The Maturity Substitution Channel: Foreign Currency Borrowing Under Global Funding Shocks

Abstract

This paper uncovers a novel debt maturity substitution channel through which firms manage their exposure to international funding shocks. Using a comprehensive dataset of corporate debt issuance across 22 countries from 2010 to 2016, we exploit the 2013 Taper Tantrum as an exogenous shock to identify how firms adjust their foreign currency borrowing. We document that firms time the debt structure by responding to funding shocks through systematic maturity substitution. When debt carry trade becomes less attractive, firms reduce short-term foreign currency borrowing by 5.7 percentage points while increasing long-term borrowing by 3.1 percentage points. This substitution pattern varies significantly with financial market development: while both developed and emerging market firms sharply reduce short-term foreign currency debt, developed market firms show greater ability to substitute into longer maturities. Despite these substantial adjustments in debt structure, we find no significant effects on real outcomes, suggesting that firms successfully insulate their operations from debt market timing. Our findings reveal how domestic financial development shapes firms' ability to navigate international funding shocks and provide new insights into the transmission of global monetary conditions to corporate financing decisions.

Keywords: Foreign currency debt, Carry Trade, Maturity Substitution
JEL Codes: F31, F32, F34, F65

1 Introduction

Debt in a foreign currency (DFC) plays an important role in corporate financing. However, DFC may expose firms to foreign exchange (FX) fluctuations that can affect their ability to service their debt obligations. While traditional theories suggest firms borrow in foreign currencies primarily to hedge operational currency exposure stemming from exports and foreign operations (see e.g., Kedia and Mozumdar (2003); Allayannis et al. (2003)), firms may engage in "selective hedging", depending on the relative cost of debt in domestic and foreign currencies (Brown et al., 2006). Firms may also time the debt market in search of a lower cost of debt, even if increasing their FX risk and, consequently, their creditworthiness (Niepmann and Schmidt-Eisenlohr, 2022). Despite the critical nature of these issues, little is known about the interplay between macroeconomic factors, firm-specific characteristics, and the choice of currency denomination of corporate debt as well as the implications for financial flexibility and investment decisions.

This paper aims to bridge this gap by examining the relationship between uncovered interest parity (UIP) deviations and foreign currency borrowing. We use a novel dataset on debt issuance for a cross-country sample of firms from 22 countries, including developed and emerging economies, between 2010 and 2016, and explore the 2013 Taper Tantrum as a natural experiment that generated exogenous variation in the costs and benefits of foreign currency borrowing. We analyze both debt currency composition (i.e. the proportion of DFC) as well as the maturity of DFC. We also examine the effects of firms' debt currency choices on real outcomes such as investment and cash holdings.

UIP is a cornerstone theory in international finance, positing that interest rate differentials between two countries should be offset by expected changes in the exchange rate (Engel, 2016). However, empirical evidence consistently shows that UIP does not hold in practice, leading to what is known as the "forward premium puzzle" (Fama, 1984; Lustig and Verdelhan, 2007). These deviations from UIP create opportunities for speculators to fund in a strong currency with low interest rates, and invest in currencies with higher interest rates,

earning the carry premium in expectation. Additionally, firms with transaction or economic exposure to exchange rate fluctuations may have greater incentives to seek these positions because they are operationally hedged (Jurek, 2014).

Our analysis yields several findings. First, we document that firms' foreign currency borrowing decisions respond significantly but modestly to carry trade opportunities, with heterogeneous effects across market development levels. In our most rigorous specification controlling for firm characteristics and time-varying industry and country factors, we find that carry trade opportunities increase foreign currency-denominated debt by 3.1 percentage points (pp) in the full sample. This effect varies across market development levels: emerging market firms demonstrate a significant response of 3.0 pp, while developed market firms show a statistically insignificant effect of 4.3 pp. Second, we uncover important differences in how firms adjust their debt maturity structure in response to UIP deviations, with long-term foreign currency borrowing showing a sensitivity of 3.4 pp to carry trade opportunities, compared to 1.2 pp for short-term borrowing. Third, exploiting the 2013 Taper Tantrum as an exogenous shock, we find evidence of significant portfolio rebalancing with firms reducing short-term foreign currency borrowing (-5.7 pp) while increasing long-term foreign currency borrowing (3.1 pp), particularly pronounced for emerging market firms. The economic magnitude of these shifts represents approximately one-quarter of the average pre-shock level of foreign currency borrowing. Fourth, despite these substantial adjustments in liability structure, we find no significant effects on real outcomes such as investment, cash holdings, or operating performance, suggesting firms successfully insulate their operations from funding shocks through active liability management.

To illustrate the dynamic nature of international debt markets and the potential for UIP deviations, Figure 1 presents the mean five-year government bond yield spread between foreign (both Emerging and Advanced Economies) and US government bonds from 2010 to 2016. The graph shows consistent, non-zero yield spreads between foreign and US government bonds. These differentials suggest potential opportunities for firms to exploit UIP de-

viations in their borrowing decisions. The consistently higher and more volatile yield spreads for emerging markets (EM) bonds compared to advanced economies (AE) bonds highlight the different risk profiles and potential borrowing costs faced by firms, especially in EM. This divergence may influence firms' decisions to borrow in foreign currencies differently across developed and emerging economies. Moreover, the period following the Taper Tantrum of 2013 shows a gradual decline in AE yield spreads, even becoming negative. While EM yields remained positive, they deviated from their previous downward trend. These changes may have shifted firms from carry trade opportunities to strategic long-term borrowing considerations, as total borrowing costs increased suggests changing dynamics in global interest rate differentials, which may affect firms' motivations for foreign currency borrowing.

Anecdotal evidence also illustrates how firms strategically navigate yield differentials and sudden stops to optimize their borrowing costs and manage financial risks.[1] By tapping into international markets during favorable conditions, these companies may not only reduce their immediate borrowing costs but also potentially hedge against future domestic market volatility and financing frictions. Such behavior underscores the importance of understanding the motivations behind foreign currency borrowing decisions and their implications for corporate financial management in a global context.

The moderating effect of financing frictions stems from the limited duration of favorable financing conditions (UIP deviations) coupled with the costs firms incur when accessing international debt markets. However, managers may not only react to existing financing frictions but also anticipate future constraints and proactively adjust their firms' policies to minimize the impact of these frictions (Almeida et al., 2011). These observations underscore the complexity of the environment in which firms make foreign currency borrowing decisions. The persistent yield differentials and their volatility in response to global events provide a rich context for examining how firms navigate UIP deviations, potentially hedging against future financing frictions or attempting to time the market.

[1]See, for example, *Reuters*, "Tata Steel looking at $1 bln bond sale to refinance debt-sources" (October 8, 2013). See also, *Financial Times*, "Apple issues 2.8bn in euro bonds" (November 4, 2014).

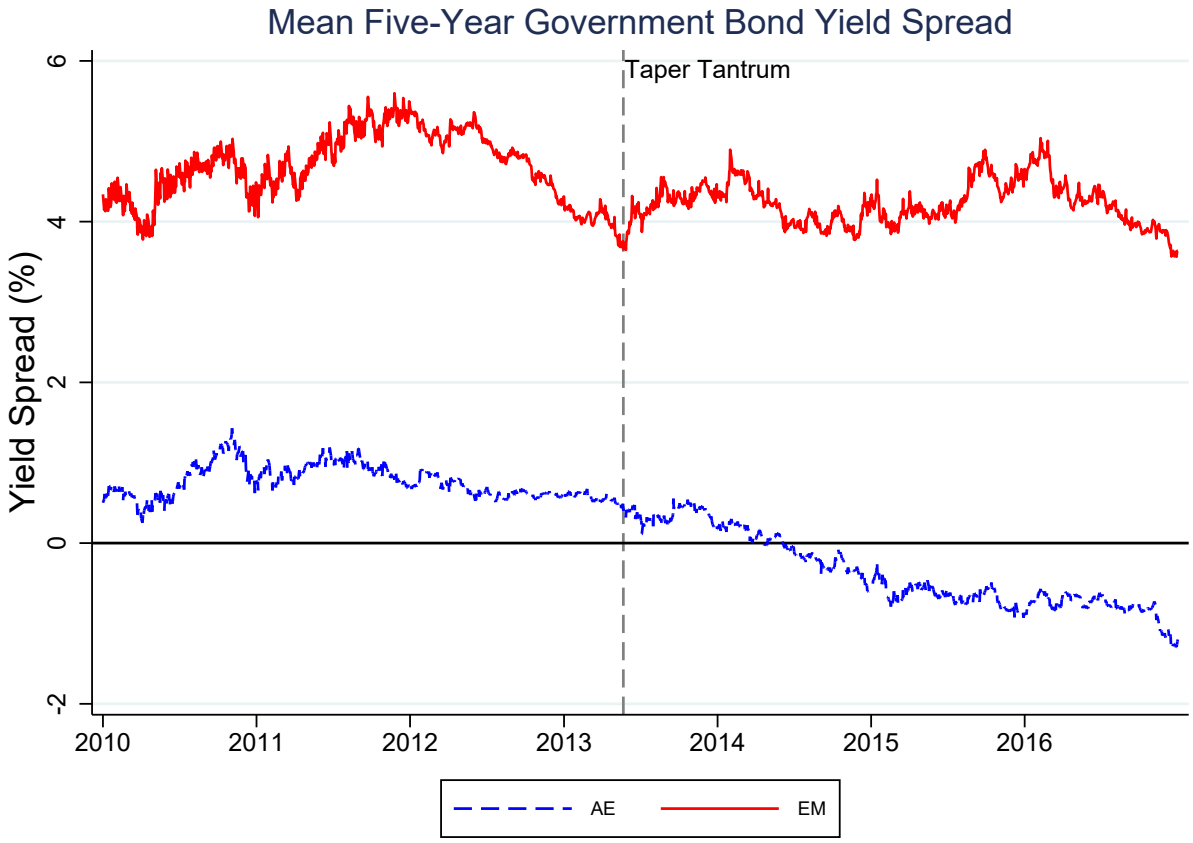

Figure 1: Mean Five-Year Government Bond Yield Spread between Foreign and US Government bond at currency i; 5-year tenor: $y^{Govt}_{i,5y,t}$ - $y^{Govt}_{US,5y,t}$. Based on government yield curves in Bloomberg using the approach of Du and Schreger (2016).

Our findings support a theoretical framework where firms balance three key factors in their foreign currency borrowing decisions: carry trade opportunities, hedging needs, and precautionary motives. The stronger response in emerging markets suggests that financial constraints amplify firms' sensitivity to international financing conditions. The maturity substitution following the Taper Tantrum indicates that firms actively manage their exposure to sudden stops in capital flows, consistent with precautionary theories of corporate financial policy (Almeida et al., 2011; Jurek, 2014). Moreover, the differential responses across debt maturities suggest that firms distinguish between opportunistic short-term carry trades and strategic long-term foreign currency borrowing decisions.

This paper contributes to the literature in several dimensions. First, we provide a comprehensive analysis of how UIP deviations influence firms' decisions to borrow in foreign currencies. While previous research has examined the impact of covered interest parity deviations on currency choices in debt issuance (Du et al., 2018), our study explicitly considers the role of expected exchange rate movements and their deviations from UIP. Furthermore, we examine each currency pair and the corresponding interest rates of debt instruments across all currencies in our sample.

Second, we investigate the incentives and motivations driving firms to borrow in foreign currencies. This analysis allows us to distinguish between two potential motivations for foreign currency borrowing: hedging against future financing frictions and market timing. The former suggests that firms use foreign currency debt as a risk management tool to ensure access to capital in the face of potential domestic credit constraints (Allayannis et al., 2003). The latter implies that firms opportunistically exploit UIP deviations to reduce borrowing costs without necessarily considering long-term risk implications (McBrady and Schill, 2007; Salomao and Varela, 2022).

Third, our study contributes to the growing literature on the interaction between financial and real decisions in an international context. By linking currency choices in debt issuance to investment and cash policies, we provide insights into how financial market imperfections affect real economic outcomes (Aghion et al., 2009; Bruno and Shin, 2017). Also, we add to the literature on the real investment-based theories (Butler et al., 2011) by gauging how market prices promptly and efficiently adjust to fluctuations in risk when firms seek external capital.

The remainder of this paper is organized as follows. Section 2 reviews the relevant literature and develops our hypotheses. Section 3 describes our data and demonstrates our empirical methodology. Section 4 presents the main results and discusses their implications. Section 5 conducts robustness checks and additional analyses. Finally, Section 6 concludes and offers directions for future research.

2 Theoretical Background

Traditionally, foreign currency borrowing has been seen as a tool for firms with foreign currency revenues to access deeper international funding markets while benefiting from a natural hedge provided by their foreign sales. This view aligns with the work of Almeida et al. (2011) on precautionary motives in corporate finance and Jurek (2014) on the benefits of foreign currency debt for firms with natural currency exposure. However, in the post-GFC era, a new pattern has emerged. Favorable funding conditions have prompted non-financial corporations, even those without significant foreign currency revenues, to engage in a form of carry trade. In this scenario, firms borrow cheaply abroad and park those funds as short-term wholesale deposits in domestic banks, rather than using them for productive investment (Bruno and Shin, 2017).

Two theories of corporate financing — market timing and real investment — can help explain the effects of the foreign financing process on investment decisions. The market timing story argues that corporate managers borrow in foreign currency to exploit UIP deviations. As a result, foreign loans may lead to higher capital accumulation in domestic currency (Bruno and Shin, 2017) and lower default, as firms become larger and more resilient to shocks (Salomao and Varela, 2022). Alternatively, proponents of real investment-based theories contend that market prices promptly and efficiently adjust to fluctuations in risk when firms seek external capital. In this case, short-term strategies to take advantage of market conditions, such as interest rate differentials, convert growth options into real assets or to changes in the cost of capital (Butler et al., 2011).

The market timing assumption shows that managers could be able to reduce their cost of capital by strategically timing the market to hoard cash for a rainy day, even when the sun shines today. When future projects are valuable and capital markets exhibit imperfections, the considerations about a company's capacity to effectively manage investment financing over time gain relevance in the context of current capital budgeting decisions (Almeida et al., 2011). However, according to *q-theory* of efficient markets, firms would experience a

reduction in the firm's cost of capital increasing the marginal value of investment. Firms respond to a reduction in required returns by increasing investment, producing a negative relation between investment and future returns (Butler et al., 2011). In this paper, we extend the above insight into the question of how DFC decisions are affected by intertemporal financing frictions where firms have both precautionary-savings and market-timing motives for external financing and investment decisions, induced by exogenous financing conditions of the exchange rate fluctuations.

Our analysis focuses on two competing explanations for foreign currency borrowing behavior: market timing and real investment motives. The market timing hypothesis suggests that firms strategically exploit interest rate differentials to reduce borrowing costs, potentially accumulating cash reserves for future needs. Under this view, firms may opportunistically increase foreign currency borrowing when UIP deviations are large, particularly in emerging markets where domestic financing constraints make international opportunities more valuable.

In contrast, the real investment hypothesis posits that firms' borrowing decisions primarily reflect fundamental investment needs rather than opportunistic behavior. This view suggests that market prices efficiently adjust to risk fluctuations, leading firms to convert growth options into real assets when borrowing conditions are favorable. The differential response across debt maturities and market development levels provides a way to test these competing explanations.

Hypotheses

H1: UIP Deviations and Foreign Currency Borrowing

Market Timing Hypothesis: According to the market timing theory, managers actively exploit interest rate differentials when borrowing. If this theory holds:

- **H1a:** Greater UIP deviations (measured by carry trade opportunities) are associated

with higher levels of foreign currency-denominated debt.

- **H1b:** The relationship between UIP deviations and foreign currency borrowing is stronger in emerging markets, where domestic financial constraints make international borrowing opportunities more valuable.

Economic Mechanism: When capital markets exhibit imperfections, considerations about a company's capacity to effectively manage investment financing over time become relevant in current capital budgeting decisions (Almeida et al., 2011). Therefore, firms in markets with greater financial frictions should be more sensitive to favorable borrowing opportunities.

H2: Debt Maturity Response

Differential Maturity Response Hypothesis: The differential response across debt maturities provides insights into the relative importance of market timing versus real investment motives:

- **H2:** Short-term foreign currency debt is more sensitive to carry trade opportunities than long-term debt, reflecting greater flexibility for market timing.

Economic Mechanism: According to q-theory of efficient markets, firms would experience a reduction in their cost of capital, increasing the marginal value of investment. This suggests that long-term borrowing should be more closely tied to real investment needs, while short-term borrowing might be more influenced by temporary market conditions.

H3: Monetary Policy Shocks and Market Timing

Taper Tantrum Hypothesis: The Taper Tantrum provides a natural experiment to test how firms adjust their foreign currency borrowing when carry trade opportunities suddenly diminish:

- **H3a:** Following the Taper Tantrum, firms in emerging markets reduce their foreign currency borrowing more than firms in developed markets.

- **H3b:** The reduction in short-term foreign currency borrowing is more pronounced than long-term borrowing, consistent with market timing motives for short-term debt.

