.3686***	0.5035***	0.5823***
	[0.0702]	[0.0420]	[0.1871]	[0.0254]	[0.0720]	[0.0456]
Leverage	0.2516	1.0973***	0.3317	0.9815***	-0.2307	1.2623***
	[0.2647]	[0.1330]	[0.6369]	[0.2048]	[0.2137]	[0.2499]
PPE	0.0024	-0.1075	-0.1565	-0.2378	0.1732	0.2977
	[0.2993]	[0.1102]	[0.3982]	[0.1823]	[0.4389]	[0.2322]
ROA	-0.3886	0.7723	0.9063	1.8875***	-1.1975	0.0864
	[0.7950]	[0.5715]	[1.3252]	[0.4343]	[0.8810]	[0.6871]
ΔGDP	0.0319*	0.0174	0.0244	-0.0614	0.0267	0.0426
	[0.0182]	[0.0215]	[0.0335]	[0.0395]	[0.0197]	[0.0377]
Inflation	0.0500**	0.0360	0.0185	-0.0238	0.0862*	0.1353
	[0.0209]	[0.0340]	[0.0232]	[0.0368]	[0.0479]	[0.0824]
Constant	-5.8683***	-7.2492***	-4.3996*	-6.1321***	-7.5326***	-6.3715***
	[1.0622]	[0.5986]	[2.3574]	[0.5461]	[0.7392]	[0.5331]
Observations	32,706	32,706	12,016	12,016	20,692	20,692
Country & Year F.E.	Y	Y	Y	Y	Y	Y
Industry F.E.	Y	Y	Y	Y	N	N

ifications and sample. *Leverage* is statistically significant only in the case of the sample of firms issuing non-USD denominated bonds, but not in the case of USD denominated bonds. In contrast, $Inflation$ is statistically significant for the sample of firms issuing USD denominated bonds. For the full sample, $\Delta Exchange\ Rate$ is not statistically significant, but we see in columns (2) that it enters with a negative sign and is statistically significant for EME firms. Higher $\Delta Exchange\ Rate$ indicates greater dollar appreciation, and so a negative coefficient indicates that bond issuance by EME firms is associated with dollar depreciation in local currency terms - a result consistent with the carry trade hypothesis. Interestingly, both the US dollar issuance and non-US dollar issuance enters significantly.

In untabulated results, we use dummies for the years 2009–14 only and find that the likelihood of issuing non-US dollar bonds, relative to non-issuing bonds, is higher for each year during 2009–14 as compared to the 2002–08 period. Issuances in US dollars surged between 2010 and 2013.

Overall, our results show differences from a simple reading of the "pecking order" hypothesis in which firms make use of internal cash resources first and resort to external debt financing only when internal cash resources are not sufficient (Myers and Majluf, 1984). The pecking order hypothesis predicts a negative relation between cash and bond issuance. A less simplistic reading of the pecking order hypothesis might be that firms are raising funds for precautionary motives while funding conditions are favourable; they are borrowing for a rainy day, even when the sun shines today. We return to this issue shortly.

In Table 3, columns 2 and 3, we divide the sample between firms in emerging (EME) and advanced economies (AE). For the sample of AE firms, the multinomial logit model does not converge when we include industry fixed effects, which are thus excluded from the specification. We observe an important difference in the variable $Cash$ between AE and EME firms. The likelihood of issuing USD bonds is higher for firms with more cash in EME firms relative to issuing non-USD bonds or not issuing any bond (column 2). In contrast, firms with lower levels of cash have a higher probability of issuing non-USD denominated bonds regardless of the level of development. We conclude that EME firms with greater cash holdings issue USD-denominated

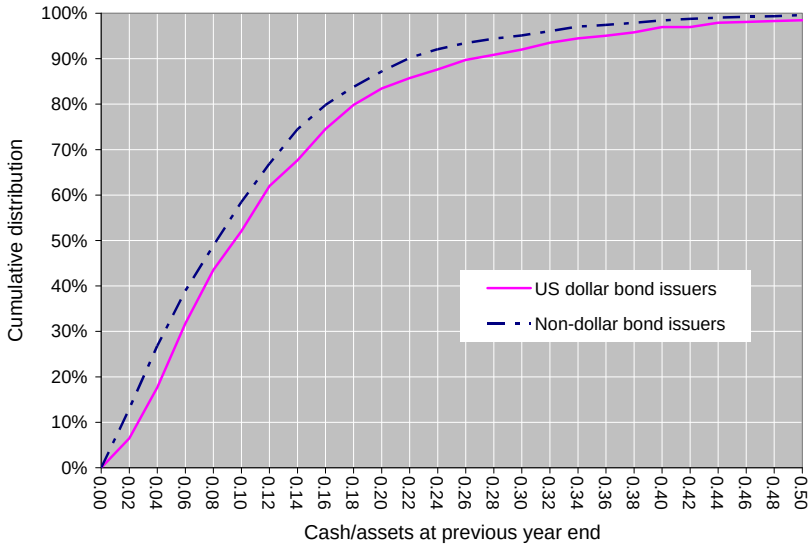

Figure 4: **Determinants of dollar bond issuance**. Cumulative distribution function of cash/assets at end of previous year conditional on currency denomination of bond issue

bonds more frequently. The same conclusion does not apply to AE firms, where the coefficient of $Cash$ is not statistically significant. Nonetheless, irrespective of whether a firm is an AE firm or EME firm, the cash holding of a firm issuing US dollar bonds is higher than the cash holding of firms that issue a non-dollar bond (t-test of equality of coefficients $Cash$ yields a p-value less than 0.001 in all specifications shown in columns 1 to 3).

Figure 4 plots the cumulative distribution function (cdf) across firms of the variable $Cash$ in the year prior to a bond issue, conditional on the currency denomination of bond issue. We see that the cdf of the cash/assets ratio for US dollar bond issuing firms lies strictly below the analogous cdf plot of the non-dollar issuance firms, implying that the cross-section frequency density of the cash/assets ratio of firms issuing dollar bonds dominates in a first-degree stochastic dominance sense the analogous density of firms issuing non-dollar bonds. Among other things, this means that firms issuing dollar bonds tend to have higher levels of cash than firms issuing non-dollar bonds.

As noted already, the coefficient of $\Delta Exchange\ Rate$ is negative and statistically significant

for EME firms for both cases of USD and non-USD denominated bonds issuances, indicating that an appreciation of the local currency w.r.t. US dollar leads to greater borrowing by EME firms. Our results thus show that real currency appreciation and corporate credit growth tend to go together in emerging economies, a result that mirrors the findings in Gourinchas and Obstfeld (2012), who have found that the two most robust predictors of financial crises in general are domestic credit growth and real currency appreciation. Results do not change qualitatively if we run regressions after excluding $Cash$ or $Leverage$.

Overall, these results highlight the existence of significant differences between AE and EME firms in the decision of issuing bonds and in the choice of the currency of denomination of the issuance. Taken together, our initial evidence suggests that liquidity needs are not the only determinant of dollar issuances for EME firms. They issue more dollar bonds when they have more cash. Also, consistent with the carry trade, local currency appreciation is associated with dollar bond issuance for EME firms.

4.2 Proportion of US dollar bond issuances

The multinomial logit analysis presented above provides evidence on the determinants of USD-denominated issuance. We now go deeper to examine the relative magnitude of bond proceeds in US dollars. In this subsection, we limit the sample to the firm-year observations with a bond issuance and focus on the choice of currency issue's.

We run tobit estimations where the dependent variable is the ratio of bond proceeds in US dollars over the total bond proceeds in a year. We use the same independent regressors, fixed effects and clustering as in the multinomial specification.