Economic Mechanism: If firms are engaging in market timing, they should quickly adjust their borrowing when conditions become less favorable. This effect should be stronger for short-term debt, which offers greater flexibility, and in emerging markets, where the shock to funding conditions was more severe.

H4: Real Effects

Financial Insulation Hypothesis: Firms use maturity substitution in foreign currency borrowing primarily as a financial management tool to insulate real operations from funding shocks:

- **H4:** Despite significant adjustments in foreign currency debt structure following the Taper Tantrum, firms will maintain stable real outcomes (investment, cash holdings, and operating performance), with no significant differences across market development levels.

Economic Mechanism: Firms engage in active liability management through maturity substitution (reducing short-term while increasing long-term foreign currency debt) specifically to shield their core operations from international funding volatility. This financial engineering approach allows firms to maintain operational stability despite significant adjustments in their liability structure. The substitution between short and long-term foreign currency debt serves as a buffer that absorbs funding shocks without transmitting these shocks to real corporate activities.

3 Data and Methods

3.1 Data

We extract novel data from Capital IQ containing detailed information on the issuance of debt instruments, allowing us to identify the issuing firm, debt currency and maturity. Using maturity data, we transform issuance data into stock variables, representing outstanding debt in domestic and foreign currency, long and short term (according to debt tenor), for each firm-year. We match this data with firm-level annual data from Compustat Global. We use a cross-country panel sample of firms from 22 countries (including both advanced and emerging economies) from 2002 to 2021. Our data spans from 2002 to 2021, and covers 10 developed countries and 12 emerging markets as follows (currency abbreviations provided in parentheses). Advanced economies (AE): Australia (AUD), Canada (CAD), Switzerland (CHF), Denmark (DKK), Germany (EUR)[2], United Kingdom (GBP), Japan (JPY), South Korea (KRW), Norway (NOK), New Zealand (NZD); Emerging markets (EM): Brazil (BRL), Chile (CLP), China (CNY), Colombia (COP), India (INR), Indonesia (IDR), Malaysia (MYR), Mexico (MXN), Peru (PEN), Philippines (PHP), South Africa (ZAR) and Thailand (THB). The United States (and thus the USD) serves as the benchmark for currency exchange rates across all countries in the sample. We obtain exchange rate data from Bloomberg, including exchange rates (spot and forward) against the US dollar, and implied volatility derived from one-year-maturity call options. We also collect foreign trade (exports and imports) data at the industry-country level from the BACI database, and firm-level financial derivatives from Capital IQ. Our final sample comprises 241 thousand firm-year observations. Some of the analyses are restricted to the period 2010-2016, around the Taper Tantrum.

[2]Following Du and Schreger (2016) and Du et al. (2020), we use Germany as the representative country for the Eurozone given its role as the economic anchor of the currency union. German sovereign bonds serve as the benchmark risk-free rate for the Eurozone, and other Eurozone countries can access German financial markets and banking system for funding.

3.2 Estimating effect of carry trade on DFC

We begin our empirical analysis by examining how carry trade opportunities influence firms' foreign currency borrowing decisions. We seek to understand how these effects vary across market development levels and debt maturities. To do that, we estimate equation 1.

$$DFC_{ijk,t} = \alpha_0 + \beta_1(CT_{k,t}) + \gamma X_{i,t-1} + \phi_i + \delta_{j,t} + \varepsilon_{ijk,t} \tag{1}$$

where the subscripts i, j, k and t correspond to firm, industry, country and year, respectively The dependent variable, DFC, is measured as the ratio between firm i's debt in foreign currency and its total outstanding debt at the end of year t. The main variable of interest is CT, which is a measure of the profitability of the carry trade. We follow Bruno and Shin (2017) and we define $CT = \frac{\text{1Y rate(local)} - \text{1Y rate(foreign)}}{\text{Imp Vol of 1Y FX options}}$, i.e., the divergence in short-term interest rates between local currency and foreign currency standardized by the implied volatility of 1-year options. To control for firm-level determinants, we include a set of accounting measures recorded at the previous fiscal year-end. These are profitability (ROA), market-to-book, depreciation, total assets, R&D, tax rate, liquidity, payout, and book leverage. Importantly, to control for unobserved heterogeneity, we gradually saturate our regressions with a series of fixed effects at different levels. In our most rigorous specifications we employ firm, country-year and industry-year fixed effects.

3.3 Estimation for Firm Outcomes

To examine whether foreign currency borrowing decisions affect real corporate activities, we estimate their impact on investment and cash management policies. Our specifications control for persistence in these outcome variables while accounting for firm-specific factors and macroeconomic conditions that might influence both borrowing and real decisions. We

specify our baseline regression as follows:

$$Y_{ij,t} = \beta_0 + \beta_1 \text{DFC}_{ij,t} + \beta_4 Z_{ij,t} + \gamma Y_{ij,t} + \phi_i + \psi j, t + \varepsilon_{ij,t} \tag{2}$$

where $Y_{ij,t}$ denotes the outcome variable of firm k, country j, in period t. $\text{DFC}_{ij,t}$ corresponds to the ratio of foreign currency debt for total debt by firm i in country j in period t; $Y_{ij,t}$ denotes a vector of control variables for firm i in period t; ϕ_i is the firm-specific fixed effect; and $\omega_{j,t}$ is the country-year fixed effect.

We employ two proxies to measure the investment rate, following the methodology of Almeida et al. (2024). The first proxy, Inv1, is calculated as capital expenditure (CaPex) divided by lagged capital stock (equity capital). The second proxy, Inv2, represents the growth rate of capital stock (equity capital). Additionally, to examine the impact of carry trade on cash management, we utilize two measures of cash holdings: (1) the ratio of cash holdings to total assets, and (2) the proportion of cash and short-term investments relative to total assets. These comprehensive measures allow us to capture both the investment dynamics and liquidity positions of firms in response to carry trade activities.

3.4 Addressing Potential Selection Bias

A potential concern in our study is that the observed relationships between UIP deviations, foreign currency borrowing, and real outcomes might be driven by selection bias. Specifically, it could be argued that our results capture the behavior of higher-quality firms that are better positioned to access international debt markets, rather than the true effects of UIP deviations on borrowing decisions and subsequent real outcomes. To address this concern and strengthen the causal interpretation of our findings, we employ two approaches following the work of Lee et al. (2016):

First, we include firm fixed effects in our main specifications to control for time-invariant unobserved firm characteristics. This approach accounts for any constant firm-specific factors

that might influence both the ability to borrow in foreign currencies and the firm's investment and cash holding decisions. However, firm fixed effects alone may not address time-varying firm quality that coincides with changes in UIP deviations.

Second, we exploit exogenous variation in international funding conditions resulting from the Taper Tantrum. This approach provides an ideal setting for our analysis for several reasons: (a) The Taper Tantrum announcement was largely exogenous to individual firm characteristics; (b) It significantly affected global interest rate differentials, exchange rates, and capital flows, directly impacting the conditions relevant to UIP deviations; (c) The timing and magnitude of effects across currencies and markets created variation in firms' incentives and opportunities for foreign currency borrowing that is independent of firm quality.

The Taper Tantrum triggered significant movements in global interest rates, exchange rates, and capital flows, affecting the relative attractiveness of foreign currency borrowing for firms worldwide, regardless of their individual quality. By examining how firms adjust their foreign currency borrowing in response to these UMP shocks, we can more confidently isolate the effect of UIP deviations on borrowing decisions from the influence of time-varying firm quality. This approach allows us to better identify whether firms are primarily responding to changes in interest rate differentials and exchange rate expectations (as captured by UIP deviations) rather than firm-specific factors when making foreign currency borrowing decisions. We implement this identification strategy through a difference-in-differences framework:

$$Y_{ij,t} = \alpha_0 + \beta_1(Post_t \times Treated_i) + \gamma X_{i,t-1} + \phi_i + \delta_{j,t} + \varepsilon_{ijk,t} \tag{3}$$

where $Y_{ij,t}$ is our dependent variable (DFC and Real Outcomes measurements), $Post_t$ is an indicator for the post-Taper Tantrum in the year 2013, and $Treated_i$ is our dummy that equals 1 if firm i in country j borrowed in foreign currency under specific conditions in all three years (2010–2012) prior to the Taper Tantrum, the idea is to capture carry trader firms, that is, firms that behave as carry traders. These conditions are: the firm borrowed at a lower interest rate compared to a benchmark local interest rate (country funds rate);

and the proportion of short-term foreign currency debt was either above the top quartile. If these conditions are met, $Treated_i$ equals 1, otherwise 0. $Post_t \times Treated_i$ captures the interaction effect between borrowing in foreign currency and the Taper Tantrum on the dependent variable. $Z_{ij,t}$ is a vector of firm-level control variables. $\gamma Y_{ij,t}$ is the lagged dependent variable controlling for persistence in investment behavior. ϕ_i represents firm fixed effects to control for time-invariant heterogeneity at the firm level. $\phi_{j,t}$ denotes country-year fixed effects, capturing shocks or trends specific to industry k at time t. We further exploit cross-country variation through a triple-difference specification:

$$Y_{ij,t} = \alpha_0 + \beta_1(Post_t \times Treated_i \times HighVol_j) + \gamma X_{i,t-1} + \phi_i + \delta_{j,t} + \varepsilon_{ijk,t} \tag{4}$$

where $HighVol_k$ indicates high volatility countries. We used the same controls and fixed effects as the main specification.

By employing these strategies, we aim to mitigate concerns about selection bias and provide more robust evidence on the causal relationships between UIP deviations, foreign currency borrowing decisions, and real outcomes. This approach allows us to distinguish between the effects of institutional and market factors versus firm-specific quality in determining foreign currency borrowing patterns and their subsequent impacts.

The 2013 Taper Tantrum offers a particularly advantageous setting to examine how firms adjust their foreign currency borrowing in response to exogenous funding shocks. This event provides several key advantages for our identification strategy. First, it was largely unanticipated by market participants, reducing concerns about anticipatory responses. Second, it affected global funding markets broadly but with varying intensity across currencies and markets, creating meaningful variation for our analysis.

4 Results

4.1 Descriptive statistics

Our sample covers non-financial firms from 22 countries between 2010 and 2016, revealing significant variation in foreign currency borrowing across market development levels. Table 1 presents the summary statistics decomposed in three panels that capture the key dimensions of our analysis: debt instrument characteristics (Panel A), firm-level variables (Panel B), and market conditions (Panel C).

Panel A shows debt instrument characteristics from 324,523 observations. The mean debt amount of \$55.76 million (SD = \$388.72 million) with a median of just \$3.51 million reveals significant right-skew in issuance size, typical of international debt markets where larger firms dominate. The maturity distribution (mean = 3.96 years, SD = 4.04) indicates a concentration in medium-term debt, with 75% of instruments having maturities of 5 years or less. Panel B reveals important patterns in firm characteristics. The investment measures show substantial heterogeneity: capital expenditure relative to lagged capital stock (Inv1) averages 15% but varies considerably (SD = 22%), while the growth rate of capital stock (Inv2) shows even greater variation (mean = 82%, SD = 330%). Foreign currency borrowing patterns are particularly noteworthy: while the average firm has 9% of total debt in foreign currency, this is primarily driven by long-term debt (8%) rather than short-term (1%). The relatively high market-to-book ratio (mean = 1.76, SD = 2.89) indicates significant growth opportunities in our sample firms.[3]

[3]In Appendix A we extend this analysis, Figure A.1 decomposes corporate debt structure into its major components over our sample period, showing remarkable stability in these proportions across different types of debt instruments, suggesting that sudden stops like the Taper Tantrum do not substantially alter how firms choose their debt instruments. Figure A.2 reveals striking differences in the currency composition of corporate debt between developed and emerging economies. Developed market firms predominantly rely on local currency debt (60-80% of total corporate debt), with foreign currency choices reflecting both financial and trade considerations. For instance, Canadian firms show higher U.S. dollar debt proportions, reflecting both their substantial U.S. trade relationships and the integration of North American financial markets. In contrast, emerging market firms exhibit substantially higher reliance on foreign currency debt, with local currency borrowing often representing less than 50% of total debt. This higher foreign currency dependence primarily reflects domestic financial market constraints rather than trade relationships.

Table 1: **Summary statistics**

This table presents summary statistics for our sample from 2010 to 2016. Panel A shows debt instrument characteristics. Panel B reports firm-level variables including investment measures and firm characteristics. Panel C presents market-level conditions including carry trade opportunities, interest rates, and yield spreads. For each variable, we report the number of observations (N), mean, median, standard deviation (SD), and various percentiles (p5, p25, p75, p95).

Panel A: Debt instrument variables

	N	Mean	Median	SD	p5	p25	p75	p95
Amount (mm USD)	324,523	55.76	3.51	388.72	0.00	0.44	20.97	216.69
Maturity (Years)	191,403	3.96	3.00	4.04	1.00	1.00	5.00	10.00

Panel B: Firm-level variables

	N	Mean	Median	SD	p5	p25	p75	p95
Inv1: CaPex/Lagged capital stock (equity capital)	44,749	0.15	0.08	0.22	0.00	0.03	0.18	0.55
Inv2: Growth rate of capital stock (equity capital)	44,188	0.82	0.03	3.30	-0.83	-0.39	0.66	4.40
Cash1: Cash/Total Assets	50,735	0.11	0.07	0.13	0.00	0.02	0.15	0.36
Cash2: Cash and Near-Cash Securities/Total Assets	52,485	0.13	0.09	0.14	0.00	0.03	0.18	0.41
DFC: Foreign Debt/Total Debt	52,485	0.09	0.00	0.24	0.00	0.00	0.00	0.78
DFC_LT: Long Term Foreign Debt/Total Debt	52,485	0.08	0.00	0.22	0.00	0.00	0.00	0.70
DFC_ST: Short Term Foreign Debt/Total Debt	52,485	0.01	0.00	0.07	0.00	0.00	0.00	0.01
Blev: Total Debt / Total Assets	52,485	0.24	0.21	0.19	0.00	0.08	0.35	0.60
Mlev: Total Debt /(Total Assets - Book Equity + Market Value)	50,216	0.20	0.14	0.19	0.00	0.04	0.31	0.60
Prof: NOPAT/Total Assets	52,485	0.02	0.05	0.20	-0.22	0.01	0.09	0.18
ROA: EBITDA/Total Assets	52,335	0.06	0.08	0.17	-0.14	0.03	0.13	0.23
MB:Market Capitalization/Total Assets	52,485	1.76	0.97	2.89	0.35	0.63	1.76	4.95
Dep:Depreciation/Total Assets	52,485	0.03	0.03	0.03	0.00	0.01	0.04	0.09
Size: LN(Total Assets in USD)	52,485	5.05	5.11	2.05	1.61	3.57	6.44	8.47
Tangibility: Fixed Assets/Total Assets	52,485	0.33	0.29	0.24	0.02	0.13	0.48	0.80
R&D: R&D/Total Assets	52,485	0.01	0.00	0.04	0.00	0.00	0.00	0.05
Taxes: Taxes/Operational Income	52,485	0.15	0.00	0.45	-0.42	0.00	0.31	0.74
Liq: Curren Assets/Current Liabilities	52,485	2.12	1.44	2.75	0.44	1.02	2.20	5.57
Div: Dummy Dividend	52,485	0.86	1.00	0.35	0.00	1.00	1.00	1.00

Panel C: Market-level variables

	N	Mean	Median	SD	p5	p25	p75	p95
Carry Trade	144	0.02	0.00	0.21	-0.05	0.00	0.00	0.39
Interest Rate	154	3.28	2.95	2.69	0.10	1.40	4.25	8.37
Yield Spread	146	2.88	2.52	2.93	-0.43	0.68	4.05	8.20
Return dxy	154	0.02	0.01	0.02	0.00	0.00	0.04	0.05
Return dtwexemegs	154	0.01	0.01	0.02	-0.02	-0.01	0.02	0.03

Panel C documents market-level conditions critical for our identification strategy. Carry trade opportunities show meaningful variation (mean = 0.02, SD = 0.21), with emerging markets offering larger differentials. The yield spread between foreign and US government bonds averages 2.88% (SD = 2.93%), providing substantial incentive for foreign currency borrowing during our sample period.

Figure 2 presents a comprehensive analysis of foreign currency debt distribution across developed and emerging economies, broken down by total debt, long-term, and short-term components. For total DFC, the distributions show marked differences between advanced and emerging economies. Advanced economy firms maintain median DFC ratios around 0.45,

with a relatively compact interquartile range of approximately 0.2. In contrast, emerging market firms exhibit higher median levels around 0.55 and notably wider dispersion, with an interquartile range of about 0.3. This pattern suggests that emerging market firms not only rely more heavily on foreign currency debt but also show greater heterogeneity in their borrowing practices.

The maturity decomposition reveals additional insights. Long-term DFC shows similar patterns across both market types, with medians around 0.4-0.5, suggesting that structural factors may drive long-term foreign currency borrowing decisions. However, the dispersion in long-term DFC is notably larger for emerging market firms, indicating greater variation in their ability to access long-term foreign currency funding. Short-term DFC exhibits the most striking contrast. Emerging market firms show substantially higher median levels and much wider dispersion in short-term foreign currency borrowing compared to their developed market counterparts. This pattern suggests that emerging market firms may use short-term foreign currency debt as a more flexible financing tool, possibly reflecting both opportunities and constraints in their funding options.