Table 4, column 1, shows that the coefficient of $Cash$ is positive and significant, suggesting that firms with more cash issue more in US dollars. The effect is sizeable. An increase of 1 percentage point in the cash/assets ratio is associated with a greater dollar share of 1.8%, which is around 9% of the mean. This evidence is confirmed when adding additional control variables (column 2). Column 3, however, shows that the positive sign on $Cash$ is mostly driven by the sample of EME firms; the coefficient of $Cash$ interacted with the EME dummy positive and

Table 4: **USD-denominated bond proceeds.** This table shows tobit regressions where the dependent variable is the ratio of bond proceeds denominated in US dollars over total bond proceeds in a fiscal year (columns 1 to 5) and OLS where the dependent variable is the logarithm of one plus the US dollar amount of the bond proceeds (column 6). Cash is the ratio of cash and short-term assets to total assets. Size is the logarithm of total assets, Leverage is the ratio of total debt divided by total assets, PPE is Property, Plants and Equipment scaled by total assets, GDP growth and Inflation growth are the annual growth in GDP and inflation. Additional controls are the change in the real exchange rate, ROA, and a dummy equal to 1 during the period 2008-2014. All regressions include country, year, and industry fixed effects. Standard errors, corrected for clustering of observations at the country level, are reported in brackets. ***, **, and * indicate statistical significance at 1, 5, and 10 percent, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Sample	All	All	All	Post 07	Pre 07	USD amount
Cash	1.8103***	1.6153**				
	[0.6771]	[0.6312]				
Cash*EME			2.9795***	3.0205***	3.2004**	7.0038***
			[0.5629]	[0.5185]	[1.4031]	[1.6420]
Cash*AE			1.2377	1.0841	1.0395	3.4226
			[0.8418]	[0.8929]	[1.4391]	[2.2410]
Size	0.1895**	0.1810**	0.1844**	0.1818**	0.1852	1.0602***
	[0.0819]	[0.0878]	[0.0834]	[0.0850]	[0.1183]	[0.2706]
Leverage	-0.5964	-0.4435	-0.6116	-0.5472	-0.7325	-1.0234
	[0.4761]	[0.3974]	[0.4744]	[0.5857]	[0.4694]	[1.2313]
PPE	-0.1887	-0.2881	-0.1721	-0.3426	0.3184	-0.6115
	[0.3571]	[0.3467]	[0.3565]	[0.3538]	[0.5192]	[0.9838]
ΔGDP	0.0580	0.0577*	0.0570	0.0668*	0.0554	0.1703**
	[0.0366]	[0.0338]	[0.0369]	[0.0356]	[0.1015]	[0.0840]
Inflation	0.0550	0.0688**	0.0549	-0.0173	0.0055	0.1037
	[0.0359]	[0.0320]	[0.0362]	[0.0457]	[0.0689]	[0.0839]
ΔExch Rate		0.5383				
		[0.6925]				
ROA		0.2016				
		[0.9805]				
Postcrisis		-0.2865				
		[0.2859]				
Constant	1.2631	1.2391	1.2507	0.9447	3.8758***	-1.6019
	[1.5534]	[1.4012]	[1.5692]	[1.7877]	[1.1284]	[4.2807]
Observations	9,243	8,762	9,243	6,886	2,357	9,243

significant, whereas the coefficient of $Cash$ interacted with the AE dummy is not statistically significant. This result holds both before and after the financial crisis (columns 4 and 5). In column 6 we use the logarithm of one plus the total US dollar proceeds as an alternative dependent variable, run an OLS specification, and find similar results. Overall, these results add weight to earlier evidence that liquidity needs are not the main driver of US dollar bond issuance for EME firms.[3]

4.3 Carry trades

We now turn to carry trades as a possible motivation for US dollar issuance by EME firms. There is a body of previous work on the subject. A study by Allayannis et al (2003) finds that interest rate differentials explain the use of foreign currency debt for a sample of the largest East Asian corporations. They find that the higher the difference in interest rates, the higher is the level of foreign currency debt (see also Kim and Stulz (1988)). Miller and Puthenpurackal (2002) find that foreign firms tend to issue in the Yankee market when the relative interest cost is low. Graham and Harvey (2001) find that 44% of firms responding to their survey report that lower foreign interest rates are "important" or "very important" in the decision to use foreign currency debt.

In the spirit of earlier studies, we include a proxy for carry trade activities. We define the variable $CarryTrade$ as the difference between the domestic money market rate and the US money market rate, averaged over the year (from the IFS). We take the T-bill rate for those countries where the money market rate is not available. We then divide the interest rate differential by the implied volatility derived from three-month at-the-money exchange rate options, a measure that captures the ex ante attractiveness of carry trades. As an alternative proxy, we also use the *Carry Return Index* (available on Bloomberg), that cumulates the returns

[3] In untabulated robustness checks, we re-run columns 3 to 6 by splitting the sample between EME and AE firms. We find that the coefficient of $Cash$ is always positive and statistically significant in the subsample of EME firms, whereas it is statistically insignificant in the subample of AE firms.

from interest rate differentials and exchange rate movements.

Column 1 in Table 5 reports results with the log of $1+CarryTrade$ added as an independent variable in the tobit regression. All the independent variables are lagged by one year, as before. We see that the coefficient of the carry trade variable is positive and significant, suggesting that firms issue more US dollar bonds when ex ante carry trade opportunities are higher. This result is confirmed when we use the log difference of the Bloomberg *Carry Return Index* (column 2). In an alternative specification (not shown), we scale the interest rate differential by the annualised standard deviation of the exchange rate changes and find the same results.

In columns 3 and 4, we split the sample by country-years where $CarryTrade$ is above (below) the sample median, and in columns 5 and 6 we do the same by using the Bloomberg *Carry Return Index.* We see that the variable $Cash$ remains significant in the subsample of country-years where carry trade opportunities are high (columns 3 and 5). In contrast, in the subsample of country-years with low carry trade attractiveness, $Cash$ is no longer statistically significant (columns 4 and 6).

We interpret these results as evidence that the positive association between cash holdings and dollar bond issuance is driven, in part, by carry trade opportunities. This is in line with reports that corporates in some jurisdictions were seeking to take advantage of international interest rate differentials by borrowing overseas and depositing the proceeds in local banks, subscribing to money market mutual funds or purchasing high-yielding wealth management products (see BIS Quarterly Review (September 2014)).

4.4 Alternative hypotheses

The initial evidence points to EME firms with large cash holdings having a higher propensity to issue US dollar bonds. In order to delve deeper into the issue and tie down better the dollar carry trade activity, we look at two alternative hypotheses that could also serve as candidate explanations of our findings. The first is precautionary issuance by firms and the second is the role of sales in the United States. We take each in turn.

Table 5: **Carry Trades.** This table shows tobit regressions where the dependent variable is the ratio of bond proceeds denominated in US dollars to total bond proceeds in a fiscal year. Carry Trade (CT) is the money market interest rate differential divided by the implied volatility derived from three-month at-the-money exchange rate options. Carry Trade (CT) Index is the Bloomberg index that cumulates returns for interest rate differentials and exchange rate movements. Cash is the ratio of cash and short-term liabilities divided by total assets. Size is the logarithm of total assets, Leverage is the ratio of total debt divided by total assets, PPE is Property, Plants and Equipment scaled by total assets, GDP growth and Inflation growth are the annual growth in GDP and inflation. Standard errors, corrected for clustering of observations at the country level, are reported in brackets. ***, **, and * indicate statistical significance at 1, 5, and 10 percent, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Sample	All	All	High CT	Low CT	High CT Index	Low CT Index
Carry Trade	1.9561*					
	[1.0934]					
ΔCarry Trade Return Index		3.1997**				
		[1.4201]				
Cash	2.7119**	2.4488**	3.3783***	0.5123	2.2976***	1.0461
	[1.3079]	[1.1831]	[0.8073]	[0.9534]	[0.8793]	[0.9093]
Size	0.1280	0.1091	0.1611	0.1941**	0.2303***	0.1131
	[0.0924]	[0.0977]	[0.1201]	[0.0934]	[0.0737]	[0.1278]
Leverage	-1.3549***	-1.6503***	-0.9963	-0.1516	-0.2510	-0.9314
	[0.3725]	[0.5336]	[0.8205]	[0.3727]	[0.3880]	[0.7577]
PPE	-0.0598	-0.1118	0.3028	-0.6863**	0.1824	-0.6685
	[0.7774]	[0.7784]	[0.4602]	[0.3171]	[0.3788]	[0.4647]
ΔGDP	-0.0936	-0.1017	0.0722	0.0541*	0.0546	0.0800**
	[0.0809]	[0.0683]	[0.0532]	[0.0322]	[0.0484]	[0.0316]
Inflation	0.0403	0.1485	0.0338	0.0543	0.0371	0.0763
	[0.1081]	[0.1340]	[0.0406]	[0.0500]	[0.0557]	[0.0475]
Constant	-2.4021	-1.9266	0.4759	-2.4362***	-1.6851	-0.1834
	[1.4666]	[1.5325]	[2.6848]	[0.9385]	[1.1505]	[1.2115]
Observations	7,949	8,868	4,550	4,693	4,699	4,544
Year, Industry FE	Y	Y	Y	Y	Y	Y
Country FE	N	N	Y	Y	Y	Y

4.4.1 Precautionary motive

A simple reading of the "pecking order" hypothesis would suggest a negative relation between cash and bond issuance. However, a more sophisticated reading of the pecking order hypothesis might be that firms are raising funds for precautionary motives while funding conditions are good; they are borrowing for a rainy day, even when the sun shines today. We examine whether precautionary issuance could be an alternative explanation of our findings.

If precautionary motives are at play, we would observe it more often in firms that are dependent on external funding sources. Rajan and Zingales (1998) approached financing needs by examining the sector fundamentals of an industry - that external financing needs would vary across sectors for technological reasons related to industry characteristics. They showed that firms in industries that require significant outside financing relative to the internally generated cash flows will grow relatively less in the presence of market frictions and the high cost of funding. In our setting, if the low cost of funding alleviates funding constraints, firms that rely on external financial markets would benefit more and, consequently, issue more bonds.

We introduce the variable $FinDep$ used by Rajan and Zingales (1998), as the index of external financial dependence at the industry level. The external financial dependence (*FinDep)* index is constructed at the industry level based on data of US firms. $FinDep$ is defined as (Capital expenditures − Cash flow from operations) / Capital expenditures, where both capital expenditures and cash flow are summed over a 10-year window (1990 to 2000) for each US firm. We then take the median value of the ratio among firms with the same two-digit US SIC code as the financial dependence index for that particular industry. We re-run the previous multinomial logit specifications by adding the variable $FinDep$.

Table 6, column 1, shows that $FinDep$ is not a significant determinant of bond issuances for EME firms and $Cash$ continues to be statistically significant. In contrast, column 2 shows that $FinDep$ is positive and statistically significant in the case of USD-denominated bond issuances for the sample of AE firms, while $Cash$ is not, suggesting that the precautionary motive is more consistent with AE firms. We obtain similar results when we restrict the sample to manufactur-

ing industries as in Rajan and Zingales (1998) (not shown). Taken together, these results show that the precautionary motive associated with the anticipation of financial constraints is not a determinant of US dollar issuance by EME firms, whereas AE firms with higher external financing dependence do show a higher probability of issuing US dollar bonds. In a nutshell, AE firms behave differently from EME firms; AE firms' behaviour is consistent with the precautionary motive, but EME firms' behaviour is not.

Finally, in columns 3 and 4 we re-run the tobit specifications by adding the variable $FinDep$ and for the sample of all firms and the subsample of manufacturing industries only, respectively, with high carry trade opportunities. The coefficient of the variable $Cash$ continues remaining positive and statistically significant whereas the coefficient of $FinDep$ is not. This confirms that precautionary motives do not explain the US carry trade behaviour.

4.4.2 US sales

A further alternative hypothesis could be that firms issue US dollar bonds if they have reliable dollar cash flows due to sales in the United States. To address this potential alternative hypothesis, we obtained data on the sales in the United States reported by each firm (from Worldscope, Geographic Segment data). Such data have, however, some limitations, because in the majority of cases (about 60%) firms report US sales combined with sales in other geographic areas. For this reason, we construct a more comprehensive dummy equal to 1 when a firm reports sales in the US and North America region, and 0 otherwise (*US Sales dummy*).

Column 1 replicates the multinomial specification for the subsample of firms that report US sales. Indeed, we see that the coefficient of $Cash$ is not statistically significant in the case of dollar-denominated bond issuances. In column 2, we further restrict the sample to firms that have US sales during periods of favourable carry trades. The coefficient of $Cash$ continues to be statistically insignificant. When we run the multinomial logit for the sample to firms that do not have US sales and during periods of high carry trade, we find that $Cash$ is positive and statistically significant in the case of USD-denominated bonds issuance (not reported).

Columns 3 and 4 replicate the tobit specification shown in Table 5 during periods of favourable

Table 6: **Precautionary Motives.** This table shows multinomial logit (columns 1 and 2) and tobit regressions (columns 3 and 4) where the dependent variable is the ratio of bond proceeds denominated in US dollars over total bond proceeds in a fiscal year. FinDep is the Rajan and Zingales (1998) industry-level index of external financing dependence. Carry Trade (CT) is the money market interest rate differential divided by the implied volatility derived from three-month at-the-money exchange rate options. Cash is the ratio of cash and short-term liabilities divided by total assets. Exchange Rate is the log difference of the real exchange rate (LCU per USD) between t and t-1. ROA is return on assets, Size is the logarithm of total assets, Leverage is the ratio of total debt divided by total assets, PPE is Property, Plants and Equipment scaled by total assets, GDP growth and Inflation growth are the annual growth in GDP and inflation. Standard errors, corrected for clustering of observations at the country level, are reported in brackets. ***, **, and * indicate statistical significance at 1, 5, and 10 percent, respectively.

	(1)		(2)		(3)	(4)
	Multinomial Logit		Multinomial Logit		Tobit	Tobit
Sample	Emerging		Advanced		High CT	High CT
Currency of the bond	USD	non-USD	USD	non-USD		& Manufac
FinDep	0.1585	0.0262	0.1891**	-0.0335	0.2178	0.0536
	[0.1260]	[0.0314]	[0.0802]	[0.0543]	[0.1522]	[0.1158]
Cash	1.9252***	-0.6686*	0.4708	-1.8365**	4.0352***	2.9436**
	[0.6100]	[0.3733]	[0.4639]	[0.7569]	[1.0341]	[1.2366]
ΔExchange Rate	-1.2948**	-1.8561*	0.5345	0.6404		
	[0.5406]	[1.0862]	[0.6505]	[0.4385]		
ROA	1.1975	1.7036***	-1.1457	0.1092		
	[1.4457]	[0.4817]	[0.8446]	[0.6850]		
Size	0.4382**	0.3297***	0.5054***	0.5814***	0.2212	0.1716
	[0.1862]	[0.0172]	[0.0727]	[0.0460]	[0.1390]	[0.1896]
Leverage	0.2789	1.0107***	-0.1104	1.2521***	-1.6023*	-1.6420
	[0.5589]	[0.2594]	[0.2258]	[0.2414]	[0.8823]	[1.1215]
PPE	0.1466	-0.3251**	0.1723	0.2870	0.7056	-0.0431
	[0.2581]	[0.1632]	[0.4328]	[0.2260]	[0.4616]	[0.6610]
ΔGDP	0.0239	-0.0597	0.0273	0.0431	0.0653	0.1202
	[0.0335]	[0.0391]	[0.0196]	[0.0378]	[0.0557]	[0.0736]
Inflation	0.0183	-0.0239	0.0865*	0.1348	0.0429	0.0618
	[0.0238]	[0.0361]	[0.0480]	[0.0828]	[0.0435]	[0.0515]
Constant	-5.8227***	-5.6870***	-7.6553***	-6.3457***	0.2440	-2.6979
	[2.1629]	[0.3063]	[0.7318]	[0.5457]	[2.0441]	[1.8021]
Observations	12,016	12,016	20,675	20,675	4,549	2,093
Year and Country F.E.	Y	Y	Y	Y	Y	Y
Industry F.E.	N	N	N	N	N	N

carry trade activities. Specifically, we run tobit regressions for the sample of country-years where $CarryTrade$ and $Carry\ Return\ Index$, as previously defined, are above the sample median. We add the variable *US Sales dummy* (lagged) by itself and also interacted with the variable $Cash$. We see that both *US Sales dummy* and its interaction with $Cash$ are statistically insignificant. Importantly, the difference in the estimated coefficients of firm-year observations with and without US sales over the range of values of $Cash$ is not statistically different from zero.[4] This evidence implies that there is no statistical difference in the choice of the bond's currency denomination as a function of cash between firms with or without US sales, and confirms that risk management motives do not drive the positive association between $Cash$ and currency denomination of bond issuances.