The outliers, particularly in emerging markets, indicate that some firms maintain exceptionally high foreign currency exposure, reaching ratios above 0.8 in some cases. These extreme observations persist across both maturity categories but are more prevalent in short-term borrowing, highlighting the potential risks of excessive reliance on short-term foreign currency funding.

4.2 UIP Deviations and Foreign Currency Borrowing

Figures 3 and 4 reveal striking differences in how foreign currency debt ratios relate to carry trade opportunities across market development levels. In emerging markets (Figure 3), we observe DFC ratios ranging from 0.35 to 0.50, exhibiting a notable relationship with carry trade opportunities. Prior to the Taper Tantrum, when carry trade opportunities increased from 0.60 to 0.75, DFC levels rose from approximately 0.38 to 0.47. The 2014 peak in carry

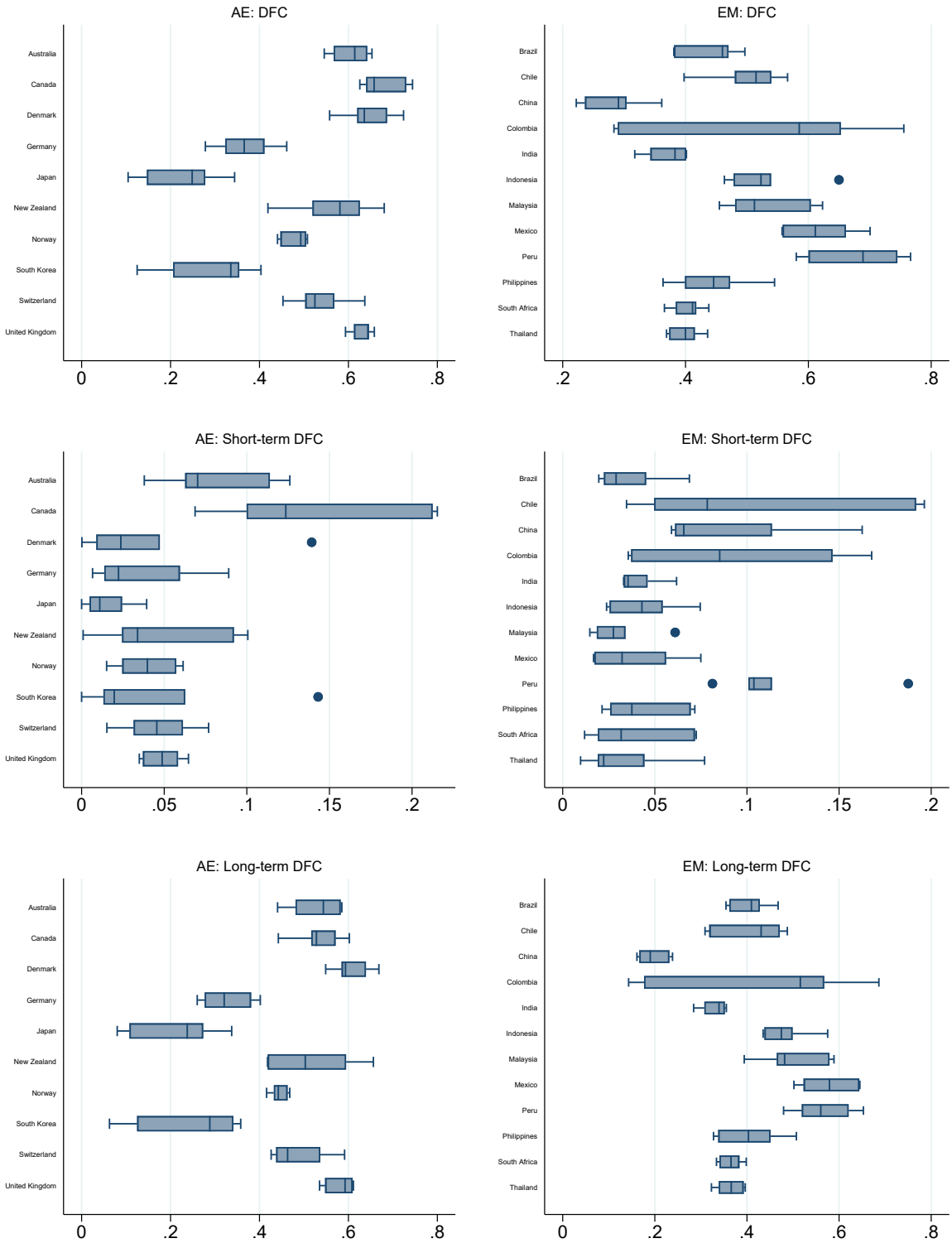

Figure 2: Debt distribution by type and economic outlook

trade opportunities (0.75) coincides with the highest levels of DFC (0.50), followed by a sharp decline in both measures.

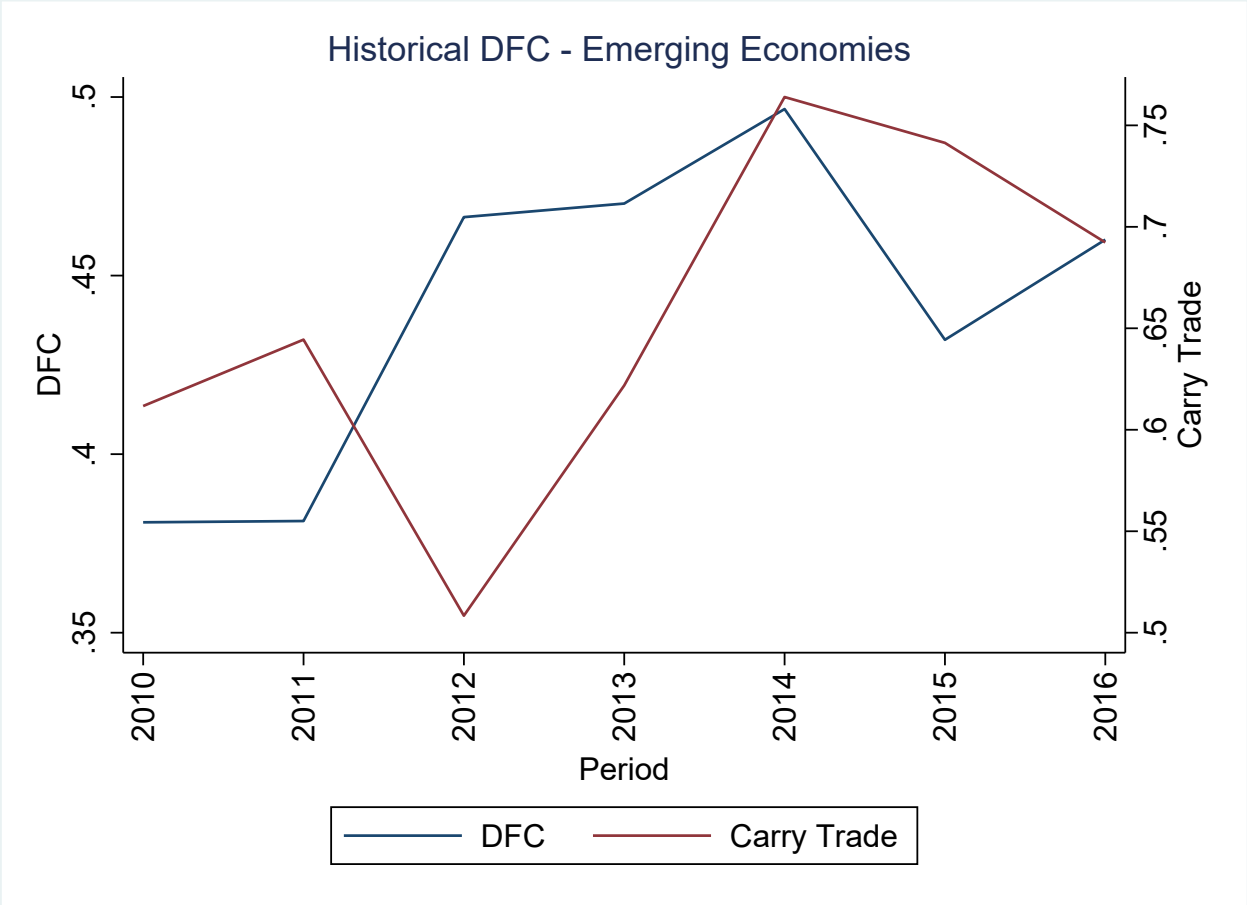

Figure 3: DFC vs Carry Trade - EM

The pattern in advanced economies (Figure 4) presents a markedly different relationship. DFC levels are generally higher, ranging from 0.55 to 0.65, but show less responsiveness to carry trade opportunities. While carry trade opportunities fluctuate between 0.15 and 0.35, DFC maintains a relatively steady upward trend until 2014, followed by a gradual decline. Notably, the peak in carry trade opportunities (0.32 in 2014) corresponds to the highest DFC level (0.65), but the subsequent decline in DFC is more gradual compared to emerging markets.

The contrast between these figures provides important insights into how market development influences the relationship between carry trade opportunities and foreign currency

borrowing. Emerging market firms show greater sensitivity to carry trade conditions, suggesting more opportunistic use of foreign currency debt. In contrast, advanced economy firms maintain more stable DFC levels despite carry trade fluctuations, indicating that their foreign currency borrowing decisions may be driven more by structural factors than by temporary market opportunities.

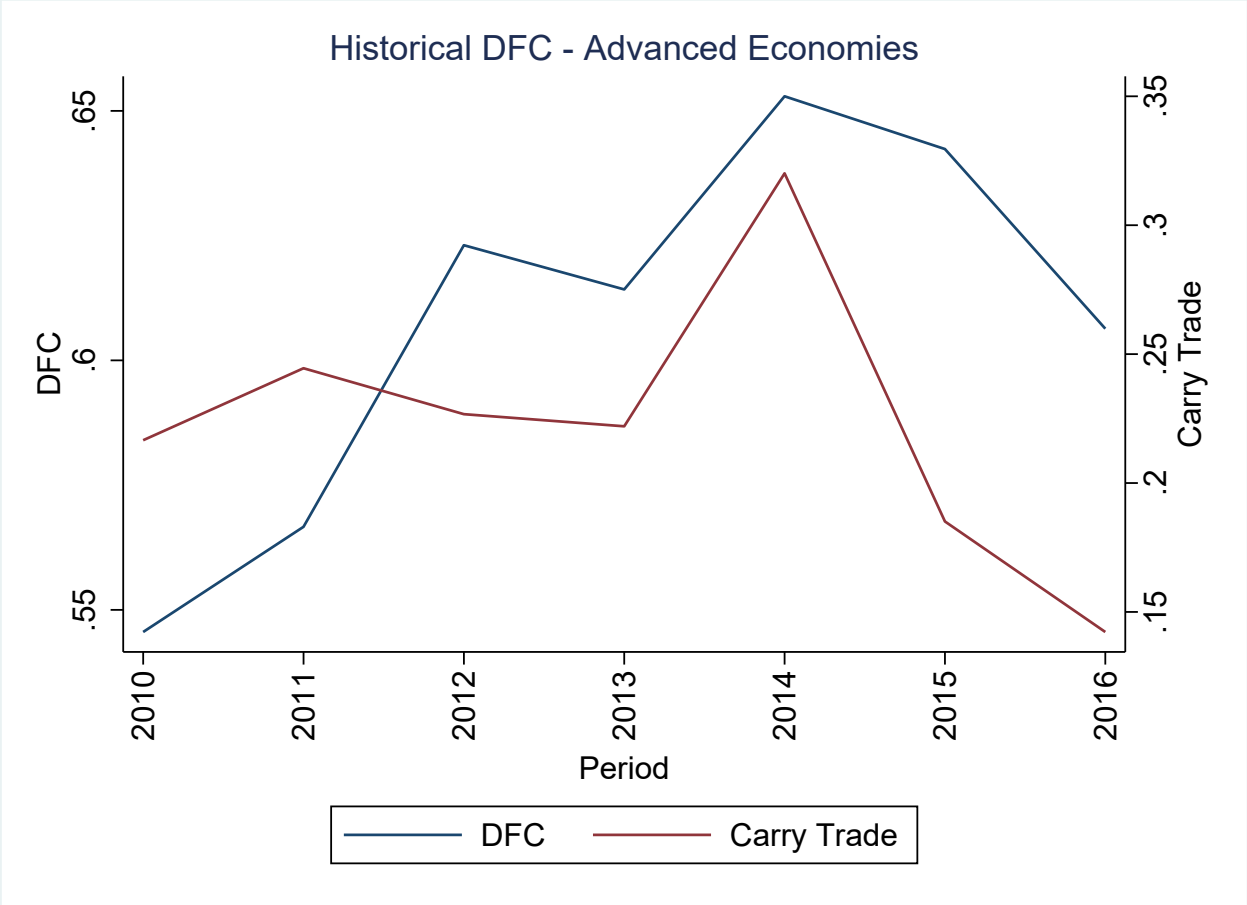

Figure 4: DFC vs Carry Trade - DE

Table 2 examines the relationship between carry trade opportunities and foreign currency borrowing using increasingly stringent specifications. The baseline result in column 1 of Panel A shows that a one standard deviation increase in carry trade opportunities is associated with a 31.8 pp increase in foreign currency-denominated debt. This economic magnitude is substantial, representing about 3.5 times the sample mean DFC ratio. The effect remains robust to successive inclusion of controls and fixed effects. Column 4 shows that controlling

for both firm characteristics and country fixed effects reduces the coefficient only slightly to 31.4%, suggesting the relationship is not driven by time-invariant country characteristics or firm-level factors. The inclusion of firm fixed effects in columns 5-7 reduces the magnitude to about 3.1-3.5%, but maintains statistical significance, indicating that even within-firm variation in carry trade opportunities drives foreign currency borrowing decisions.

Table 2: **Effect of Carry Trade on Debt in Foreign Currency**

This table presents the impact of carry trade and policy changes on the Debt in Foreign Currency. The dependent variable is the Debt in Foreign Currency ratio. Carry Trade is the divergence in short-term interest rates between local currency and foreign currency standardized by the implied volatility of 1-year options. Sudden Stop is a binary indicator variable that equals 1 if a sudden stop in monetary policy occurred in period t, and 0 otherwise. Control variables are not reported for brevity. Columns (1)-(7) show results with increasing levels of fixed effects. P-values reported are calculated based on robust standard errors. The significance levels of 10%, 5%, and 1% are represented by *, **, and *** respectively.

	Debt in Foreign Currency						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Full Sample							
CarryTrade	0.318***	0.321***	0.314***	0.314***	0.035***	0.035***	0.031***
	(0.095)	(0.091)	(0.085)	(0.056)	(0.012)	(0.012)	(0.010)
Constant	0.134***	-0.094	-0.097	-0.121***	0.111**	0.111**	0.087**
	(0.031)	(0.077)	(0.069)	(0.040)	(0.041)	(0.041)	(0.042)
Observations	241,202	120,090	119,974	120,090	119,447	119,334	119,330
R-squared	0.053	0.150	0.179	0.237	0.873	0.873	0.877
Panel B: Developed Economies							
CarryTrade	0.289	0.288	0.279	0.214	0.037	0.039	0.043
	(0.273)	(0.258)	(0.228)	(0.237)	(0.038)	(0.036)	(0.036)
Constant	0.158***	-0.009	-0.014	-0.158***	-0.002	-0.001	0.020
	(0.023)	(0.039)	(0.034)	(0.036)	(0.037)	(0.035)	(0.056)
Observations	59,407	29,751	29,708	29,751	29,365	29,326	29,322
R-squared	0.010	0.087	0.137	0.160	0.871	0.871	0.879
Panel C: Emerging Economies							
CarryTrade	0.331**	0.378***	0.364***	0.336***	0.035**	0.035**	0.030**
	(0.107)	(0.082)	(0.077)	(0.056)	(0.012)	(0.012)	(0.010)
Constant	0.125***	-0.446***	-0.417***	-0.208***	0.157***	0.157**	0.121
	(0.039)	(0.096)	(0.092)	(0.036)	(0.051)	(0.051)	(0.068)
Observations	181,795	90,339	90,265	90,339	90,082	90,008	90,005
R-squared	0.075	0.194	0.235	0.286	0.873	0.873	0.879
Controls							
Firm Controls	No	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	No	Yes	No	No	Yes	No
Country FE	No	No	No	Yes	No	Yes	No
Industry x Time FE	No	No	No	No	No	No	Yes
Country x Time FE	No	No	No	No	No	No	Yes
Firm FE	No	No	No	No	Yes	Yes	Yes

Panels B and C reveal striking heterogeneity across market development levels. In developed economies (Panel B), the relationship is generally weaker and statistically insignificant. In contrast, emerging markets (Panel C) show consistently stronger effects, with coefficients ranging from 33.1% to 37.8% across specifications. This pattern suggests that firms in emerging markets are particularly responsive to carry trade opportunities, consistent with theories emphasizing the role of domestic financial constraints in international borrowing decisions.