4.5 Back-to-back issuance

In our sample we have firms that are frequent issuers, with bond issuance in consecutive years. One concern may be that such back-to-back issuance introduces serial correlation in the errors. We tackle this issue by excluding back-to-back issues and re-run the multinomial logit and tobit specifications.[5] Table 8, column 1, shows results from multinomial logit regressions for the subsample of EME firms, and confirms the results found in Table 3 that higher $Cash$ is associated with a higher probability of USD-denominated issuance. Column 2 shows results from tobit estimations and confirms that the sample of EME firms drives the positive association between Cash and USD issuance found in Table 4. Finally, column 3 shows that Cash remains

[4]The interpretation of the coefficient of the interaction term in the tobit regression is different from the OLS because the value of the interaction effect changes depending upon the value of the continuous predictor variable. In particular, the marginal effect of a change in both interacted variables is not equal to the marginal effect of changing just the interaction term. The sign may be different for different observations and the statistical significance cannot be determined from the z-statistics of the regressions. We therefore compute the derivative of the dependent variable (USD bond ratio) with respect to *Cash* as if all firms had US sales, and subtract it from the derivative of the dependent variable with respect to *Cash* as if all firms had no US sales, over the range of values of *Cash* (see the STATA function *margins* for a description).

[5]In untabulated regressions, we also re-run our multinomial logit and tobit regressions by adding a lagged dependent variable and dummy variables for back-to-back issuances. We also re-run our specifications after excluding frequent issuing firms (those with more than three bond issues over the entire sample period). Our results are robust to these additional tests.

Table 7: **US Sales.** This table shows multinomial logit (columns 1 and 2) and tobit regressions (columns 3 and 4) where the dependent variable is the ratio of bond proceeds denominated in US dollars over total bond proceeds in a fiscal year. Carry Trade (CT) is the money market interest rate differential divided by the implied volatility derived from three-month at-the-money exchange rate options. Carry Trade (CT) Index is the Bloomberg index that cumulates returns for interest rate differentials and exchange rate movements. Cash is the ratio of cash and short-term liabilities divided by total assets. US sales dummy is a dummy equal to 1 when a firm reports sales in the US, North America region and similar, and 0 otherwise. Exchange Rate is the log difference of the real exchange rate (LCU per USD) between t and t-1. ROA is return on assets, Size is the logarithm of total assets, Leverage is the ratio of total debt divided by total assets, PPE is Property, Plants and Equipment scaled by total assets, GDP growth and Inflation growth are the annual growth in GDP and inflation. Standard errors, corrected for clustering of observations at the country level, are reported in brackets. ***, **, and * indicate statistical significance at 1, 5, and 10 percent, respectively.

	(1)		(2)		(3)	(4)
Model	Multinomial Logit		Multinomial Logit		Tobit	Tobit
Sample	US Sales >0		US Sales >0 & High CT		High CT	High CT
Currency of the bond	USD	non-USD	USD	non-USD		Index
Cash	-0.0924	-2.1148***	0.4741	-2.2503**	3.0687***	1.8644**
	[1.2555]	[0.7781]	[1.1724]	[1.0790]	[0.9208]	[0.8762]
ΔExchange Rate	0.9409*	0.0734	0.9194	-2.0764*		
	[0.4993]	[0.5253]	[0.8988]	[1.1496]		
US Sales dummy					0.5193	0.4590
					[0.4453]	[0.2861]
Cash*US Sales dummy					0.9865	1.2671
					[1.5100]	[1.0313]
ROA	-1.0261	0.8877	-0.6158	2.0932*		
	[1.5134]	[0.8701]	[1.3449]	[1.2016]		
Size	0.5221***	0.5867***	0.3734***	0.6310***	0.1232	0.1867**
	[0.0973]	[0.0778]	[0.1002]	[0.0503]	[0.1294]	[0.0813]
Leverage	0.3106	1.3991***	-0.1585	2.0284***	-1.0162	-0.2716
	[0.4115]	[0.4114]	[0.3906]	[0.4491]	[0.8266]	[0.3881]
PPE	0.2570	0.2104	0.7683**	-0.2411	0.3026	0.1800
	[0.4166]	[0.2184]	[0.3771]	[0.3937]	[0.4410]	[0.3609]
ΔGDP	0.0566**	0.0151	0.1341***	0.0466	0.0685	0.0559
	[0.0267]	[0.0261]	[0.0392]	[0.0433]	[0.0515]	[0.0474]
Inflation	0.0796**	0.1030*	0.1036**	0.0567	0.0344	0.0352
	[0.0323]	[0.0541]	[0.0428]	[0.0482]	[0.0410]	[0.0558]
Constant	-6.1447***	-8.5901***	-4.9281***	-9.1506***	0.5224	-1.4534
	[1.1693]	[0.9681]	[1.1892]	[0.6858]	[2.5611]	[1.1774]
Observations	9,233	9,233	3,544	3,544	4,550	4,699

significant in the subsample of country-years when carry trade opportunities are high, as we found in Table 5.

4.6 Endogeneity

The specifications employ independent variables lagged by one year to reduce endogeneity. In the absence of suitable instruments, we modify the tobit specification by using a dynamic panel data GMM estimation. We chose the system GMM specification given that numerous studies show that the system GMM due to Blundell and Bond (1998) is superior to the difference GMM of Arellano and Bover (1995).[6] To avoid instrument proliferation, we use just one lag and combine instruments into smaller sets, yielding a total of 19 instrumental variables. All the firm-level variables are treated as endogenous and we lag the dependent variable (the ratio of USD-denominated bond proceeds over total proceeds *USD/Tot Proceeds*) by one year.

The test passes all the required conditions. We find evidence of first- but not second-order serial correlation (AR(1) p-value =0.000 and AR(2) p-value=0.171). The Hansen J-test of overidentification restrictions yields a p-value of 0.561, thus validating our instruments. Finally, the difference-in-Hansen test for the exogeneity of a subset of our instruments yields a J-statistic with a p-value equal to 0.488. As such, we cannot reject the hypothesis that the additional subset of instruments used in the system GMM estimation is exogenous as required by the system GMM specification. Table 8, column 4, shows that the coefficient of $Cash$ remains positive and significant in the case of EME firms, suggesting that higher cash holdings are associated with a higher proportion of USD issuances only for EME firms.

4.7 Additional robustness tests

We run numerous additional robustness tests that are not reported for space reasons. Commodity producers in the oil and gas industry earn much of their revenues in US dollars. Similar to the argument above related to foreign profits and sales, they are more likely to issue USD debt

[6] We also employ a tobit model that treates the variable $Cash$ as endogenously determined and uses its lagged values as instruments (ivtobit).

Table 8: **Back-to-back issuances and Endogeneity.** This table shows multinomial logit (column 1) and tobit regressions (columns 2 and 3) where the dependent variable is the ratio of bond proceeds denominated in US dollars over total bond proceeds in a fiscal year. Repeated issues are excluded from the sample. Column 4 presents results from a system GMM specification. Cash is the ratio of cash and short-term assets to total assets. EME (AE) is a dummy equal to 1 identifying EME (AE) firms, and 0 otherwise. High CT identifies the subsample of country-years when the variable Carry Trade is above the sample mean. Exchange Rate is the log difference of the real exchange rate (LCU per USD) between t and t-1. ROA is return on assets, Size is the logarithm of total assets, Leverage is the ratio of total debt divided by total assets, PPE is Property, Plants and Equipment scaled by total assets, GDP growth and Inflation growth are the annual growth in GDP and inflation. Standard errors, corrected for clustering of observations at the country level, are reported in brackets. ***, **, and * indicate statistical significance at 1, 5, and 10 percent, respectively.

	(1)		(2)	(3)	(4)
VARIABLES	Multinomial Logit		Tobit	Tobit	GMM
	USD	non-USD		High CT	
Cash	1.4641**	-1.0239***		5.5066***	
	[0.6576]	[0.3419]		[1.6189]	
Cash*EME			5.7324***		0.6939*
			[1.2470]		[0.3642]
Cash*AE			1.4727		-0.1366
			[1.8384]		[0.9478]
ΔExchange Rate	-1.5377***	-2.1421*			
	[0.5843]	[1.2057]			
ROA	1.0711	1.5392***			
	[1.3993]	[0.4089]			
Size	0.2242	0.2234***	0.1550	0.1180	-0.0220
	[0.1905]	[0.0211]	[0.1660]	[0.2877]	[0.0484]
Leverage	-0.2713	0.4683***	-0.9218	-2.2894	-0.5420***
	[0.7255]	[0.1665]	[1.1288]	[1.8066]	[0.1881]
PPE	-0.0706	-0.1737	0.1358	1.0780	0.2358
	[0.2718]	[0.1276]	[0.6764]	[0.7483]	[0.1875]
ΔGDP	0.0363	-0.0783*	0.1162	0.1758	-0.0068*
	[0.0420]	[0.0419]	[0.0820]	[0.1217]	[0.0035]
Inflation	0.0112	-0.0280	0.0466	0.0199	-0.0012
	[0.0182]	[0.0424]	[0.0644]	[0.0612]	[0.0060]
USD/Tot Proceeds $t-1$					0.4461**
					[0.2107]
Constant	-3.4490	-21.2167***	3.2193	3.1314	0.4182
	[2.3697]	[1.1429]	[3.6362]	[4.3122]	[0.4608]
Observations	11,184	11,184	5,250	2,774	3,993
AR(1)					0.000
AR(2)					0.171
Hansen J test					0.561
Difference in Hansen test					0.488

for risk management reasons. We re-run all the regressions above (multinomial logit and tobit) after excluding the oil and gas industry (SIC code= 13) and we find that our results are not driven by this specific industry. Due to the unbalanced nature of the panel, we also re-run our regressions after excluding countries (one at the time) with a large number of bond issuances: Japan, Korea, Canada, China and India.

One potential drawback to the multinomial logit approach is the underlying assumption of the independence of irrelevant alternatives. This assumes that the choice between any two financing alternatives be independent of the existence of a third choice. We address this issue in two ways. First, we run a maximum-likelihood probit model with a selection correction that takes account of the firm issuing a bond. We specify a selection equation in which the firm first chooses whether or not to issue a corporate bond, and then chooses the currency of denomination. For the sample of EME firms, we find that an appreciation of the currency statistically increases the likelihood of bond issuances (first stage), and higher levels of cash increase the likelihood of issuing USD-denominated bonds (second stage).

As an additional check, we run separate binary logit regressions over the three choices and verify that the qualitative results continue to hold. For the sample of EME firms, we find that in the binary logit model for issuing a bond versus not issuing a bond, the coefficient of $\Delta Exchange\ Rate$ is negative and statistically significant, whereas $Cash$ is not. In the binary choice between issuing USD- versus non-USD denominated bonds, we find that higher $Cash$ is statistically significant while currency appreciation is not statistically significant. In the binary choice between issuing USD-denominated bonds versus not issuing at all, we find that both currency appreciation and higher cash holdings increase the likelihood of issuing USD denominated bonds. Despite some variation with multinomial logit regression results, the key findings about USD issuance and the impact of the exchange rate and cash continue to hold.

We have used a parsimonious selection of variables to maximize the sample size. For robustness, we also add additional control variables: the market to book ratio, market capitalisation, and carry trade indicators. In additional untabulated regressions, we tried firm fixed effects in

our multinomial logit regression, but unsuccessfully as convergence was not achieved.[7]

We also augment the sample with the firms that never issued a bond over the period 2002-14 and re-estimate the multinomial logit regressions. The sample size now comprises a total of about 257,000 observations. The sample selection is now highly dominated by firms that never have accessed bond markets (about 87% of the sample).[8] Our main results are confirmed and the coefficient of $Cash$ for USD bond issuances continues to be positive and significant for the subsample of emerging economies and not significant for the subsample of advanced economies. Finally, we also run specifications with standard errors clustered at the firm level. The standard errors are generally smaller. This may be due to the nature of the unbalanced panel and the small number of observations in some clusters that would produce biased standard errors. For this reason, we continue clustering standard errors at the country level.

5 Use of proceeds of bond issuance

So far, we have found that firms globally have increased bond issuances, EME and AE firms differ in many ways, and EME firms have increasingly issued USD-denominated debt. What do firms do with these bond proceeds? If the main reason is related to external financing needs, then firms will be less likely to save such proceeds as cash. In contrast, if capital needs are not the main reason and other conditions, such as the investors reaching for the yield, favourable liquidity conditions or carry trade opportunities, are behind firms' capital decisions, then firms will more likely save the proceeds as cash.

To answer our question, we employ a specification similar to Kim and Weisbach (2008) and Erel, Julio, Kim and Weisbach (2011) that allows funds from bond issuances and other sources of incremental funds available to the firm to enter the specification separately. For a sample of

[7] Computing resources used in this specification were provided by the American University High Performance Computing System, which is funded in part by the National Science Foundation (BCS-1039497).

[8] The median size of the sample of firms that never issued a bond over the sample period 2000–14 is 112.5 (in USD millions), which is lower compared with the median size (1,458.6 USD million) of the sample of firms that issued at least one bond over the period. This seems to be consistent with the evidence that smaller firms have less access to bond markets due to large issuance costs.

US firms, Erel, Julio, Kim and Weisbach (2011) find that during a recession, high-quality issuers increase their issuances beyond what is necessary, because financing is available at moderate cost, and save the proceeds as cash. They argue that this evidence is in line with the flight-to-quality argument as macroeconomic conditions affect investor demand for securities.

In a similar vein, our objective is to investigate whether global liquidity conditions and the search for the yield affect investor demand for bonds. If so, we should observe firms issuing bonds beyond what it is necessary and saving proceeds as cash, especially in emerging countries where investors have been actively searching for yield.

The specification normalises each source of funds by total assets and takes the log of one plus the normalised cash flow as a way to minimize the effect of outliers. We define:

$$Y = \ln\left[\left(\left(V_t - V_0\right)/\text{TotalAssets}_0\right) + 1\right]$$

where V_0 is the cash and short-term investments at the fiscal year-end prior to the bond issuance (date 0) and V_t is the cash and short-term investments at the fiscal year-end t years after date 0.

As before, we aggregate all the bond proceeds within a fiscal year at the ultimate parent level (*Bond Proceeds*). We then compute the bond proceeds accumulated over a time horizon t as:

$$\text{Bond Proceeds}_t = \sum_{i=1}^{t} \left(\frac{\text{Bond Proceeds}_i}{\text{Total Assets}_0} \right)$$

Finally, we compute the total sources of funds for the firm, of which bond issuance is a subset. Following Kim and Weisbach (2008), *Total Sources of Funds* is the sum of funds from operations, sale of property, plant and equipment, long-term debt issuance, and sale of common and preferred stock (from Worldscope and Compustat for Canadian firms). The variable *Total Sources of Funds* thus includes internally generated cash flows from firm's continuing operations, as well as other sources of funds from investment and financing activities. We define the variable

Other Sources that captures all non-bond sources of financing as:

$$\text{Other Sources}_t = \ln\left[\sum_{i=1}^{t}\left(\text{Total Sources of Funds}_i - \text{Bond Proceeds}_i\right)/\text{Total Assets}_0 + 1\right]$$

We estimate the following regressions, where standard errors are clustered by country:

$$Y = \alpha + \beta_1 \ln\left[\left(\frac{\text{Bond Proceeds}_t}{\text{Total Assets}_0}\right) + 1\right] + \beta_2 \ln\left[\left(\frac{\text{Bond Proceeds}_t}{\text{Total Assets}_0}\right) + 1\right] * \text{ EME dummy}$$

$$+ \beta_3 \text{ EME dummy} + \delta \ln\left[\left(\frac{\text{Other Sources}_t}{\text{Total Assets}_0}\right) + 1\right] + \chi \ln\left(\text{Total Assets}_0\right)$$

$$+ \sum_{i=2002}^{2013} \theta_i \cdot \text{year dummy} + \sum_{i=1}^{63} \phi_i \cdot \text{industry dummy} + \sum_{i=1}^{47} \lambda_i \cdot \text{country dummy} + \varepsilon$$

The coefficients β_1 and β_2 capture the proportion of proceeds from bond issues that is used to increase Y, while δ measures the proportion of other sources of funds that is used to increase Y. Specifically, the coefficient β_1 measures the proportion of bond proceeds used to increase Y in AE firms over the period 2002–13. The coefficients β_2 captures the incremental impact of bond proceeds in EME firms.

Differences in the coefficients from the bond proceeds (β) and those from other sources of capital (δ) will reflect differences in propensities to use the different sources of capital, thus providing us insights about the underlying reasons for bond issuances. Because we want to focus on the uses of bond proceeds, regressions are run for the years when a firm issues a bond. For instance, if a firm issues a bond at any time during its fiscal year ending in 2002, we look at the increases in cash during the fiscal year periods 2001–02 ($t = 1$), 2001–03 ($t = 2$), and 2001–04 ($t = 3$). In the case of a firm that issues a bond in 2013, we are able to compute only the effect over the period 2012–13 because our financial data stop in 2013.