The markedly different sensitivity between developed and emerging markets aligns with financial constraint theories: firms in less developed financial markets face greater domestic borrowing constraints, making international borrowing opportunities particularly valuable when favorable conditions arise.

Table 3 isolates the effects of carry trade opportunities on long-term foreign currency borrowing, revealing important patterns in firms' strategic debt management. In the full sample (Panel A), a one standard deviation increase in carry trade opportunities (0.21) is associated with a 27.1 pp increase in long-term foreign currency debt. This effect represents more than three times the sample mean long-term DFC ratio of 8%, highlighting the substantial economic magnitude of this relationship.

The maturity-specific analysis provides insights into firms' strategic debt management. The strong response of long-term debt suggests that firms view favorable carry trade conditions as opportunities for fundamental liability restructuring rather than merely short-term tactical adjustments. This pattern is consistent with precautionary financing motives, where firms exploit temporary favorable conditions to secure long-term funding.

The market development comparison reveals an intriguing pattern: while emerging market firms show a stronger effect (28.1 pp per standard deviation of carry trade opportunities) than developed market firms (26.7 pp, statistically insignificant), both groups demonstrate substantial sensitivity for long-term borrowing. This suggests that across development levels, firms recognize the strategic value of exploiting favorable international funding conditions for longer-term liability management, though emerging market firms do so with greater intensity,

likely reflecting their more constrained domestic alternatives.

Table 3: **Effect of Carry Trade on Long Term Debt in Foreign Currency**

This table presents the impact of carry trade and policy changes on the Long Term Debt in Foreign Currency. Long Term Debt is any amount of outstanding debt a company holds that has a maturity of 12 months or longer. The dependent variable is the Debt in Foreign Currency ratio. Carry Trade is the divergence in short-term interest rates between local currency and foreign currency standardized by the implied volatility of 1-year options. Sudden Stop is a binary indicator variable that equals 1 if a sudden stop in monetary policy occurred in period t, and 0 otherwise. Control variables are not reported for brevity. Columns (1)-(7) show results with increasing levels of fixed effects. P-values reported are calculated based on robust standard errors. The significance levels of 10%, 5%, and 1% are represented by *, **, and *** respectively.

	Long Term Debt in Foreign Currency						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Full Sample							
CarryTrade	0.271**	0.288***	0.282***	0.290***	0.038***	0.038***	0.034***
	(0.099)	(0.086)	(0.080)	(0.052)	(0.007)	(0.007)	(0.006)
Constant	0.119***	-0.106	-0.108	-0.133***	0.089	0.090	0.078
	(0.028)	(0.073)	(0.066)	(0.039)	(0.056)	(0.056)	(0.059)
Observations	241,202	120,090	119,974	120,090	119,447	119,334	119,330
R-squared	0.045	0.145	0.174	0.228	0.857	0.857	0.862
Panel B: Developed Economies							
CarryTrade	0.267	0.270	0.264	0.204	0.045	0.048	0.049
	(0.240)	(0.223)	(0.195)	(0.200)	(0.041)	(0.039)	(0.038)
Constant	0.141***	-0.032	-0.039	-0.169***	-0.034	-0.035	-0.011
	(0.022)	(0.034)	(0.033)	(0.034)	(0.036)	(0.034)	(0.048)
Observations	59,407	29,751	29,708	29,751	29,365	29,326	29,322
R-squared	0.010	0.092	0.143	0.164	0.854	0.855	0.864
Panel C: Emerging Economies							
CarryTrade	0.281**	0.343***	0.333***	0.310***	0.037***	0.037***	0.033***
	(0.110)	(0.075)	(0.069)	(0.051)	(0.006)	(0.006)	(0.005)
Constant	0.111***	-0.453***	-0.425***	-0.226***	0.130	0.130	0.067
	(0.034)	(0.084)	(0.082)	(0.032)	(0.078)	(0.078)	(0.097)
Observations	181,795	90,339	90,265	90,339	90,082	90,008	90,005
R-squared	0.064	0.186	0.226	0.271	0.858	0.858	0.865
Controls							
Firm Controls	No	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	No	Yes	No	No	Yes	No
Country FE	No	No	No	Yes	No	Yes	No
Industry x Time FE	No	No	No	No	No	No	Yes
Country x Time FE	No	No	No	No	No	No	Yes
Firm FE	No	No	No	No	Yes	Yes	Yes

Table 4 presents an important contrast to the long-term borrowing patterns seen in Table 3. For short-term foreign currency debt, the effect of carry trade opportunities is markedly smaller, with a one standard deviation increase in our carry trade measure associated with

just a 5.7 pp increase in short-term foreign currency borrowing in the full sample. This represents approximately one-fifth of the effect observed for long-term debt, suggesting fundamentally different decision-making processes for short versus long-term borrowing.

Table 4: **Effect of Carry Trade on Short Term Debt in Foreign Currency**

This table presents the impact of carry trade and policy changes on the Short Term Debt in Foreign Currency. Short Term Debt is any amount of outstanding debt a maturing within a year. The dependent variable is the Debt in Foreign Currency ratio. Carry Trade is the divergence in short-term interest rates between local currency and foreign currency standardized by the implied volatility of 1-year options. Sudden Stop is a binary indicator variable that equals 1 if a sudden stop in monetary policy occurred in period t, and 0 otherwise. Control variables are not reported for brevity. Columns (1)-(7) show results with increasing levels of fixed effects. P-values reported are calculated based on robust standard errors. The significance levels of 10%, 5%, and 1% are represented by *, **, and *** respectively.

	Short Term Debt in Foreign Currency						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A: Full Sample							
CarryTrade	0.057***	0.045***	0.043***	0.039***	0.012***	0.012***	0.012***
	(0.018)	(0.010)	(0.010)	(0.010)	(0.004)	(0.004)	(0.003)
Constant	0.014***	0.010	0.010	0.009	0.003	0.003	-0.009
	(0.004)	(0.008)	(0.007)	(0.009)	(0.017)	(0.017)	(0.021)
Observations	241,202	120,090	119,974	120,090	119,447	119,334	119,330
R-squared	0.020	0.024	0.032	0.036	0.550	0.550	0.570
Panel B: Developed Economies							
CarryTrade	0.021	0.016	0.014	0.008	-0.006	-0.006	-0.003
	(0.037)	(0.041)	(0.039)	(0.041)	(0.009)	(0.009)	(0.008)
Constant	0.016***	0.023***	0.023***	0.009	0.050**	0.051**	0.053**
	(0.002)	(0.007)	(0.005)	(0.011)	(0.022)	(0.022)	(0.020)
Observations	59,407	29,751	29,708	29,751	29,365	29,326	29,322
R-squared	0.001	0.006	0.024	0.012	0.591	0.591	0.616
Panel C: Emerging Economies							
CarryTrade	0.060**	0.049***	0.048***	0.043***	0.014***	0.014***	0.013***
	(0.020)	(0.010)	(0.011)	(0.010)	(0.004)	(0.004)	(0.003)
Constant	0.013**	-0.008	-0.008	0.009	-0.008	-0.008	0.009
	(0.005)	(0.010)	(0.010)	(0.006)	(0.017)	(0.018)	(0.016)
Observations	181,795	90,339	90,265	90,339	90,082	90,008	90,005
R-squared	0.030	0.039	0.050	0.054	0.527	0.527	0.557
Controls							
Firm Controls	No	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	No	Yes	No	No	Yes	No
Country FE	No	No	No	Yes	No	Yes	No
Industry x Time FE	No	No	No	No	No	No	Yes
Country x Time FE	No	No	No	No	No	No	Yes
Firm FE	No	No	No	No	Yes	Yes	Yes

The smaller coefficient for short-term debt contradicts simple market timing theories,

which would predict stronger opportunistic behavior in more flexible short-term instruments. Instead, the pattern suggests firms view long-term foreign currency debt as a more strategic tool for exploiting favorable funding conditions, possibly because the benefits of locking in advantageous rates for longer periods outweigh the flexibility advantages of short-term debt.

The emerging versus developed market comparison further illuminates these dynamics. While emerging market firms again show stronger effects (6.0 pp versus 2.1 pp in developed markets), the difference is less pronounced than for long-term debt. This reduced divergence suggests that constraints on short-term international borrowing are more similar across market development levels, possibly reflecting the greater standardization and liquidity of short-term international debt markets.

Table 5 provides evidence of maturity-dependent substitution effects in firms' foreign currency borrowing behavior. The results reveal a nuanced pattern: carry trade opportunities have differential effects across debt maturities, with a negative impact on overall DFC issuance but opposite directional effects between long-term and short-term borrowing. In the full sample (Panel A), we find that carry trade opportunities are associated with a 11.6 pp reduction in total foreign currency debt issuance. This aggregate effect masks important heterogeneity across debt maturities. Long-term foreign currency borrowing decreases by 17.3 pp, while short-term borrowing increases by 5.7 pp. This contrasting pattern suggests that firms actively manage their debt maturity structure in response to carry trade conditions, substituting away from long-term foreign currency exposure while maintaining or slightly increasing short-term foreign currency borrowing.

The market development analysis (Panels B and C) reveals striking differences in how developed and emerging market firms respond to carry trade opportunities. Developed market firms show a positive, albeit statistically insignificant, relationship between carry trade opportunities and total foreign currency debt (7.5 pp), with similar patterns for both long-term (5.2 pp) and short-term borrowing (2.3 pp). In contrast, emerging market firms demonstrate a significant negative response in total (-14.3 pp) and long-term foreign currency

borrowing (-20.1 pp), partially offset by an increase in short-term borrowing (5.8 pp).

Table 5: **DFC Issuance by maturity type**

This table examines how carry trade opportunities affect foreign currency debt issuance across different maturities. The dependent variables are total foreign currency debt (DFC), long-term DFC (LT_DFC), and short-term DFC (ST_DFC). Results are presented for the full sample and separately for developed and emerging markets. All specifications include firm controls and fixed effects for industry, country, and firm characteristics. Standard errors in parentheses are clustered at the firm level. *, **, and *** denote significance at 10%, 5%, and 1% respectively.

	DFC Issuance		
	(1)	(2)	(3)
	DFC	LT_DFC	ST_DFC
Panel A: Full Sample			
Carry Trade	-0.116*	-0.173**	0.057**
	(0.065)	(0.063)	(0.027)
Constant	-0.547	-0.350	-0.197
	(0.731)	(0.627)	(0.283)
Observations	119,330	119,330	119,330
R-squared	0.855	0.799	0.879
Panel B: Developed Economies			
Carry Trade	0.075	0.052	0.023*
	(0.076)	(0.074)	(0.010)
Constant	-0.507	-0.516	0.010
	(0.536)	(0.542)	(0.051)
Observations	29,322	29,322	29,322
R-squared	0.738	0.732	0.531
Panel C: Emerging Economies			
Carry Trade	-0.143**	-0.201***	0.058*
	(0.062)	(0.062)	(0.030)
Constant	-0.023	0.035	-0.057
	(0.568)	(0.405)	(0.372)
Observations	90,005	90,005	90,005
R-squared	0.865	0.814	0.883
Controls	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Country FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes

This divergent response pattern suggests that emerging market firms face greater constraints in maintaining long-term foreign currency exposure during periods of high carry trade activity, possibly reflecting differences in hedging capabilities, debt rollover risks, or access to international capital markets. The positive coefficient on short-term borrowing across both market types indicates that firms may view short-term foreign currency debt as

a tactical tool for exploiting temporary carry trade opportunities while managing longer-term currency exposure more conservatively.

Table 6: **Effect of DFC on Investment Decisions**

This table presents the impact of DFC on Investment Decisions. The dependent variable is calculated as the CaPex divided by lagged capital stock (equity capital). Debt in foreign currency (DFC) is the ratio of foreign currency borrowing to total debt. Uncovered interest parity (UIP) is a dummy variable that indicates when deviations from UIP conditions are violated for a pair of currencies. Control variables are not reported for brevity. Columns (1)-(8) show results with increasing levels of fixed effects. P-values reported are calculated based on robust standard errors. The significance levels of 10%, 5%, and 1% are represented by *, **, and *** respectively.

	Investment (Inv1)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Full Sample								
DFC	0.027**	0.027**	0.007	0.012	0.013	0.006	0.031**	0.025*
	(0.013)	(0.013)	(0.011)	(0.011)	(0.011)	(0.011)	(0.015)	(0.014)
Constant	0.177***	0.177***	0.004	0.008	-0.010	-0.005	0.788***	0.714***
	(0.003)	(0.003)	(0.011)	(0.011)	(0.011)	(0.011)	(0.061)	(0.061)
Observations	281,479	281,479	146,571	146,434	146,571	146,571	145,820	145,682
R-squared	0.001	0.001	0.108	0.127	0.120	0.112	0.634	0.659
Panel B: Developed Economies								
DFC	0.020	0.020	-0.001	-0.004	0.000	0.000	0.028	0.030**
	(0.017)	(0.017)	(0.016)	(0.015)	(0.016)	(0.016)	(0.021)	(0.015)
Constant	0.150***	0.150***	-0.013	-0.014	-0.008	-0.013	0.471***	0.584***
	(0.005)	(0.005)	(0.022)	(0.022)	(0.031)	(0.022)	(0.148)	(0.094)
Observations	53,283	53,283	30,500	30,464	30,500	30,500	30,136	30,097
R-squared	0.001	0.001	0.152	0.201	0.162	0.153	0.684	0.733
Panel C: Emerging Economies								
DFC	0.037**	0.037**	0.011	0.022	0.021	0.006	0.028	0.019
	(0.017)	(0.017)	(0.015)	(0.015)	(0.014)	(0.015)	(0.020)	(0.019)
Constant	0.183***	0.183***	-0.022*	-0.022	-0.027**	-0.037***	0.852***	0.779***
	(0.003)	(0.003)	(0.013)	(0.014)	(0.013)	(0.013)	(0.066)	(0.071)
Observations	228,196	228,196	116,071	115,969	116,071	116,071	115,684	115,582
R-squared	0.001	0.001	0.106	0.134	0.116	0.113	0.623	0.651
Controls								
Firm Controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	No	No	Yes	No	No	No	No
Country FE	No	No	No	No	Yes	No	No	No
Time FE	No	No	No	No	No	Yes	No	No
Firm FE	No	No	No	No	No	No	Yes	Yes
Industry x Time FE	No	No	No	No	No	No	No	Yes
Country x Time FE	No	No	No	No	No	No	No	Yes

The descriptive patterns in foreign currency borrowing and carry trade opportunities motivate our formal analysis of how these relationships affects real outcomes. Table 6 examines how the relationship between foreign currency borrowing and carry trade opportunities

varies with investment decisions. The baseline specification shows that a one pp increase in DFC is associated with a 0.027 pp increase in investment. This relationship remains robust to the inclusion of comprehensive controls and fixed effects, suggesting that foreign currency borrowing has meaningful implications for firms' real investment decisions. The economic magnitude represents approximately 18% of the sample mean investment rate.

Table 7: **Effect of DFC on Investment Decisions**

This table presents the impact of DFC on Investment Decisions. The dependent variable is calculated as the growth rate of capital stock (equity capital). Debt in foreign currency (DFC) is the ratio of foreign currency borrowing to total debt. Uncovered interest parity (UIP) is a dummy variable that indicates when deviations from UIP conditions are violated for a pair of currencies. Control variables are not reported for brevity. Columns (1)-(8) show results with increasing levels of fixed effects. P-values reported are calculated based on robust standard errors. The significance levels of 10%, 5%, and 1% are represented by *, **, and *** respectively.

	Investment (Inv2)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Full Sample								
DFC	-0.316***	-0.316***	0.053	0.018	0.072	0.049	0.302*	0.276*
	(0.066)	(0.066)	(0.063)	(0.065)	(0.074)	(0.063)	(0.172)	(0.166)
Constant	0.697***	0.697***	1.957***	2.142***	1.813***	1.946***	9.016***	8.833***
	(0.020)	(0.020)	(0.085)	(0.097)	(0.099)	(0.085)	(0.734)	(0.836)
Observations	278,778	278,778	145,256	145,123	145,256	145,256	144,507	144,373
R-squared	0.001	0.001	0.022	0.027	0.024	0.023	0.334	0.350
Panel B: Developed Economies								
DFC	-0.262***	-0.262***	-0.069	-0.064	-0.081	-0.058	0.165	0.150
	(0.076)	(0.076)	(0.075)	(0.084)	(0.082)	(0.075)	(0.173)	(0.146)
Constant	0.568***	0.568***	1.848***	2.033***	1.667***	1.843***	8.537***	7.914***
	(0.032)	(0.032)	(0.185)	(0.195)	(0.187)	(0.185)	(1.117)	(1.161)
Observations	52,865	52,865	30,324	30,290	30,324	30,324	29,968	29,931
R-squared	0.001	0.001	0.036	0.053	0.039	0.039	0.426	0.478
Panel C: Emerging Economies								
DFC	-0.307***	-0.307***	0.094	0.072	0.146	0.086	0.344	0.357
	(0.087)	(0.087)	(0.088)	(0.092)	(0.106)	(0.089)	(0.236)	(0.230)
Constant	0.724***	0.724***	2.003***	2.157***	1.890***	1.990***	9.169***	8.996***
	(0.023)	(0.023)	(0.106)	(0.121)	(0.120)	(0.105)	(0.898)	(1.036)
Observations	225,913	225,913	114,932	114,832	114,932	114,932	114,539	114,439
R-squared	0.001	0.001	0.021	0.026	0.022	0.022	0.319	0.339
Controls								
Firm Controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	No	No	Yes	No	No	No	No
Country FE	No	No	No	No	Yes	No	No	No
Time FE	No	No	No	No	No	Yes	No	No
Firm FE	No	No	No	No	No	No	Yes	Yes
Industry x Time FE	No	No	No	No	No	No	No	Yes
Country x Time FE	No	No	No	No	No	No	No	Yes

Table 7 presents results using our second measure of investment (growth rate of capital stock), revealing a more nuanced pattern. The coefficient on DFC is negative and significant in the baseline specification. This contrasting result suggests that while firms maintain capital expenditure levels, they become more conservative in their overall capital stock growth when exposed to foreign currency debt. The effect is particularly pronounced in emerging markets, highlighting potential risks of foreign currency borrowing in less developed financial markets.