Results from columns 1 to 3 in Table 9 show that on average firms use proceeds from bond

Table 9: **Cash holdings from bond-raising activities.** This table shows results from the use of funds regression (equation (1)). The dependent variable is the natural log of the change in the ratio of cash and short-term liabilities over one-to-three year horizons divided by total assets, plus one. Bond is the ratio of bond proceeds to total assets. Other Sources is the ratio of the difference in total sources of funds and bond proceeds to total assets over one-to-three year horizons. EME is a dummy equal to 1 for firms in emerging economies, 0 otherwise. In(TA) is the logarithm of total assets. All regressions include year, industry and country fixed effects. Standard errors (clustered by country) are reported in brackets. ***, **, and * indicate statistical significance at the 1, 5, and 10 percent levels, respectively. The sample period is from 2002 to 2013.

		(1)	(2)	(3)	(4)	(5)	(6)
Periods		t=1	t=2	t=3	t=1	t=2	t=3
Years		All	All	All	Post 2007	Post 2007	Post 2007
ln(Bond/TA+1)	β_1	0.1025***	0.0993***	0.1075***	0.1062***	0.0833***	0.0937**
		[0.0160]	[0.0230]	[0.0342]	[0.0207]	[0.0264]	[0.0414]
ln(Bond/TA+1)$*EME$	β_2	0.0262	0.0595*	0.0944*	-0.0004	0.0662*	0.1165*
		[0.0273]	[0.0323]	[0.0533]	[0.0259]	[0.0367]	[0.0588]
ln(Other/TA+1)	δ	0.0184	0.0341***	0.0409***	0.0158	0.0335***	0.0357***
		[0.0118]	[0.0111]	[0.0122]	[0.0126]	[0.0122]	[0.0130]
EME		0.0017	-0.0632***	-0.0987***	-0.0202***	-0.0032	-0.0681***
		[0.0048]	[0.0055]	[0.0113]	[0.0048]	[0.0058]	[0.0151]
ln(TA)		0.0009	-0.0017	-0.0046**	0.0011*	-0.0022*	-0.0050**
		[0.0006]	[0.0011]	[0.0017]	[0.0006]	[0.0013]	[0.0020]
Constant		0.0454*	0.0817*	0.1165**	0.0389	0.0126	0.0669**
		[0.0250]	[0.0410]	[0.0466]	[0.0265]	[0.0206]	[0.0272]
# countries		47	47	47	47	47	47
Observations		7,109	6,059	4,709	5,214	4,623	3,641
R-squared		0.082	0.118	0.159	0.083	0.120	0.163
					p-value		
$\beta_1 = \delta$		0.000	0.018	0.070	0.000	0.095	0.202
$\beta_1 + \beta_2 = \delta$		0.000	0.000	0.000	0.000	0.000	0.090

issuances to increase cash more than from other sources of funding ($\beta_1 > \delta$ and $\beta_1 + \beta_2 > \delta$ in all periods). This result holds also when we augment the sample to include observations also in the years when there are no bond issuances (not reported). These findings suggest that the funds from bond proceeds are more likely to be used for cash than, on average, funds raised from other sources of funding.

The estimated results also show that firms in emerging economies tend to use bond proceeds for cash savings in a greater proportion than firms in advanced economies ($\beta_2 > 0$ at $t = 2, 3$). Furthermore, columns 4 to 6 show that the significance of the coefficient β_2 is mostly driven by the period post-2007, i.e., when the demand for high-yield corporate bonds has surged (the coefficient β_2 becomes insignificant at $t = 2, 3$ in the period pre-2007, not reported). Overall, this initial evidence seems to be consistent with the difference in behaviour between AE and EME firms. In particular, EME firms increased bond issuances beyond what is necessary – especially during the second phase of global liquidity – and increased their cash savings at the margin more than AE firms.

5.1 Use of proceeds of dollar-denominated bonds

The results above have further highlighted the differences between AE and EME firms. On average, EME firms tend to save bond proceeds in the form of cash more than AE firms. We now investigate whether the currency denomination of the bond plays a role in this decision. We modify equation (1) and investigate whether and to what extent the currency denomination of the bond issuances affects firms' allocation decisions.

We employ a specification that allows funds from USD- and non-USD-denominated bond issuances and other sources of available funds to enter the specification separately. Similarly to the previous specification, we aggregate all the bond proceeds in US dollars within a fiscal year at the ultimate parent level (*Bond Proceeds USD*) and in non-US dollars (*Bond Proceeds non-USD*). We then compute the bond proceeds accumulated over a time horizon t as:

$$\text{Bond Proceeds USD}_t = \sum_{i=1}^{t} \left(\frac{\text{Bond Proceeds USD}_i}{\text{Total Assets}_0} \right)$$

and

$$\text{Bond Proceeds non-USD}_t = \sum_{i=1}^{t} \left(\frac{\text{Bond Proceeds non-USD}_i}{\text{Total Assets}_0} \right).$$

We estimate the following regressions, where standard errors are clustered by country:

$$Y = \alpha + \beta_1 \ln \left[\left(\frac{\text{Bond Proceeds USD}_t}{\text{Total Assets}_0} \right) + 1 \right] + \beta_2 \ln \left[\left(\frac{\text{Bond Proceeds USD}_t}{\text{Total Assets}_0} \right) + 1 \right] * \text{EME dummy}$$

$$+ \beta_3 \ln \left[\left(\frac{\text{Bond Proceeds non-USD}_t}{\text{Total Assets}_0} \right) + 1 \right] + \beta_4 \ln \left[\left(\frac{\text{Bond Proceeds non-USD}_t}{\text{Total Assets}_0} \right) + 1 \right] * \text{EME dummy}$$

$$+ \beta_5 \text{ EME dummy} + \gamma \ln \left[\left(\frac{\text{Other Sources}_t}{\text{Total Assets}_0} \right) + 1 \right] + \delta \ln (\text{Total Assets}_0)$$

$$+ \sum_{i=2002}^{2013} \theta_i \cdot \text{year dummy} + \sum_{i=1}^{63} \phi_i \cdot \text{industry dummy} + \sum_{i=1}^{47} \lambda_i \cdot \text{country dummy} + \varepsilon$$

where all the other variables are as defined in model (1).

The coefficient β_1 (β_3) measures the proportion of bond proceeds in USD-denominated (non-USD-denominated) currency that is used to increase Y in AE firms. The coefficient β_2 (β_4) measures the incremental proportion of bond proceeds in US dollars (non-USD-denominated) that is used to increase Y in EME firms. Differences in the coefficients of the bond proceeds in USD and non-US dollars ($\beta_1, \beta_1 + \beta_2, \beta_3, \beta_3 + \beta_4$) will reflect differences in propensities to use the proceeds from USD- and non-USD-denominated bonds, thus providing us with insights about the underlying reasons for USD- and non-USD dollar denominated bond issuances in both advanced and emerging economies.

We have shown that EME firms use a greater proportion of bond proceeds to accumulate cash than AE firms. In Table 10, we see that such a difference is mostly driven by USD-denominated bonds. In fact, EME firms save a greater proportion of USD-denominated bonds

Table 10: **Cash holdings from bond-raising actvities: dollar vs non-dollar.** This table shows results from the use of funds regression (equation (2)). The dependent variable is the growth in cash over one-to-three year horizons as a proportion of total assets. Bond US is the dollar-denominated bond proceeds as a fraction of total assets. Bond non-US is the non-USD proceeds to total assets. Other Sources is the sources of funds other than bond proceeds as a fraction of total assets. EME is the emerging economy dummy. ln(TA) is log total assets. Dollar changes are the implied change in the dependent variable when bond proceeds or other sources of funds increases by one dollar for a median-sized firm. All regressions include year, industry and country fixed effects. Standard errors (clustered by country) are reported in brackets. ***, **, and * indicate statistical significance at the 1, 5, and 10 percent levels, respectively. The sample period is from 2002 to 2013.

		(1)	(2)	(3)	(4)	(5)	(6)
Periods		t=1	t=2	t=3	t=1	t=2	t=3
Years		All	All	All	Post 2007	Post 2007	Post 2007
ln(Bond US/TA+1)	β_1	0.1173***	0.0454**	0.0853***	0.0982***	0.0106	0.0509
		[0.0226]	[0.0179]	[0.0262]	[0.0345]	[0.0232]	[0.0352]
ln(Bond US/TA+1)$*EME$	β_2	0.0703*	0.1888***	0.1562***	0.0558	0.2145***	0.2231***
		[0.0392]	[0.0321]	[0.0497]	[0.0375]	[0.0379]	[0.0563]
ln(Bond non-US/TA+1)	β_3	0.1293***	0.1084**	0.0811***	0.1332***	0.0927*	0.0755**
		[0.0350]	[0.0466]	[0.0283]	[0.0409]	[0.0525]	[0.0352]
ln(Bond non-US/TA+1)$*EME$	β_4	0.0099	0.0164	0.0671	-0.0089	0.0300	0.0685
		[0.0443]	[0.0623]	[0.0652]	[0.0487]	[0.0683]	[0.0631]
EME		-0.0030	-0.0668***	-0.1120***	-0.0192***	-0.0125	-0.0295***
		[0.0044]	[0.0104]	[0.0095]	[0.0029]	[0.0116]	[0.0071]
ln(Other/TA+1)		0.0181	0.0343***	0.0430***	0.0138	0.0334***	0.0385***
		[0.0119]	[0.0112]	[0.0127]	[0.0130]	[0.0123]	[0.0134]
ln(TA)		0.0011*	-0.0010	-0.0056***	0.0014**	-0.0017	-0.0059***
		[0.0006]	[0.0009]	[0.0020]	[0.0005]	[0.0010]	[0.0020]
Constant		0.0342	0.0545	0.1508**	0.0416	0.0239	0.0826*
		[0.0239]	[0.0517]	[0.0654]	[0.0274]	[0.0312]	[0.0420]
Observations		7,033	5,539	4,146	5,162	4,083	3,086
R-squared		0.086	0.121	0.153	0.078	0.130	0.163
				p-value			
$\beta_1 = \beta_3$		0.776	0.234	0.875	0.547	0.180	0.550
$\beta_1+\beta_2 = \beta_3+\beta_4$		0.248	0.027	0.035	0.355	0.064	0.000
				$US change			
USD Bond Advanced		11.00	4.23	8.49	9.27	0.94	4.69
USD Bond Emerging		17.69	21.01	22.08	14.36	20.53	25.44
Non-USD Bond Advanced		12.78	10.66	8.51	13.26	8.74	7.3
Non-USD Bond Emerging		13.77	11.80	14.29	12.22	11.8	14.09

in cash ($\beta_2 > 0$). We do not observe such differential behaviour in the case of non-USD-denominated bonds ($\beta_4 = 0$).

The economic magnitude of the results is important for judging the impact of the findings. Following the computations presented in Kim and Weisbach (2008), we compute the change in cash implied from a one-dollar increase in bond proceeds in each equation, based on the median values (USD- and non-USD-denominated bond proceeds, total assets and other sources of funds) of the sample of firms. The lower portion of Table 10 reports the results of these calculations.

The estimates show that a large fraction of USD-denominated bond proceeds is kept in cash in EME firms. On average, EME firms hold between 17 and 22 cents in cash for every dollar raised in the form of USD-denominated bonds. This proportion is significantly larger than the one in advanced economies (between 4 and 11 cents for every implied dollar increase in USD-denominated debt). These numbers suggest that firms keep a substantial fraction of bond proceeds in US dollars as cash for at least three years, and they are consistent with the view that firms issue bonds not for fixed capital expenditures reasons but to take advantage of global liquidity conditions in the bond markets.

This evidence is further reinforced in columns 4 to 6, where the specification is run for the period after the crisis. Here, the coefficient β_1 is positive and statistically significant only at $t = 1$, meaning that after 2007, AE firms issue USD-denominated debt for cash holdings over only a one-year horizon. In contrast, the coefficient $\beta_1 + \beta_2$ is positive and significant over all the three-year horizons, confirming that after the crisis, EME firms save a substantial fraction of bond proceeds in the form of cash for a long period of time. We also observe another important difference within emerging economies, where EME firms use USD-denominated debt for cash accumulation more than non-USD debt ($\beta_1 + \beta_2 > \beta_3 + \beta_4$ at $t = 2, 3$). We do not observe such a difference in advanced economies ($\beta_1 = \beta_3$).

Taken together, the evidence on cash holdings highlights very different behaviour between advanced and emerging economy firms. Erel et al (2012) have shown that business cycles are an important determinant of capital raising. An implication of their argument is that, during subdued economic times, the cost of capital for high-quality firms should be relatively low, and

the firms should raise capital to replenish their liquidity.

Our contribution is to show that global liquidity conditions affect firms' capital decisions and allocation of funds. Bruno and Shin (2015a) have shown that global liquidity originating from the banking sector affected capital flows and credit growth. After the global financial crisis, attention has shifted to global liquidity originating from bond flows and the search for the yield from investors. Our results show that in the new era of global liquidity, EME firms increased bond issuances (especially in US dollars) and used them to increase their cash holdings.

Results are robust to the exclusion (one by one) of countries with a large number of bond issuances and hence observations (e.g., Japan, Korea, Canada, China). We re-run specification (2) with additional control variables, e.g., leverage, exchange rate changes, GDP growth, inflation, market capitalization, etc., with unchanged results both in the relative magnitude of the coefficients and in the statistical significance. We also re-run (2) after excluding observations with back-to-back issuances to further address serial correlation. The results are confirmed and the evidence arising from EME firms is actually stronger.

As an alternative specification, we run model (1) with the variable $ln(Bond/TA + 1)$ interacted with a dummy variable equal to 1 in those years when a firm issues a majority of USD-denominated debt, and 0 otherwise, and for the subsamples of AE and EME firms. We see that USD-denominated proceeds are saved in cash more than non-USD proceeds only for the subsample of EME firms, a result that mimics the evidence from specification (2).

5.2 Carry trade and growth opportunities

Having established that firms in AE and EMEs behave differently, we now perform estimations that attempt to explain cross-sectional differences. Previous research has related cash accumulations to hedging strategies, poor growth opportunities, precautionary reasons or agency costs (see, e.g., Almeida, Campello, Cunha and Weisbach (2014) for a recent survey).

In this subsection, we investigate two possible factors that may affect firms' cash allocations: carry trade and growth opportunities. Previously, we saw that firms in EMEs took advantage of interest rate differentials and low exchange rate volatility to issue USD-denominated bonds.

In addition to affecting the currency denomination of the bond, carry trade opportunities could potentially affect the use of such proceedings. To the extent that firms, especially in EMEs, issue USD-denominated debt to take advantage of interest rate differentials, we expect the proceeds to be kept in cash and other liquid assets. Alternatively, if bond issuances occur mostly because of investment and growth opportunities, then we would expect the proceeds of bond issuances from firms with high growth opportunities to be less likely saved as cash opportunities.

In Table 11, panel A, we test the carry trade hypothesis by dividing the sample between country-years with high carry trade (above median) and low carry trade (below the median). We then re-estimate model 2 and show the coefficient estimates β only. We see that β_2 is positive and significant only in the subsample of country-years with high carry trade opportunities, meaning that EME firms accumulate more cash in the presence of more carry trade opportunities than AE firms do.

In panel B, we test the growth opportunities hypothesis by dividing the sample between firms with high (above the median) and low market-to-book ratios (MB) within each AE and EME group. Firms with low market-to-book ratios within the subsample of EME firms are compared to firms with low market-to-book ratios within the subsample of AE firms. We see that the coefficient β_2 is mostly not significant, and actually it is positive and significant in the subsample of EME firms with high growth opportunities at $t = 2$ and $t = 3$. Overall, these results are consistent with the view that firms' bond issuance decisions and allocation of funds are better explained by global liquidity conditions than by real investment.

Table 11: **Cash holdings from bond-raising activities: Carry Trade and Growth Opportunities.** This table shows results from the use of funds regression (equation (2)). The dependent variable is the growth in cash as a proportion of total assets over one-to-three year horizons. Bond US is the ratio of bond proceeds denominated in US dollars to total assets. Bond non-US is the ratio of non-dollar bond proceeds to total assets. Other Sources is total sources of funds other than bond proceeds as a fraction of total assets. Panel A divides the sample between above median (High) and below median (Low) carry trade indicator. Panel B divides the sample between the above median (High) and below median (Low) market-to-book ratios. All regressions include year, industry and country fixed effects. Standard errors (clustered by country) are reported in brackets. ***, **, and * indicate statistical significance at the 1, 5, and 10 percent levels, respectively. The sample period is 2002 to 2013.