Tables 8 and 9 document the relationship between foreign currency borrowing and cash management policies. The results indicate that firms reduce their cash holdings in response to increased DFC, with a coefficient of -0.014 in the full sample. Using an alternative measure of cash holdings that includes marketable securities (Table 9), we find similar patterns but larger economic magnitudes, with a coefficient of -0.022. The negative relationship between DFC and cash holdings is stronger in developed markets compared to emerging markets. This pattern suggests that firms in more developed financial markets are more likely to use foreign currency borrowing as a substitute for cash holdings, possibly reflecting better access to international capital markets and more sophisticated financial management strategies.

Table 8: **Effect of DFC on Cash**

This table presents the impact of carry trade on cash management. The dependent variable is calculated as the ratio of cash holdings to total assets. Debt in foreign currency (DFC) is the ratio of foreign currency borrowing to total debt. Uncovered interest parity (UIP) is a dummy variable that indicates when deviations from UIP conditions are violated for a pair of currencies. Control variables are not reported for brevity. Columns (1)-(7) show results with increasing levels of fixed effects. P-values reported are calculated based on robust standard errors. The significance levels of 10%, 5%, and 1% are represented by *, **, and *** respectively.

	Cash (Cash)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Full Sample								
DFC	-0.014***	-0.014***	-0.007	-0.008*	0.012**	-0.006	-0.002	-0.002
	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)
Constant	0.106***	0.106***	0.169***	0.170***	0.138***	0.172***	0.218***	0.220***
	(0.001)	(0.001)	(0.005)	(0.005)	(0.005)	(0.005)	(0.014)	(0.016)
Observations	324,523	324,523	149,907	149,755	149,907	149,907	149,135	148,985
R-squared	0.001	0.001	0.191	0.202	0.247	0.193	0.818	0.823
Panel B: Developed Economies								
DFC	-0.035***	-0.035***	-0.028***	-0.030***	-0.016**	-0.027***	-0.008	-0.012*
	(0.005)	(0.005)	(0.006)	(0.006)	(0.007)	(0.006)	(0.007)	(0.006)
Constant	0.116***	0.116***	0.141***	0.144***	0.176***	0.141***	0.316***	0.343***
	(0.002)	(0.002)	(0.011)	(0.013)	(0.014)	(0.011)	(0.028)	(0.032)
Observations	61,791	61,791	30,945	30,902	30,945	30,945	30,565	30,522
R-squared	0.008	0.008	0.149	0.179	0.173	0.150	0.808	0.819
Panel C: Emerging Economies								
DFC	-0.008	-0.008	0.005	0.005	0.029***	0.006	0.001	0.002
	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)
Constant	0.103***	0.103***	0.156***	0.152***	0.121***	0.160***	0.191***	0.181***
	(0.001)	(0.001)	(0.005)	(0.005)	(0.005)	(0.005)	(0.016)	(0.019)
Observations	262,732	262,732	118,962	118,852	118,962	118,962	118,570	118,460
R-squared	0.000	0.000	0.238	0.255	0.302	0.241	0.821	0.827
Controls								
Firm Controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	No	No	Yes	No	No	No	No
Country FE	No	No	No	No	Yes	No	No	No
Time FE	No	No	No	No	No	Yes	No	No
Firm FE	No	No	No	No	No	No	Yes	Yes
Industry x Time FE	No	No	No	No	No	No	No	Yes
Country x Time FE	No	No	No	No	No	No	No	Yes

Tables 6-9 present correlational evidence on the relationship between foreign currency borrowing and firms' financial policies. While these patterns are informative, they should be interpreted as associations rather than causal effects, given potential endogeneity concerns and omitted variables. These correlational patterns, while consistent with theories of corporate financial policy, motivate our subsequent causal analysis using the Taper Tantrum as

an exogenous shock to foreign currency borrowing conditions.

Table 9: **Effect of DFC on Cash and Marketable Securities**

This table presents the impact of carry trade on cash management. The dependent variable is calculated as the proportion of cash and short-term investments relative to total assets. Debt in foreign currency (DFC) is the ratio of foreign currency borrowing to total debt. Uncovered interest parity (UIP) is a dummy variable that indicates when deviations from UIP conditions are violated for a pair of currencies. Control variables are not reported for brevity. Columns (1)-(8) show results with increasing levels of fixed effects. P-values reported are calculated based on robust standard errors. The significance levels of 10%, 5%, and 1% are represented by *, **, and *** respectively.

	Cash and Marketable Securities (Cash2)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A: Full Sample								
DFC	-0.022***	-0.022***	-0.011***	-0.010***	0.006	-0.010***	0.000	-0.000
	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Constant	0.092***	0.092***	0.155***	0.156***	0.128***	0.158***	0.220***	0.214***
	(0.001)	(0.001)	(0.004)	(0.004)	(0.004)	(0.004)	(0.011)	(0.013)
Observations	314,822	314,822	145,170	145,027	145,170	145,170	144,385	144,243
R-squared	0.003	0.003	0.199	0.211	0.267	0.201	0.816	0.821
Panel B: Developed Economies								
DFC	-0.030***	-0.030***	-0.018***	-0.019***	-0.009*	-0.018***	-0.005	-0.010*
	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)
Constant	0.102***	0.102***	0.130***	0.132***	0.166***	0.130***	0.287***	0.316***
	(0.002)	(0.002)	(0.009)	(0.010)	(0.010)	(0.009)	(0.024)	(0.026)
Observations	61,273	61,273	30,725	30,683	30,725	30,725	30,338	30,295
R-squared	0.007	0.007	0.161	0.188	0.188	0.161	0.790	0.803
Panel C: Emerging Economies								
DFC	-0.022***	-0.022***	-0.005	-0.004	0.015***	-0.004	0.003	0.004
	(0.004)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)	(0.005)
Constant	0.089***	0.089***	0.142***	0.138***	0.107***	0.146***	0.196***	0.179***
	(0.001)	(0.001)	(0.004)	(0.005)	(0.004)	(0.004)	(0.013)	(0.014)
Observations	253,549	253,549	114,445	114,343	114,445	114,445	114,047	113,945
R-squared	0.003	0.003	0.244	0.261	0.320	0.248	0.824	0.830
Controls								
Firm Controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	No	No	No	Yes	No	No	No	No
Country FE	No	No	No	No	Yes	No	No	No
Time FE	No	No	No	No	No	Yes	No	No
Firm FE	No	No	No	No	No	No	Yes	Yes
Industry x Time FE	No	No	No	No	No	No	No	Yes
Country x Time FE	No	No	No	No	No	No	No	Yes

4.3 Causal Effects of International Funding Shocks

To establish causal relationships between foreign currency borrowing and firm outcomes, we exploit the 2013 Taper Tantrum as an exogenous shock to international funding condi-

tions. Our identification strategy relies on the unexpected nature of this monetary policy announcement and its differential impact across market development levels. This setting provides a unique opportunity to examine how firms adjust their foreign currency borrowing and whether these financial adjustments affect real outcomes.

4.3.1 Foreign Currency Borrowing Response

Table 10 presents difference-in-differences estimates examining how the Taper Tantrum affected firms' foreign currency borrowing decisions across different maturities. In the full sample (Panel A), we find that the Post-Taper $\times$ Treated interaction coefficient is not statistically significant. This aggregate effect masks substantial heterogeneity across debt maturities. Long-term foreign currency borrowing increased by 3.1 pp, while short-term foreign currency borrowing decreased by 5.7 pp. This maturity substitution effect suggests that firms actively rebalanced their foreign currency debt structure following the shock, reducing short-term exposures while maintaining or increasing long-term borrowing. This maturity substitution pattern, consistent with Brunnermeier and Yogo (2009)'s theory of optimal maturity choice under funding risk, our results suggest that firms actively manage their debt structure rather than passively reducing foreign currency exposure.

Table 10: **Effect of UMP on DFC**

This table presents the effects of the Taper Tantrum on foreign currency borrowing across different maturities. $Post\_Taper \times Treated$ is the difference-in-differences interaction term capturing the effect of the shock. The dependent variables are total debt in foreign currency (DFC), long-term DFC (LT_DFC), and short-term DFC (ST_DFC), all scaled by total debt. Results are shown separately for the full sample and by market development level. All specifications include firm controls and fixed effects for industry×time, country×time, and firm level. Standard errors in parentheses are clustered at the firm level. *, **, and *** indicate significance at 10%, 5%, and 1% respectively.

	Effect of CT on DFC		
	(1)	(2)	(3)
	DFC	LT_DFC	ST_DFC
Panel A: Full Sample			
$Post\_Taper \times Treated$	-0.014	0.031**	-0.057***
	(0.013)	(0.013)	(0.005)
Constant	0.316***	0.268***	0.051***
	(0.003)	(0.003)	(0.001)
Observations	85,976	85,976	85,976
R-squared	0.786	0.763	0.532
Panel B: Developed Economies			
$Post\_Taper \times Treated$	-0.005	0.044	-0.059***
	(0.028)	(0.028)	(0.013)
Constant	0.418***	0.367***	0.053***
	(0.005)	(0.005)	(0.002)
Observations	16,309	16,309	16,309
R-squared	0.813	0.789	0.624
Panel C: Emerging Economies			
$Post\_Taper \times Treated$	-0.017	0.028*	-0.057***
	(0.015)	(0.015)	(0.005)
Constant	0.293***	0.245***	0.051***
	(0.004)	(0.004)	(0.001)
Observations	69,667	69,667	69,667
R-squared	0.783	0.761	0.530
Controls	Yes	Yes	Yes
Industry vs Time FE	Yes	Yes	Yes
Country vs Time FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes

The market development analysis reveals important cross-sectional variation in firms' responses to the monetary policy shock. Developed market firms show a modest 0.5 pp decrease in total DFC but exhibit significant maturity substitution, with long-term DFC increasing by 4.4 pp and short-term DFC decreasing by 5.9 pp. In contrast, emerging market firms demonstrate stronger overall effects, reducing their total foreign currency borrowing

by 1.7 pp, driven by a 5.7 pp reduction in short-term borrowing partially offset by a 2.8 pp increase in long-term debt. These patterns suggest that emerging market firms face greater constraints in maintaining foreign currency borrowing during periods of market stress, consistent with theories of financial frictions in international capital markets.

The differential response across market development levels is economically meaningful. Emerging market firms reduce their overall foreign currency borrowing by 1.7 pp (approximately 13% of their pre-shock average of 13.5%), while developed market firms show a more modest reduction of 0.5 pp (approximately 3% of their pre-shock average of 16.8%). This threefold difference in adjustment magnitude highlights how financial development shapes firms' ability to maintain access to international debt markets during stress periods. For a typical emerging market firm in our sample, this represents a reduction of approximately $8.5 million in foreign currency borrowing that is not substituted with alternative financing. This gap in adjustment capacity has significant implications for capital allocation efficiency and potentially explains why emerging market economies often experience sharper contractions following global monetary tightening. This pattern aligns with theories of financial market development and international capital market segmentation (Maggiori et al., 2020).

Figure 5 presents the difference-in-differences estimates for short-term foreign currency borrowing around the Taper Tantrum. The pre-trend coefficients (2010-2012) fluctuate between -0.02 and 0.02, with confidence intervals consistently containing zero. This pattern validates our identification strategy by confirming parallel trends in short-term borrowing behavior before the shock. The post-Taper Tantrum period shows a dramatic change. Beginning in 2013, we observe an immediate and persistent decline in short-term foreign currency borrowing. The point estimates drop to approximately -0.03 in 2013 and continue declining to around -0.06 by 2014-2016. The swift and substantial decline in short-term borrowing, combined with tight confidence intervals, suggests that firms actively reduced their short-term foreign currency exposure in response to the funding shock. This pattern provides statistical evidence for our maturity substitution hypothesis, indicating that firms primarily

adjusted their foreign currency exposure through reductions in short-term borrowing.

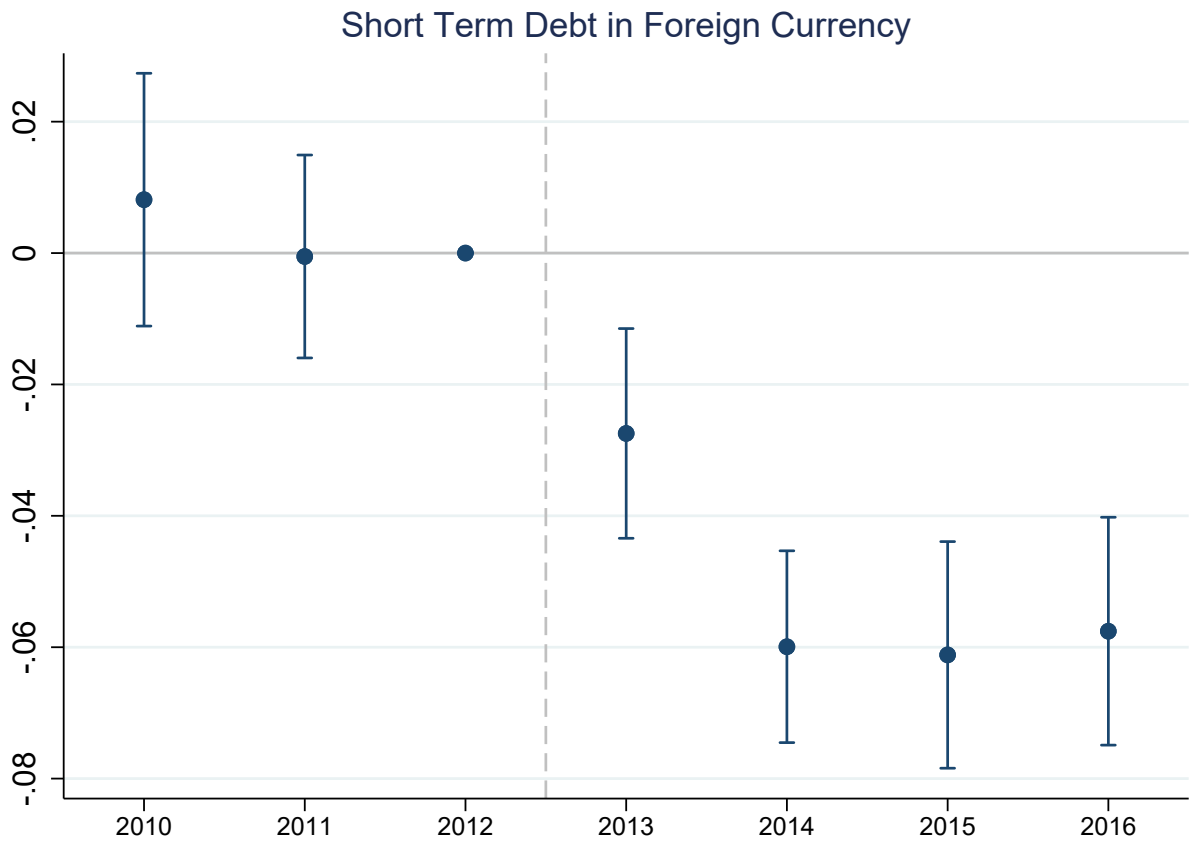

Figure 5: Event study - Taper Tantrum

Figure 6 reveals a pattern that complements and contrasts with the short-term DFC findings in Figure 5. The pre-treatment period (2010-2012) shows coefficient estimates fluctuating between 0.03 and 0.04, with confidence intervals that include zero. This pattern validates the parallel trends assumption for long-term borrowing decisions before the shock. Post-Taper Tantrum, we observe a gradual increase in long-term foreign currency borrowing. Point estimates rise to approximately 0.05 by 2014 and remain elevated through 2016, though the confidence intervals widen over time. When viewed alongside Figure 5's sharp decline in short-term borrowing, this pattern provides evidence of maturity substitution. As firms reduced their short-term foreign currency exposure by 6 pp, they partially offset this reduction by increasing long-term foreign currency borrowing by 3-5 pp.