Panel A		(1)	(2)	(3)	(4)	(5)	(6)
Periods		t=1	t=1	t=2	t=2	t=3	t=3
Sample		High CT	Low CT	High CT	Low CT	High CT	Low CT
ln(Bond USD/TA+1)	β_1	0.0669***	0.1632***	-0.0050	0.0825***	0.0840**	0.0962**
		[0.0211]	[0.0361]	[0.0308]	[0.0108]	[0.0393]	[0.0379]
ln(Bond USD/TA+1)$*EME$	β_2	0.1208***	0.1147	0.2490***	0.0777	0.1787***	-0.0261
		[0.0357]	[0.1198]	[0.0393]	[0.1272]	[0.0559]	[0.2005]
ln(Bond non-USD/TA+1)	β_3	0.1196**	0.1167***	0.1259	0.1024**	0.0421	0.0770**
		[0.0468]	[0.0419]	[0.0770]	[0.0382]	[0.0374]	[0.0281]
ln(Bond non-USD/TA+1)$*EME$	β_4	0.0483	0.0671	0.0032	-0.0705	0.1118	0.0280
		[0.0542]	[0.1269]	[0.0931]	[0.0703]	[0.0689]	[0.1367]
Panel B		(1)	(2)	(3)	(4)	(5)	(6)
Periods		t=1	t=1	t=2	t=2	t=3	t=3
Sample		High MB	Low MB	High MB	Low MB	High MB	Low MB
ln(Bond USD/TA+1)	β_1	0.1128***	0.1276*	0.0278	0.0820	0.0637***	0.1629**
		[0.0214]	[0.0679]	[0.0199]	[0.0664]	[0.0227]	[0.0794]
ln(Bond USD/TA+1)$*EME$	β_2	0.0609	0.1400	0.1799***	-0.0153	0.1575***	0.0191
		[0.0447]	[0.0914]	[0.0305]	[0.0773]	[0.0443]	[0.1344]
ln(Bond non-USD/TA+1)	β_3	0.1684***	0.0893***	0.1321*	0.0689**	0.0821	0.0844***
		[0.0531]	[0.0268]	[0.0677]	[0.0258]	[0.0550]	[0.0136]
ln(Bond non-US/TA+1)$*EME$	β_4	-0.0470	0.0617	-0.0260	0.0223	0.0563	0.0553
		[0.0645]	[0.0578]	[0.0766]	[0.0584]	[0.0609]	[0.0769]

6 Concluding remarks

When the availability of external financing from international capital markets varies with global liquidity conditions, the surrogate financial intermediation activity of non-financial firms in emerging economies will reflect (at least in part) the ebb and flow of global liquidity conditions themselves. Consistent with this hypothesis, we find that the extent of the intermediation activity of non-financial firms is closely linked with their borrowing in US dollars. In particular, we have found evidence of divergence between emerging and advanced economy firms, with emerging economy firms being more susceptible to carry trades and the associated surrogate financial intermediation activities.

By its nature, shedding light on the impact of non-financial firms' balance sheet decisions on system-wide financial conditions presents formidable challenges in measurement and data availability. We see our paper as a small step in this direction. By examining firm-level data, we may come one step closer to the activities of non-financial firms by tracking the consequences of their actions through the consolidated balance sheet at the reporting period.

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A Appendix

In this appendix, we report the bond proceeds attributable to sectors, with separate breakdowns for emerging and advanced economy issuers.

Table 12 shows the industry breakdown of the sum of corporate bond proceeds from emerging economies (total and in US dollars) over the period 2002–14. The industry classification is based on the one digit SIC code: Agriculture, Forestry, And Fishing; Mining, Oil, Gas and Construction; Manufacturing 1 (SIC code 2); Manufacturing 2 (SIC code 3); Transportation; Trade (Wholesale and Retail); Services 1 (SIC code 7); Services 2 (SIC code 8). We also report selected statistics based on 2 digit SIC codes when the relative magnitude of bond proceeds is high: Metal Mining, Coal Mining, Oil and Gas, Mining ex fuels, Food and Kindred Products, Chemical and Allied Products, Stone Clay Glass, Primary Metal Industries, Communications Electric and Gas. See www.osha.gov for a detailed description of the SIC Division Structure. Values are in USD millions.

Table 13 shows the industry breakdown of the sum of bond corporate proceeds from advanced economies (Total and in USD denominated) over the period 2002–14. The industry classification is identical to the table for EME firms.

Table 12: **Industry Breakdown of Bond Proceeds- Emerging Countries** This table show the industry breakdown of the sum of bond proceeds (total and in US dollars) over the period 2002-14. The industry classification is based on 1 digit SIC code: Agriculture, Forestry, And Fishing; Mining, Oil, Gas and Construction; Manufacturing 1 (SIC code 2); Manufacturing 2 (SIC code 3); Transportation; Trade (Wholesale and Retail); Services 1 (SIC code 7); Services 2 (SIC code 8). We also report selected statistics based on 2 digit SIC codes when the relative magnitude of bond proceeds is high: Metal Mining, Coal Mining, Oil and Gas, Mining ex fuels, Food and Kindred Products, Chemical and Allied Products, Stone Clay Glass, Primary Metal Industries, Communications Electric and Gas. See www.osha.gov for a detailed description of the SIC Division Structure. Values are in USD millions.

Emerging economies							Million US dollars
one digit Sector	1 digit SIC	2 digit SIC	two digit sector	Total USD	Total Proceeds	% USD (of Sector)	% Sector (of Total)
Agriculture	0			7966	12258	64.99%	0.99%
Mining	1			225338	412476	54.63%	33.27%
		of which					
		10	Metal Mining	37103	47195	78.62%	3.81%
		12	Coal Mining	3485	15589	22.36%	1.26%
		13	Oil and Gas	177653	288638	61.55%	23.28%
Manufact. 1	2			62319	160036	38.94%	12.91%
		of which					
		20	Food	25710	53005	48.50%	4.28%
		28	Chemical	19723	53397	36.94%	4.31%
Manufact. 2	3			61730	198726	31.06%	16.03%
		of which					
		32	Stone Glass	19597	58469	33.52%	4.72%
		33	Primary Metal	25945	69210	37.49%	5.58%
Transportation	4			113671	365220	31.12%	29.46%
& Utilities		of which					
		48	Communication	49473	141880	34.87%	11.45%
		49	Electric & Gas	49118	160228	30.66%	12.93%
Trade	5			10333	46800	22.08%	3.78%
Services 1	7			8059	25702	31.36%	2.07%
Services 2	8			1157	18435	6.28%	1.49%
			Total EME	490573	1239653		

Table 13: **Industry Breakdown of Bond Proceeds - Advanced Countries** This table show the industry breakdown of the sum of bond proceeds (total and in US dollars) over the period 2002-14. The industry classification is based on 1 digit SIC code: Agriculture, Forestry, And Fishing; Mining, Oil, Gas and Construction; Manufacturing 1 (SIC code 2); Manufacturing 2 (SIC code 3); Transportation; Trade (Wholesale and Retail); Services 1 (SIC code 7); Services 2 (SIC code 8). We also report selected statistics based on 2 digit SIC codes when the relative magnitude of bond proceeds is high: Metal Mining, Coal Mining, Oil and Gas, Mining ex fuels, Food and Kindred Products, Chemical and Allied Products, Stone Clay Glass, Primary Metal Industries, Communications Electric and Gas. See www.osha.gov for a detailed description of the SIC Division Structure. Values are in USD millions.

Advanced economies							Million US dollars
one digit sector	1 digit SIC	2 digit SIC	two digit sector	Total USD	Total Proceeds	% USD (of Sector)	% Sector (of Total)
Agriculture	0			2860	10767	26.57%	0.13%
Mining	1			509433	1009864	50.45%	11.77%
		of which					
		10	Metal Mining	152362	208715	73.00%	2.43%
		12	Coal Mining	21946	31271	70.18%	0.36%
		13	Oil and Gas	307532	523791	58.71%	6.10%
Manufact. 1	2			362758	1243025	29.18%	14.48%
		of which					
		20	Food	138071	382820	36.07%	4.46%
		28	Chemical	13527	76971	17.57%	0.90%
Manufact. 2	3			943169	2589795	36.42%	30.17%
		of which					
		32	Stone Glass	15926	121567	13.10%	1.42%
		33	Primary Metal	10817	165542	6.53%	1.93%
Transportation & Utilities	4			606734	3003594	20.20%	35.00%
		of which					
		48	Communication	284158	1055765	26.91%	12.30%
		49	Electric & Gas	213755	1406764	15.19%	16.39%
Trade	5			42377	370875	11.43%	4.32%
Services 1	7			69260	243769	28.41%	2.84%
Services 2	8			20184	111033	18.18%	1.29%
			Total AE	2556775	8582721		