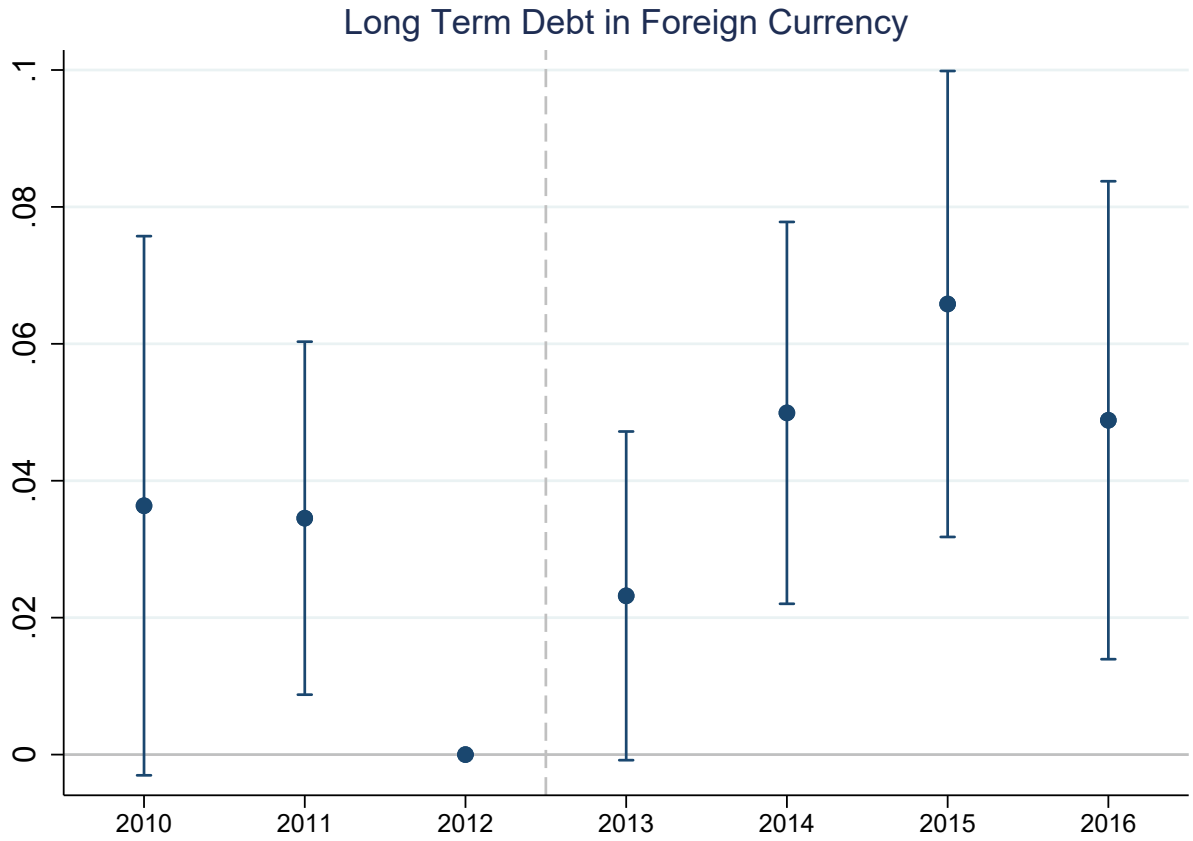

Figure 6: Event study - Taper Tantrum

The dynamic evidence in Figures 5-6 supports both our identification strategy and the maturity substitution mechanism. Parallel pre-trends validate our research design, while the post-shock patterns reveal that maturity substitution begins immediately following the Taper Tantrum. The precise estimates for short-term reductions coupled with more gradual long-term increases suggest that firms quickly reduce their most volatile exposures while methodically building long-term positions.

These results have important policy implications. First, they suggest that unconventional monetary policy in advanced economies has significant spillover effects on corporate financing in emerging markets, supporting arguments for international policy coordination. Second, the maturity substitution effect indicates that firms can partially insulate themselves from funding shocks through active liability management, though this ability varies

with financial development. This finding suggests that policies aimed at developing domestic corporate bond markets could help reduce emerging market firms' vulnerability to external shocks. Finally, the stronger response in emerging markets highlights the importance of maintaining adequate foreign currency reserves and macroprudential policies that address currency mismatches in corporate balance sheets.

The economic magnitudes we document suggest that global monetary conditions significantly influence corporate financing decisions beyond the traditional bank lending channel. The differential response between short and long-term debt indicates that firms actively manage their liability structure in response to funding shocks, with implications for both corporate resilience and systemic risk in emerging markets.

4.3.2 Real Outcomes

We examine the real effects of the Taper Tantrum shock on firm outcomes. These tables reveal an important finding: while firms actively adjust their foreign currency debt maturity structure in response to the Taper Tantrum, these financial decisions do not translate into significant changes in real outcomes. This disconnect between financial adjustments and real effects provides insights into how firms manage international funding shocks.

In Table 11, the lack of significant changes in investment and cash holdings suggests that firms' maturity substitution in foreign currency borrowing primarily serves as a financial management tool rather than a mechanism for altering real corporate policies. The Post-Taper $\times$ Treated interaction shows statistically insignificant effects on capital expenditure, capital stock growth, and cash holdings. These negligible real effects stand in contrast to the significant maturity structure adjustments documented in our earlier results.[4]

[4]In our baseline analysis, we measure firm outcomes over the contemporaneous fiscal year. To address potential timing effects in the relationship between the Taper Tantrum shock and firm outcomes, we also estimate our specifications using forward-looking dependent variables measured over the subsequent fiscal year (t+1). These alternative specifications yield quantitatively and qualitatively similar results. The coefficients on Post-Taper $\times$ Treated remain statistically insignificant. This robustness check further supports our conclusion that firms' maturity structure adjustments in foreign currency borrowing did not materially affect their real outcomes, regardless of the measurement horizon.

Table 11: **Effect of DFC on Real Outcomes**

This table examines how the Taper Tantrum affected real firm outcomes. The dependent variables are: capital expenditure scaled by lagged capital (Inv1), growth rate of capital stock (Inv2), cash holdings to assets (Cash1), and cash plus short-term investments to assets (Cash2). $Post\_Taper \times Treated$ captures the differential effect on treated firms after the shock. Results are presented for the full sample and by market development level. All specifications include firm controls and comprehensive fixed effects. Standard errors clustered at firm level in parentheses. *, **, and *** denote significance at 10%, 5%, and 1%.

	Effect of DFC on Real Outcomes			
	(1)	(2)	(3)	(4)
	Inv1	Inv2	Cash1	Cash2
Panel A: Full Sample				
$Post\_Taper \times Treated$	-0.010	0.119	0.002	0.004
	(0.016)	(0.136)	(0.003)	(0.004)
Constant	0.196***	0.410***	0.087***	0.102***
	(0.004)	(0.033)	(0.001)	(0.001)
Observations	76,619	76,255	83,719	85,976
R-squared	0.653	0.303	0.787	0.796
Panel B: Developed Economies				
$Post\_Taper \times Treated$	-0.025	0.145	-0.006	-0.005
	(0.018)	(0.141)	(0.005)	(0.006)
Constant	0.172***	0.284***	0.078***	0.091***
	(0.003)	(0.027)	(0.001)	(0.001)
Observations	14,568	14,489	16,150	16,309
R-squared	0.799	0.569	0.752	0.774
Panel C: Emerging Economies				
$Post\_Taper \times Treated$	-0.004	-0.023	0.003	0.004
	(0.018)	(0.154)	(0.004)	(0.004)
Constant	0.201***	0.475***	0.089***	0.105***
	(0.004)	(0.039)	(0.001)	(0.001)
Observations	62,051	61,766	67,569	69,667
R-squared	0.643	0.295	0.802	0.809
Controls	Yes	Yes	Yes	Yes
Industry x Time FE	Yes	Yes	Yes	Yes
Country x Time FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes

To complement Table 11, Figure 7 presents a dynamic analysis of investment responses around the Taper Tantrum. The estimates show investment and cash behavior for treated versus control firms from 2010 to 2016. The pre-trend coefficients hover around zero with tight confidence intervals, validating our parallel trends assumption. After the Taper Tantrum, we observe minimal deviation from this pattern, with coefficients remaining statistically indistinguishable from zero. This visual evidence reinforces the regression results in Table 11, suggesting that firms' maturity substitution in foreign currency borrowing did not significantly impact their investment decisions.

Despite the economically significant adjustments in debt structure, we find remarkably stable real outcomes. The estimates for investment effects are not only statistically insignificant but also economically small, with magnitudes below 0.3 pp (less than 2% of the pre-shock investment rate of 15%). This stability is particularly notable given

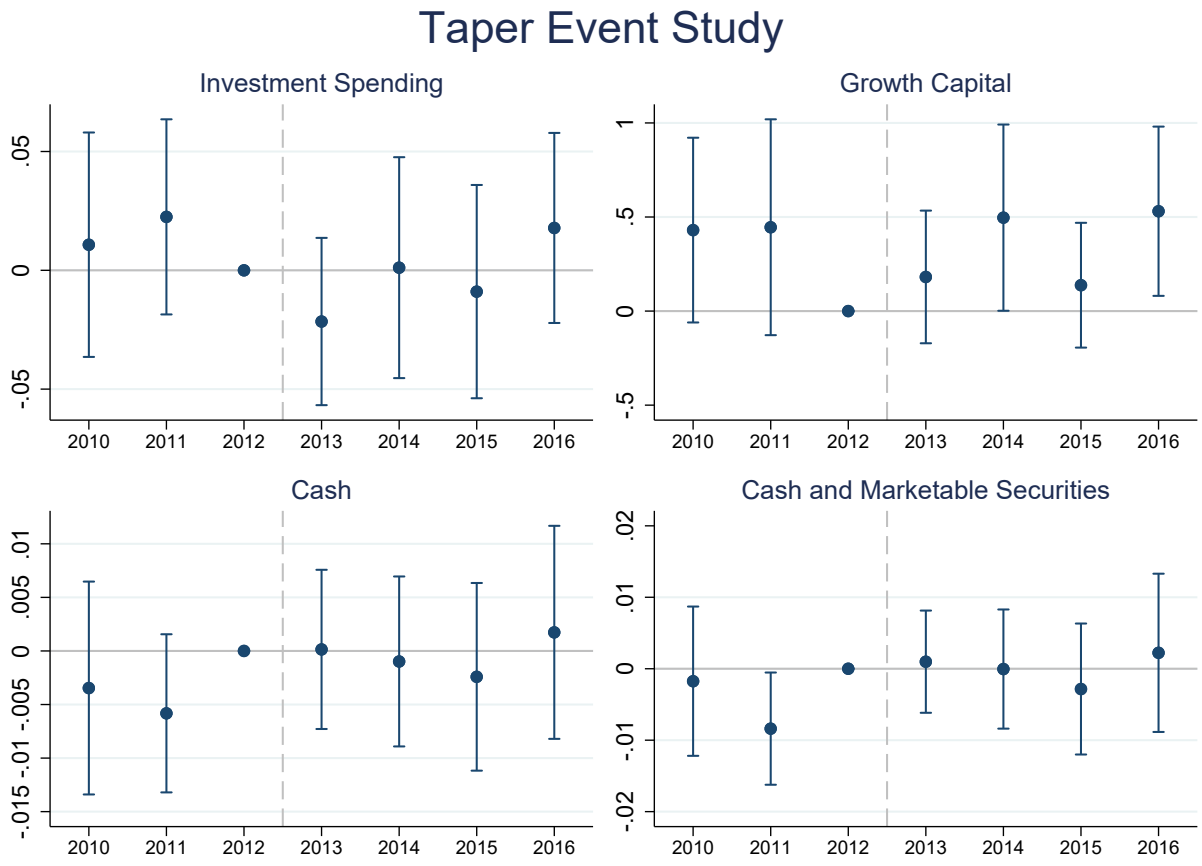

Figure 7: Event study - Taper Tantrum

The economic significance of this non-result lies in what it reveals about corporate financial management. Firms appear capable of absorbing substantial liability structure adjustments—shifting over debt composition for the average firm—without compromising their investment plans or operating performance. This financial resilience suggests that concerns about the real economic costs of international funding volatility may be overstated, at least for firms with the capacity to implement maturity substitution strategies. The evidence supports a view of foreign currency borrowing as a financial management decision that operates

largely independently from firms' real activities. While firms actively manage their foreign currency debt maturity in response to market conditions, these adjustments appear designed to maintain rather than alter their existing operational patterns.

5 Robustness check

5.1 Financial Market Development

To better understand how market development influences firms' responses to international funding shocks, we conduct an event study analysis examining foreign currency borrowing patterns around the 2013 Taper Tantrum. Figures 8 and 9 present the evolution of long-term and short-term foreign currency borrowing coefficients, respectively, for both advanced (AE) and emerging market (EM) economies from 2010 to 2016. These plots employ a difference-in-differences framework that controls for time-varying industry and country factors, allowing us to isolate how firms' borrowing behavior changes relative to their pre-shock patterns. The vertical dashed line marks the Taper Tantrum announcement in 2013, with coefficients and 95% confidence intervals plotted separately for advanced and emerging market firms. This visualization enables us to examine not only the immediate impact of the shock but also the persistence and potential divergence in adjustment patterns across different levels of financial market development.

The differential response between advanced and emerging economies provides important insights into how financial development shapes firms' ability to adjust to international funding shocks. Prior to the Taper Tantrum, both advanced and emerging market firms maintained relatively stable levels of foreign currency borrowing, with coefficients fluctuating around zero and showing no significant differences between market types. However, the post-2013 period reveals striking divergences in adjustment patterns across both short-term and long-term borrowing.

The short-term borrowing (Fig. 8) patterns reveal an even more pronounced divergence.

While both advanced and emerging market firms initially reduced their short-term foreign currency borrowing in 2013, with coefficients dropping to around -0.03, their subsequent adjustment paths differed markedly. Advanced economy firms exhibited a gradual recovery in short-term borrowing capacity, with coefficients moderating to around -0.02 by 2015-2016. Emerging market firms, however, experienced a persistent decline in short-term foreign currency borrowing, with coefficients reaching -0.05 or lower by the end of our sample period.

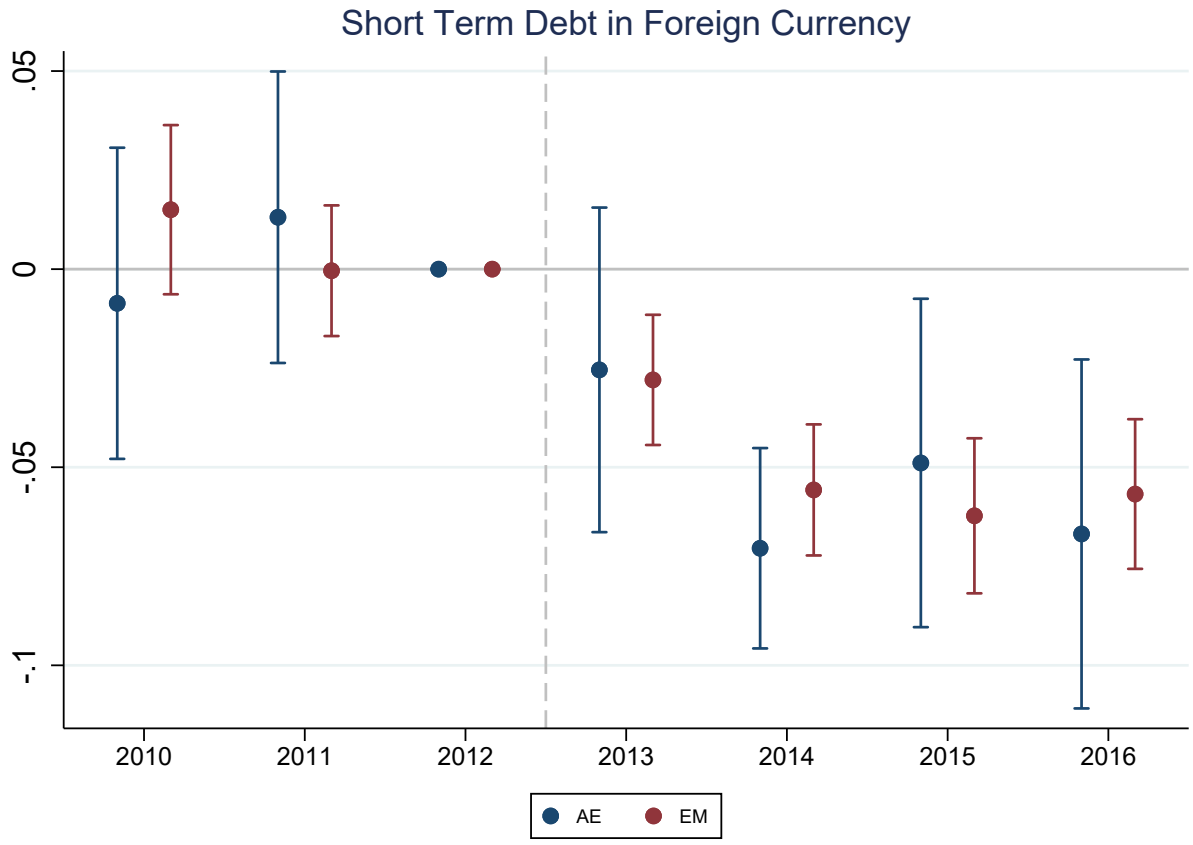

Figure 8: Event study of Short-Term DFC by Financial Market Development

In the long-term debt market (Fig. 9), advanced economy firms demonstrated greater capacity to maintain and even expand their foreign currency borrowing, with coefficients rising to approximately 0.08-0.09 by 2014-2015. This pattern suggests that developed financial markets provided firms with sufficient flexibility to continue accessing long-term international funding despite tightening global conditions. In contrast, emerging market firms showed a

more modest response, with coefficients remaining below 0.05 throughout the post-shock period, indicating more constrained access to long-term foreign currency financing.

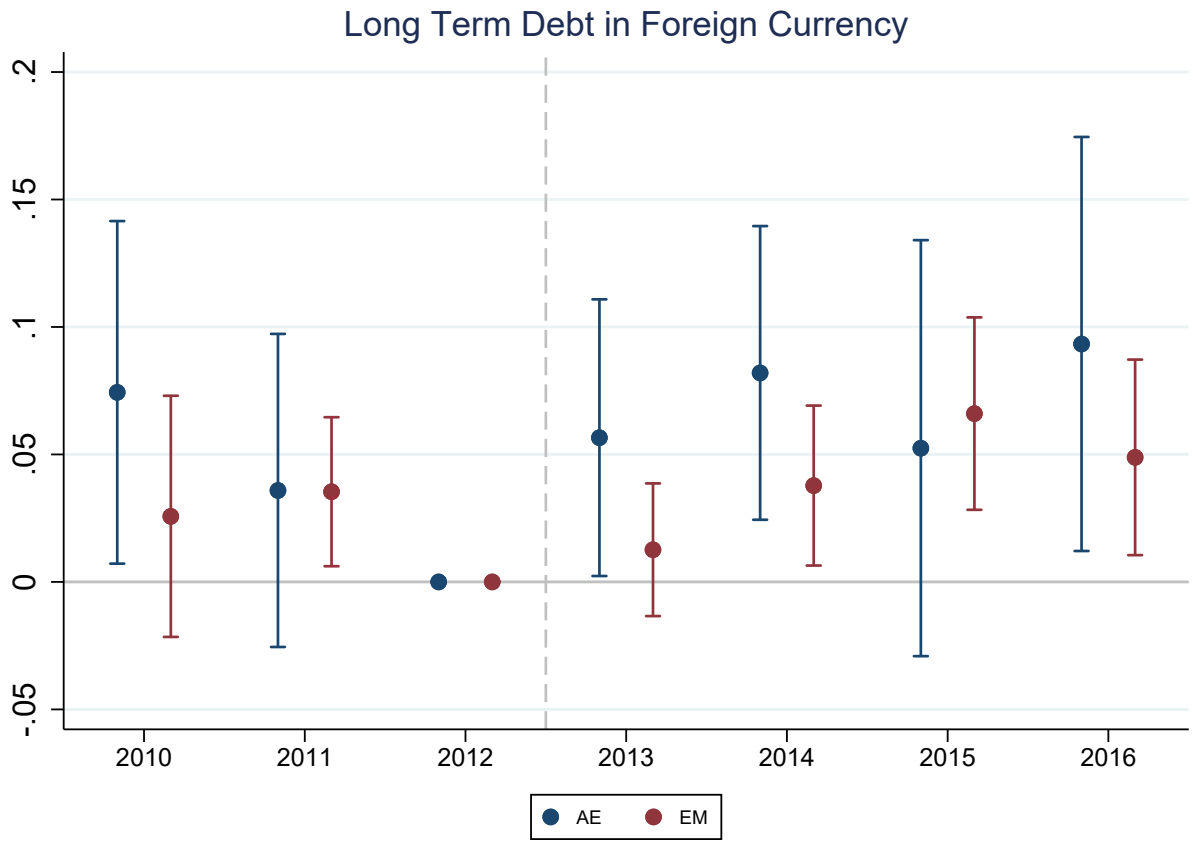

Figure 9: Event study of Long-Term DFC by Financial Market Development

These contrasting patterns highlight how domestic financial development influences firms' ability to maintain stable access to international funding markets during periods of stress. The greater flexibility demonstrated by advanced economy firms in both maintaining long-term borrowing and moderating short-term reductions suggests that developed financial markets provide important advantages in managing external funding shocks. This finding carries significant implications for understanding how global monetary conditions transmit differently across varying levels of financial market development.

5.2 Alternative Real Outcomes

Beyond investment and cash holdings, we examine a broader set of real outcomes to provide a comprehensive view of how firms' operations are affected by changes in foreign currency borrowing. We analyze market-based measures including systematic risk (beta) and valuation metrics, as well as accounting-based performance measures like profitability and operating margins. This analysis helps distinguish whether firms' financial adjustments have spillover effects into their broader business operations and market performance.

Table 12: **Effect of DFC on Alternative Real Outcomes**

This table analyzes the Taper Tantrum's impact on additional firm outcomes: systematic risk (Beta), market-to-book ratio (MB), return on assets (ROA), and return on equity (ROE). $Post\_Taper \times Treated$ measures the treatment effect. Results are shown for the full sample and separately for developed and emerging markets. All models include firm-level controls and fixed effects for industry×time, country×time, and firm characteristics. Standard errors in parentheses are clustered at firm level. *, **, and *** indicate significance at 10%, 5%, and 1%.

	Effect of DFC on Real Outcomes			
	(1)	(2)	(3)	(4)
	Beta	MB	ROA	ROE
Panel A: Full Sample				
$Post\_Taper \times Treated$	0.021	-0.104	0.000	-0.002
	(0.030)	(0.237)	(0.003)	(0.005)
Constant	0.710***	2.920***	0.088***	0.049***
	(0.007)	(0.057)	(0.001)	(0.001)
Observations	84,213	85,976	85,891	85,976
R-squared	0.542	0.917	0.791	0.664
Panel B: Developed Economies				
$Post\_Taper \times Treated$	0.076	-0.010	-0.000	-0.005
	(0.107)	(0.091)	(0.008)	(0.011)
Constant	1.002***	1.178***	0.080***	0.023***
	(0.019)	(0.016)	(0.001)	(0.002)
Observations	15,960	16,309	16,290	16,309
R-squared	0.540	0.822	0.842	0.759
Panel C: Emerging Economies				
$Post\_Taper \times Treated$	0.010	-0.098	0.001	-0.001
	(0.030)	(0.296)	(0.004)	(0.005)
Constant	0.643***	3.322***	0.090***	0.055***
	(0.008)	(0.075)	(0.001)	(0.001)
Observations	68,252	69,667	69,601	69,667
R-squared	0.540	0.917	0.755	0.570
Controls	Yes	Yes	Yes	Yes
Industry x Time FE	Yes	Yes	Yes	Yes
Country x Time FE	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes

Table 12 reinforces this interpretation by showing that the debt maturity adjustments

also fail to impact firms' market risk exposure or operating performance. We find no significant changes in systematic risk, valuation metrics, or profitability measures. This pattern holds across both developed and emerging markets, suggesting that firms globally manage to insulate their operations from changes in foreign currency borrowing conditions. These findings extend our understanding of corporate responses to international funding shocks in two ways. First, they indicate that firms use maturity substitution primarily as a defensive financial management tool rather than an opportunity for changing real investment or operating policies. Second, they suggest that firms successfully isolate their operations from funding market disruptions through liability management, maintaining stable investment and performance despite significant adjustments in their debt structure.

Supporting the findings in Table 12, Figure 10 examines the dynamic evolution of systematic risk (beta) around the Taper Tantrum. The pre-treatment period shows stable coefficients near zero, indicating similar risk profiles between treated and control firms before the shock. Following the Taper Tantrum, we observe only minor fluctuations in beta estimates, with confidence intervals consistently containing zero. This pattern aligns with the regression results in Table 12, demonstrating that firms' adjustments to their foreign currency debt structure did not materially affect their market risk exposure, despite the significant changes in liability composition documented earlier.

5.3 Triple differences: Currency volatility

To construct our measure of historical market volatility, we first calculate the average pre-2013 volatility for each country in our sample. We then identify high-volatility countries separately within advanced economies (AE) and emerging markets (EM) by determining the 75th percentile threshold of pre-2013 average volatility within each group. This approach ensures that our classification of high-volatility countries is relative to peer economies at similar stages of development, rather than applying a single global threshold that might predominantly capture emerging markets. Countries above their respective group's 75th

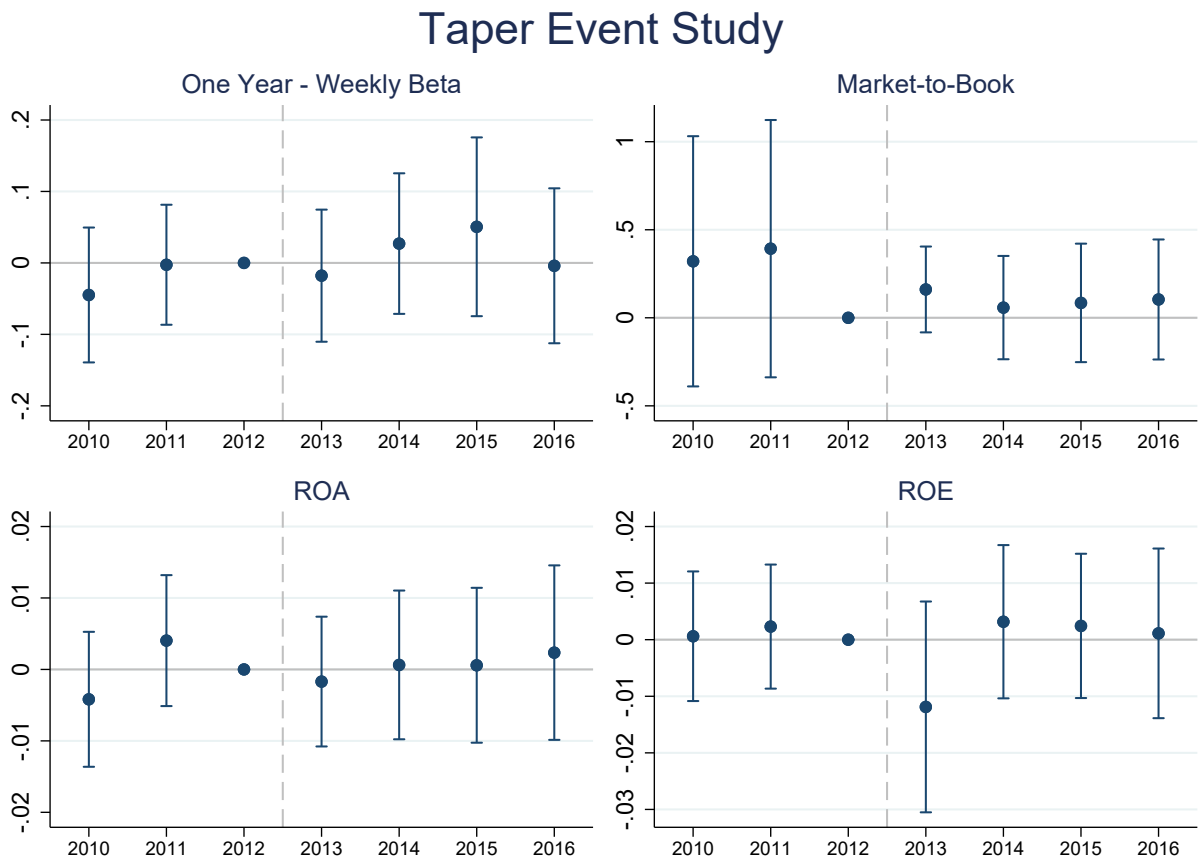

Figure 10: Event study - Taper Tantrum

percentile threshold are classified as high-volatility countries. The final indicator variable takes a value of one for firms in high-volatility advanced economies (relative to other AE countries) or high-volatility emerging markets (relative to other EM countries), and zero otherwise. This construction allows us to examine how the relationship between market development and firms' foreign currency borrowing varies with underlying market volatility, while accounting for systematic differences between advanced and emerging economies.

Figure 11 presents triple-difference estimates examining long-term foreign currency borrowing behavior around the Taper Tantrum. The analysis isolates the differential effect across market development levels while controlling for time-varying industry and country factors, providing our most rigorous test of how financial development influences firms' ability to maintain long-term foreign currency funding during stress periods. The pre-treatment

estimates, ranging from 2010 to 2012, demonstrate coefficients fluctuating between 0.05 and -0.05, with confidence intervals containing zero. This pattern validates our identification strategy by confirming the absence of differential pre-trends in long-term borrowing behavior across market development levels prior to the shock.

Following the Taper Tantrum, we observe a gradual but persistent decline in the triple-difference coefficients. The point estimates become increasingly negative, reaching approximately -0.08 by 2014-2015. While the confidence intervals widen in later years, suggesting increased heterogeneity in firms' responses, the persistent negative coefficients indicate that firms in less developed markets faced greater constraints in maintaining long-term foreign currency borrowing. The magnitude of these effects is particularly noteworthy when compared to our earlier findings on total and short-term debt. The substantial decline in long-term borrowing capacity, indicated by coefficients between -0.05 and -0.10, suggests that market development plays a crucial role in firms' ability to maintain stable access to long-term foreign currency funding. This evidence supports theories emphasizing the importance of domestic financial market development for firms' access to international capital markets during periods of stress.

Figure 12 presents our most rigorous analysis of short-term foreign currency borrowing behavior around the Taper Tantrum, employing a triple-difference framework to isolate the differential effect across market development levels. The estimates reveal how financial market development influences firms' ability to maintain short-term foreign currency funding during periods of market stress. The pre-treatment period shows modest coefficients ranging between -0.02 and 0.02, with confidence intervals consistently containing zero. This pattern confirms the absence of differential pre-trends and validates our identification strategy. The stability of these estimates through 2012 indicates that firms across market development levels maintained similar short-term borrowing patterns before the shock. The post-Taper Tantrum period reveals a distinct and interesting pattern. Initially, we observe a positive shift in the coefficients during 2013, reaching approximately 0.02. This immediate response

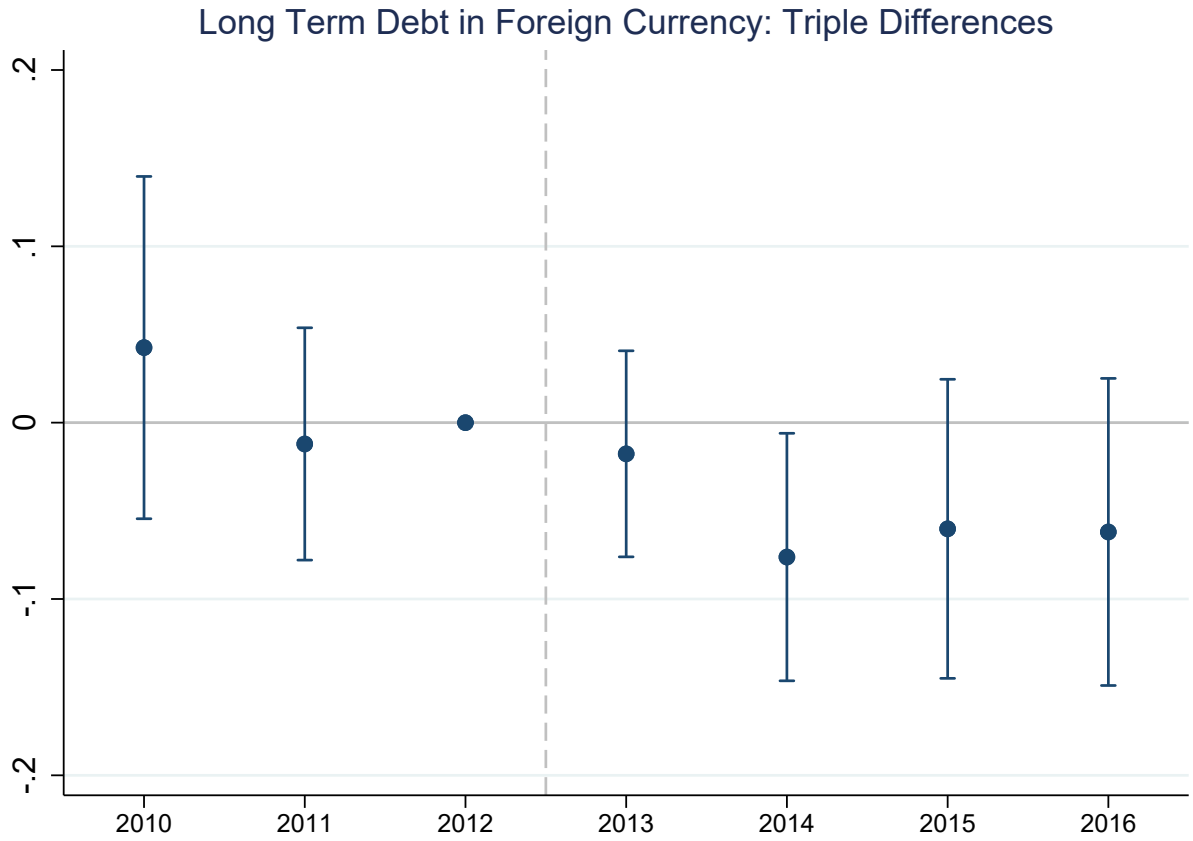

Figure 11: Triple Difference Event study - Taper Tanturm

suggests that firms in less developed markets initially attempted to maintain their short-term foreign currency borrowing. However, this effect reverses in subsequent years, with coefficients turning slightly positive in 2014-2015 before settling around 0.01 by 2016. The confidence intervals remain relatively tight throughout the post-treatment period, providing precise estimates of these effects. The evolution of these coefficients offers important insights into how market development influences firms' short-term funding strategies. Unlike the persistent negative effects observed in long-term borrowing 11, the more muted and variable response in short-term debt suggests that firms across market development levels found ways to manage their short-term foreign currency exposure, albeit potentially through different mechanisms.

Our triple-difference analysis reveals a striking maturity-dependent response to the Taper

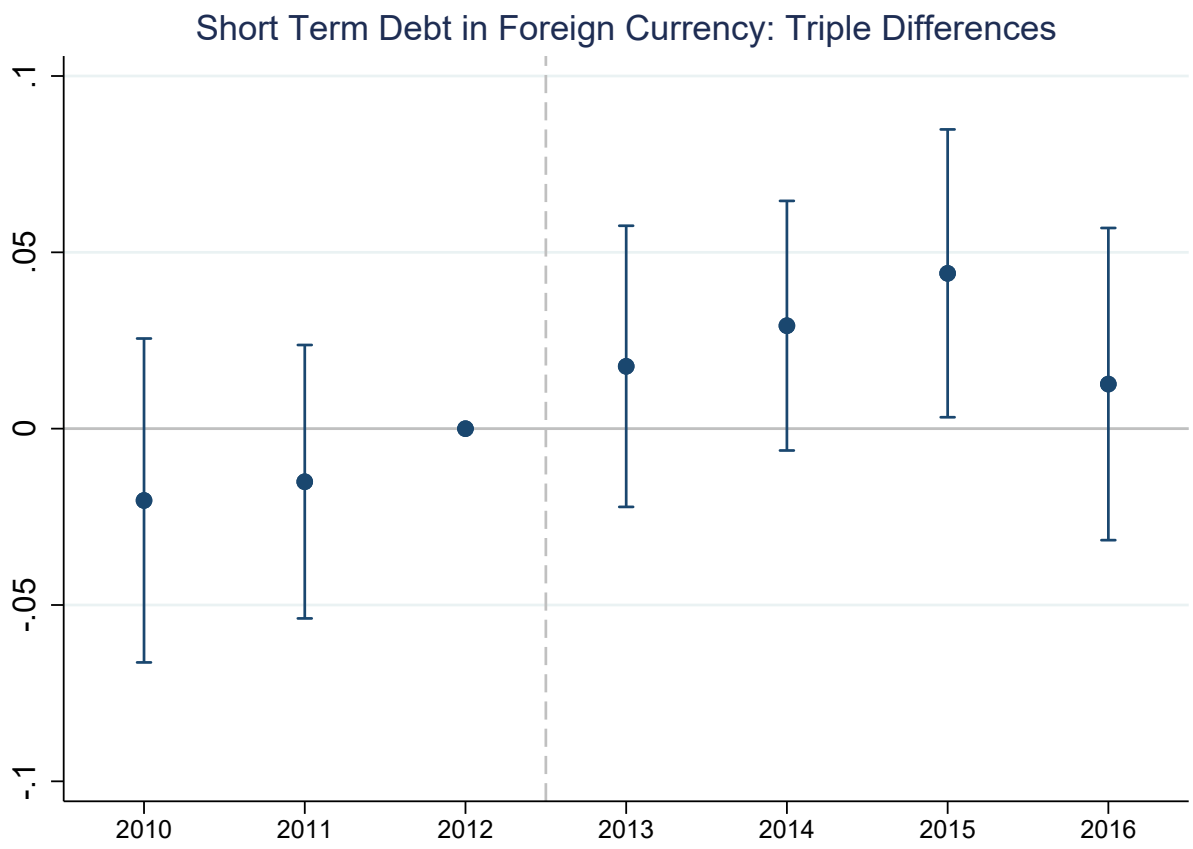

Figure 12: Triple Difference Event study - Taper Tanturm

Tantrum that varies systematically with historical currency volatility and financial market development. Firms in countries with historically volatile currencies and less developed financial markets experience a sharp, persistent decline in long-term foreign currency borrowing (5-10 pp) while maintaining or slightly increasing their short-term foreign currency borrowing (1-2 pp).

This maturity-specific response pattern builds on Liao (2020)'s examination of how currency choice in corporate debt responds to monetary policy shocks, and extends (Du and Schreger, 2022), who show how domestic financial development shapes emerging market firms' currency choices. Our findings complement (Bruno and Shin, 2023), who examine how exchange rate volatility affects global banks' lending behavior during stress periods. While they focus on the overall currency composition of debt, we show that the response

varies systematically by maturity, suggesting a more nuanced approach to currency risk management. The stronger response in emerging markets supports Maggiori et al. (2020)'s emphasis on the crucial role of financial market development in international capital flows.

Our difference-in-differences approach exploits this variation while addressing several potential concerns. We employ comprehensive fixed effects to absorb confounding factors, including country-year and industry-year effects that control for macroeconomic conditions and sector-specific trends. Our event study analysis confirms parallel pre-trends between treatment and control groups, supporting the validity of our research design. Additionally, our triple-difference specifications provide further identification leverage by exploiting variation across market development levels. While no empirical strategy can eliminate all potential confounds in a complex international setting, our approach provides a robust framework for examining how firms adjust their foreign currency borrowing in response to funding shocks. The consistency of our results across multiple specifications and subsamples further strengthens our confidence in the findings.

6 Conclusion

This paper examines how firms adjust their foreign currency borrowing in response to international funding shocks and investigates whether these financial adjustments affect real corporate outcomes. Using the 2013 Taper Tantrum as an exogenous shock to funding conditions, we document substantial heterogeneity in firms' responses across market development levels and debt maturities.

Our analysis reveals that firms actively manage their foreign currency exposure through maturity substitution. Following the Taper Tantrum, firms reduce their short-term foreign currency borrowing by 5.7 pp while increasing long-term borrowing by 3.1 pp. This adjustment varies systematically with financial market development. While both developed and emerging market firms sharply reduce short-term foreign currency borrowing, developed

market firms show greater ability to substitute into longer maturities, increasing long-term borrowing by 4.4 pp compared to 2.8 pp in emerging markets.

Following the Taper Tantrum, firms reduced short-term foreign currency borrowing by 5.7 pp, representing a substantial 57% decline relative to the pre-shock mean of 10%. Simultaneously, firms increased long-term foreign currency borrowing by 3.1 pp, a 31% increase from the pre-shock baseline. For the average firm in our sample with $500 million in total debt, this maturity substitution represents a shift of approximately $28.5 million from short-term to long-term foreign currency instruments.

The differential response between developed and emerging markets provides important insights into how domestic financial development influences firms' ability to manage international funding shocks. Emerging market firms show a stronger overall reduction in foreign currency borrowing (-1.7 versus -0.5 pp), suggesting that domestic financial constraints amplify sensitivity to international funding conditions. However, despite these substantial differences in financial adjustment patterns, we find no significant effects on real outcomes. Investment, cash holdings, market risk exposure, and operating performance remain remarkably stable across market development levels.

These findings advance our understanding of international corporate finance in several ways. First, they demonstrate that firms view short and long-term foreign currency debt as distinct financing tools rather than perfect substitutes, with their ability to substitute between maturities depending crucially on domestic financial development. Second, they suggest that firms can successfully insulate their operations from funding shocks through active liability management, even in less developed markets. Third, they indicate that the transmission of international funding shocks to real outcomes may be more limited than previously thought when firms can actively adjust their liability structure.

By providing a framework that incorporates both traditional views of foreign currency borrowing and newly observed carry trade behavior, we contribute to a more comprehensive understanding of corporate financing decisions in an international context. This framework

not only explains observed patterns but also highlights potential risks and policy implications, paving the way for future empirical investigations and policy discussions. It offers a nuanced view of how firms' foreign currency borrowing decisions are influenced by their natural currency exposure, market conditions, and financial constraints, while also considering the broader implications of these decisions for investment, risk accumulation, and financial stability. Therefore, our framework highlights the need for policymakers to consider the changing nature of foreign currency borrowing. Macroprudential policies may need to address the systemic risks posed by widespread corporate carry trade activity.

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Appendix A

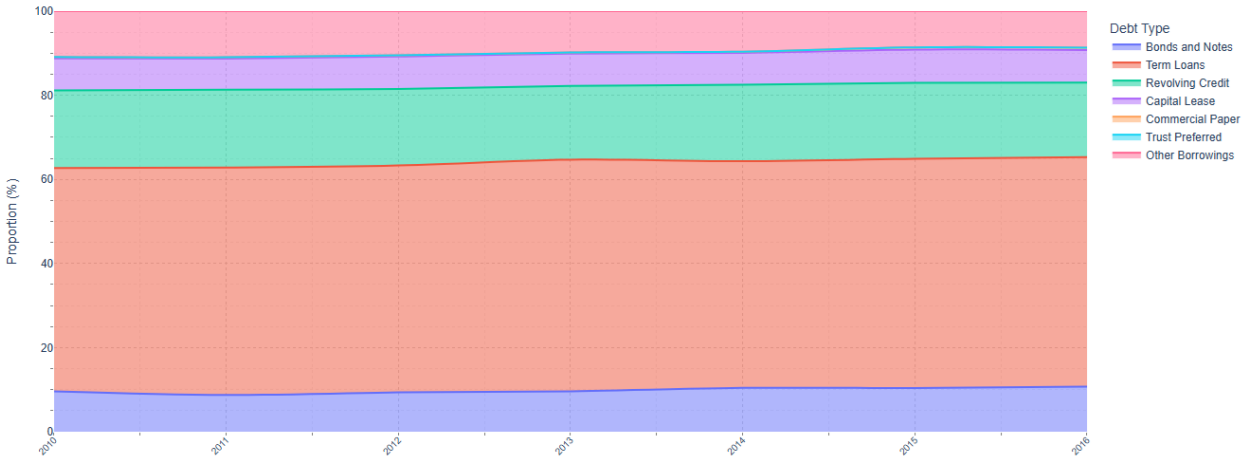

Figure A.1: Proportion of debt types over time

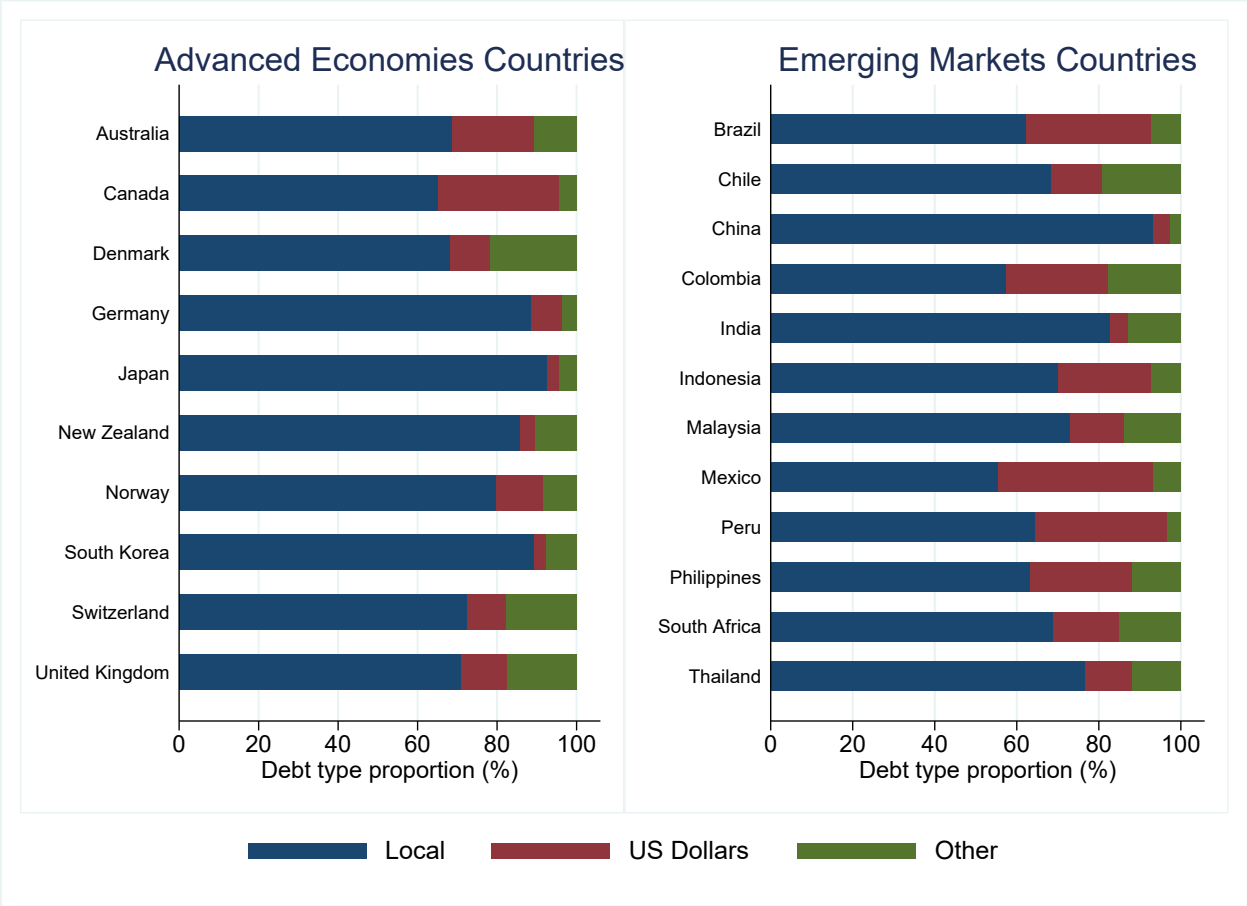

Figure A.2: Debt proportion by currency of firms by Financial Market Development

Table A.1: **Baseline: Carry Trade Effects**

This table examines the carry trade effects on debt issuance and proportion by currency pair. All specifications include firm controls and fixed effects for year, currency pair, and firm characteristics. Standard errors in parentheses are clustered at the firm level. *, **, and *** denote significance at 10%, 5%, and 1% respectively.

	Total		Long-Term		Short-Term	
	Debt Issuance	Debt Proportion	Debt Issuance	Debt Proportion	Debt Issuance	Debt Proportion
	(1)	(2)	(3)	(4)	(5)	(6)
Carry Trade	0.556***	0.0363**	0.448***	0.0117	0.289***	0.152***
	(0.0256)	(0.0154)	(0.0285)	(0.0157)	(0.0231)	(0.0178)
Constant	0.152***	0.0892***	0.151***	0.0890***	0.0614***	0.0423***
	(0.00288)	(0.00173)	(0.00320)	(0.00176)	(0.00260)	(0.00200)
Observations	111,414	111,414	111,235	111,398	111,042	111,333
R-squared	0.819	0.735	0.785	0.716	0.586	0.501
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Currency Pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Table A.2: **Taper Tantrum Effects on Carry Trade**

This table examines the carry trade effects on debt issuance and proportion by currency pair using the 2013 Taper Tantrum as an exogenous shock. All specifications include firm controls and fixed effects for year, currency pair, and firm characteristics. Standard errors in parentheses are clustered at the firm level. *, **, and *** denote significance at 10%, 5%, and 1% respectively.

	Total		Long-Term		Short-Term	
	Debt Issuance	Debt Proportion	Debt Issuance	Debt Proportion	Debt Issuance	Debt Proportion
	(1)	(2)	(3)	(4)	(5)	(6)
Carry Trade	0.637***	0.0625***	0.531***	0.0374*	0.300***	0.158***
	(0.0294)	(0.0203)	(0.0322)	(0.0208)	(0.0302)	(0.0245)
Post-Taper ×	-0.108***	-0.0350**	-0.112***	-0.0344**	-0.0135	-0.00698
Carry Trade	(0.0143)	(0.0160)	(0.0171)	(0.0167)	(0.0287)	(0.0265)
Constant	0.150***	0.0888***	0.149***	0.0885***	0.0612***	0.0422***
	(0.00291)	(0.00176)	(0.00320)	(0.00179)	(0.00260)	(0.00198)
Observations	111,414	111,414	111,235	111,398	111,042	111,333
R-squared	0.820	0.735	0.786	0.717	0.586	0.501
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Currency Pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes