Dash for Dollars[☆]

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Abstract

This paper documents a 'dash for dollars' in corporate bond markets during the COVID-19 crisis. Exploiting within-firm variation in bond spreads and transaction volumes, we show that US dollar-denominated corporate bonds experienced significantly greater selling pressure, price declines, and liquidity deterioration than non-dollar bonds. We highlight a novel mechanism behind this forced selling: dollar liquidity needs faced by non-US institutions with large dollar exposures and FX hedges. Using the UK insurance sector as a leading example, we provide evidence that these institutions faced substantial dollar liquidity demands due to margin calls on their derivative positions. To meet these demands, they resorted to selling dollar-denominated bonds, thereby exacerbating market disruptions.

Keywords: Corporate Bonds, credit spreads, liquidity, dash for cash, dollar demand, COVID crisis, trading volumes, currency hedging.

JEL Codes: E44, E58, G01, G11, G12, G15, G23.

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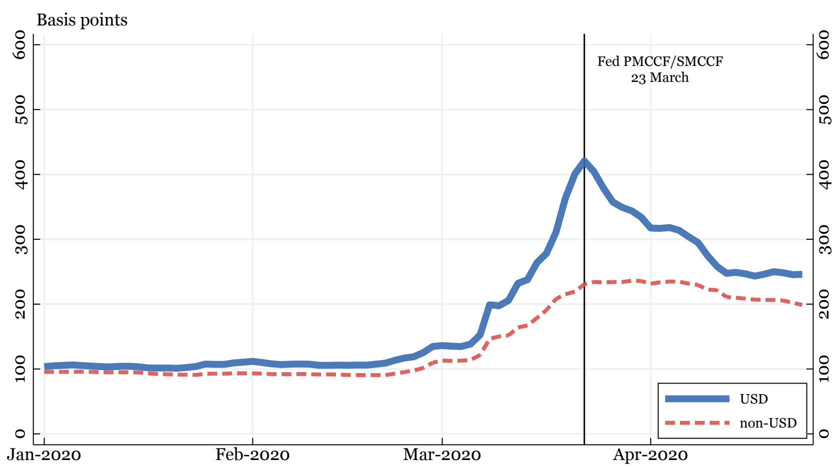
1 Introduction

Global corporate bond markets were under severe distress during the outbreak of the COVID-19 pandemic in early 2020. Heightened economic and financial market uncertainty sparked a global 'dash for cash', as institutions rushed to sell securities to meet sudden liquidity demands and build cash buffers. As a result, corporate bond spreads widened sharply between late February, when the spread of COVID-19 accelerated worldwide, and mid-March, when the Fed announced measures to ease conditions in financial markets.

While the rapid widening of credit spreads drew widespread attention, another key feature of the market turmoil was the uneven increase in spreads between US dollar-denominated bonds and bonds in other currencies—a dimension that existing studies have so far overlooked. Figure 1 shows the average spread dynamics for dollar and non-dollar corporate bonds during the COVID-19 outbreak, using a large multi-country dataset. As the pandemic worsened in March, spreads of dollar-denominated bonds rose much faster than those of non-dollar bonds. In this paper, we ask whether investors' sell-off of corporate bonds was more severe for dollar-denominated bonds and, if so, what are the reasons that can explain this pattern.

Figure 1 Corporate Bond Spreads During COVID-19



Note. Average of option adjusted corporate bonds spreads (weighted by face value) across all outstanding bonds in the ICE Bank of America Merrill Lynch's Global Corporate Index, issued in US dollars (solid blue line) and non-dollar currencies (dashed red line), respectively. The vertical line marks the date when the Federal Reserve introduced the Primary Market Corporate Credit Facility (PMCCF) and the Secondary Market Corporate Credit Facility (SMCCF) on March 23, 2020. Source: ICE Bank of America Merrill Lynch.

Simple unconditional averages, such as those reported in Figure 1, are of course only illustrative. To identify the driving forces of the selling pressure in corporate bonds, we exploit the granularity of two complementary data sets: a global *bond-level* data set with information on corporate bond credit spreads at daily frequency; and a regulatory UK *transaction-level* data set on corporate bond trades in the secondary market. To inform our empirical estimates, we exploit a unique feature of our data, namely that firms often have multiple outstanding bonds issued in different currencies. By exploiting this within-firm variation, we circumvent problems associated with unobserved confounding factors, such as whether certain types of firms systematically issue bonds with particular characteristics.

We begin our empirical analysis by documenting three key facts about corporate bond markets during the COVID-19 crisis. First, US dollar-denominated bonds experienced a significantly larger increase in spreads compared to non-dollar bonds issued by the same firm, with daily spreads rising by nearly 20bps more for dollar bonds in the final week of the turmoil. Second, our transaction data shows that this spread rise was associated with an increased selling of dollar bonds, even when comparing the trades of the same investor, on the same day, across bonds of the same issuer. Third, within-firm variation in transaction costs reveals substantially higher trading costs (18bps on average) for dollar bonds. These results suggest that the March 2020 dash for cash was, in essence, a 'dash for dollars'.

We argue that the dash for dollars is closely tied to the role of the US dollar as a dominant currency in the international monetary and financial system. The widespread denomination of financial assets and liabilities in US dollars creates vulnerabilities, as institutions may face unanticipated dollar obligations, particularly during periods of financial stress. These vulnerabilities are especially pronounced for non-US non-bank financial institutions that invest heavily in dollar-denominated assets and hedge their positions by selling dollars forward (BIS, 2020; Du and Huber, 2023). These institutions may encounter large dollar liquidity needs due to variation margin calls on their hedging positions, which can intensify in volatile market conditions. Given that alternative funding sources—such as dollar repo or the unsecured money market—are often inaccessible for non-bank financial institutions, investors may be forced to sell assets to meet dollar liquidity demands.[1]

To test whether increased immediate dollar liquidity needs are linked to greater selling

[1] In volatile markets, the typically short maturity of FX derivatives can also pose challenges, as institutions may find it more costly to renew their hedges amid widening CIP deviations. Kubitza et al. (2024) explore this alternative and complementary mechanism in detail.

pressure in dollar bonds, we focus on the UK insurance sector—an ideal laboratory for this analysis for three key reasons. First, UK insurers have substantial dollar exposures: by the end of 2019, they held over £270bn ($360bn) in dollar assets, hedged with around £80bn ($107bn) in short dollar FX derivatives (Czech et al., 2021). Second, our data show that insurers and pension funds were key contributors to the dollar bond sell-off in the UK market. Third, and critically, for insurers we can link transaction-level data with supervisory data on their derivative holdings, allowing us to measure their heterogeneous exposure to unexpected dollar liquidity needs. Using this data, we find that insurers with a higher share of dollar-denominated derivatives, and thus larger dollar liquidity needs, sold more dollar bonds. We also show that selling dollar bonds was more cost-effective than the alternative option of selling non-dollar bonds and converting the proceeds into dollars.

These findings contribute a new dimension to the extensive literature on forced selling in corporate bond markets during the COVID-19 crisis, which has largely focused on dealer constraints (e.g., Kargar et al., 2021; O'Hara and Zhou, 2021) and mutual fund redemptions (e.g., Ma et al., 2022; Falato et al., 2021). While our identification of the mechanisms at play focuses on UK insurers—owing to the granular data available to us—the same dynamics likely extend to other non-US institutions with large dollar exposures and FX hedges, such as those in Japan or the euro area (see also Kubitza et al., 2024). Given that non-US investors held over 30% of the total global outstanding supply of dollar bonds in 2020 (Maggiori et al., 2020; Du and Huber, 2023), the potential impact of this channel is far from negligible. Our results therefore complement existing narratives by highlighting a distinct source of forced selling: dollar liquidity needs faced by non-US institutions. Together, these forces help explain the sharp price declines and liquidity stress in dollar bonds during the crisis.

Our empirical results and proposed interpretation carry useful implications for policymakers and investors. As financial assets and liabilities are widely denominated in US dollars, institutions may choose to liquidate dollar-denominated assets in stress periods to obtain dollar cash. The yield spikes induced by this selling pressure, if unarrested, may ultimately limit the ability of firms to issue or roll-over dollar-denominated debt. To avoid such an adverse scenario, our findings emphasize the crucial role of the Federal Reserve dollar swap lines as a policy tool. By reducing dollar funding strains and covered interest parity (CIP) deviations, swap lines can effectively mitigate the severity of selling pressures in dollar-denominated securities.

Related literature Our findings directly contribute to the literature on the dynamics of corporate bond spreads during the COVID-19 pandemic (e.g., Ebsim et al., 2020; Gilchrist et al., 2020; Haddad et al., 2021; Kargar et al., 2021; O'Hara and Zhou, 2021; Boyarchenko et al., 2022). Distinct from these studies, we introduce a novel currency dimension, showing that investor behavior during the crisis was not merely a general dash for cash but specifically a targeted dash for dollars. Our study also diverges methodologically: while prior work primarily uses low-frequency investor holdings or anonymous trading data, we leverage the MiFID II bond transaction database, which provides counterparty identities. This unique dataset allows us to better identify the effects and mechanisms at play during the COVID-19 crisis, clarifying which investor groups were buying or selling, as well as the resulting impact on prices and liquidity. Crucially, we link trading patterns to investor balance sheets, demonstrating that the selling pressure was, in part, driven by the need to meet immediate dollar obligations. Our paper therefore complements Czech et al. (2021), who show that UK insurers and pension funds sold gilts to meet FX derivative margin calls during the dash for cash, but without distinguishing the currency of the margin call. In contrast, we link greater dollar liquidity needs—proxied by a higher share of dollar-denominated derivatives—to more pronounced selling of dollar bonds.

Our study also contributes to the broader literature on the special role of the US dollar in the international monetary and financial system. This includes research on the exorbitant privilege (e.g., Gourinchas and Rey, 2007; Maggiori, 2017), convenience yields (e.g., Krishnamurthy and Vissing-Jorgensen, 2012; Jiang et al., 2021; Bianchi et al., 2022), and global safe assets (e.g., Caballero et al., 2008; He et al., 2019). Our paper is particularly related to studies that explore dollar dominance by examining the pricing and issuance of global corporate debt across currencies. For example, Liao (2020) investigates within-firm bond spread differentials across currencies and their connection to CIP deviations in FX markets. While his analysis concentrates on relative currency dynamics at the business cycle frequency, our study focuses on the absolute directional differences between US dollar and non-dollar bonds, particularly during periods of financial stress. Additionally, our work complements Caramichael et al. (2021), who analyze the characteristics of US dollar corporate bonds relative to those issued in other currencies during normal times, and Kubitza et al. (2024), who explore how frictions in currency risk hedging affect international capital allocation by connecting CIP deviations to euro area investor holdings of US dollar bonds.

2 Data

We use three data sets in our analysis. The first is a global bond-level data set, providing daily information on corporate bond credit spreads. The second is a UK transaction-level data set, which contains details of corporate bond trades in the secondary market. We complement the transaction-level data by matching it with supervisory Solvency II data on UK insurers' derivative holdings. Below, we describe each data source in detail.

2.1 A Bond-level Data Set on Corporate Bond Credit Spreads

We collect information for the constituents of a comprehensive global index of investment grade corporate bonds, the ICE Bank of America Merrill Lynch's Global Corporate Index, from January 2020 to April 2020. This index includes daily data for more than $14,500$ investment grade bonds issued by about $2,900$ companies in 60 countries. The main variable we focus on is a bond's (option adjusted) spread.[2] The data set also contains information on other bond characteristics, such as the bond maturity, its currency of denomination, coupon, seniority and rating. Crucially, the included bonds are denominated in a range of currencies. US dollar-denominated bonds dominate, comprising 65.7% of the sample, followed by euro (23.6%), sterling (4.8%), Canadian dollar (4.3%), and Australian dollar (1.7%).

A unique feature of our data set, which is central to our identification strategy, is the fact that many firms have multiple outstanding bonds at any given point in time. As the main focus of the analysis is on a bond's currency of denomination, we only keep 'multi-currency' firms in our sample, i.e. firms that have at least one dollar-denominated bond and one non-dollar-denominated bond. We further exclude bonds issued by firms in the banking and financial services industries, in order to focus on real economy firms. Finally, to avoid capturing differences in legal characteristics, we only keep bonds of the same seniority, i.e. senior unsecured bonds.[3]

[2] The option adjusted spread is defined as the number of basis points that the government spot curve is shifted to match the present value of discounted cash flows to the corporate bond's price. The calculation of the option adjustment is described here `https://www.theice.com/market-data/indices`.

[3] As noted by Gopinath et al. (2020), the bonds of global corporate issuers (as the ones that populate our sample) often have 'pari passu' clauses implying that bonds in different currencies are treated equally on a legal basis. Gopinath et al. (2020) also highlight that it is unlikely that other idiosyncrasies with respect to covenants or disclosure requirements vary systematically with the currency of denomination.

The sample period in our baseline empirical exercise runs from February 28th to March 20th 2020. The starting date of February 28th is an arbitrary point that aims to capture the end of relatively tranquil market conditions, as shown in Figure 1. The end date of March 20th corresponds to the last trading day before the Fed's announcement of its corporate bond purchase programs. The final daily data consists of $3,107$ bonds issued by 225 firms in 29 countries. Table A.1 in the Appendix reports the summary statistics for the dollar and non-dollar bonds in our sample.

2.2 A Transaction-level Data Set on Corporate Bond Trades

We collect data on corporate bond trades from the transaction-level MiFID II database, which is maintained by the UK's Financial Conduct Authority (FCA). The MiFID II data provide detailed reports of all secondary-market trades that meet one of the following conditions: i) trades carried out on a UK trading venue, and ii) trades where at least one counterparty is an FCA-regulated entity. While less comprehensive than our global corporate spread data set in terms of country coverage, the MiFID II database has information on a diverse set of corporates, both in terms of geography and industry.

Each transaction report contains information on the transaction date and time, ISIN, execution price, transaction size, and the legal identities of the buyer and seller. The sample covers the period from January 2018 to May 2020, and we obtain information on $\sim$ 2.1m trades in 7.4k corporate bonds. After excluding financial bonds and interdealer trades, so as to align the sample with the bond spreads data set, we are left with approximately 650k trades in 925 corporate bonds issued by 157 firms.[4] We also merge our transaction-level data with information on bond characteristics (issuer, rating, etc.) from S&P Capital IQ.

Table 1 provides further descriptive statistics for our regulatory MiFID II transaction database. On average, as shown in Panel A, we observe a total trading volume of £1.6bn per day, with a trading volume of £293m in dollar bonds, £859m in pound sterling bonds, £472m in euro bonds, and £55m in bonds denominated in other currencies. While most of the trading volume is concentrated in sterling bonds, the majority of trades is in euro bonds (416 per day), followed by sterling bonds (343) and dollar bonds (226). Out of the 925 bonds in our sample, the majority are issued in sterling (541), followed by dollar bonds

[4] Dealers tend to have distinctive motives for trading in the interdealer market (e.g. for re-balancing of inventories), and we therefore exclude these trades from our sample (see also Bongaerts et al., 2017).

Table 1 MiFID II transaction database: Descriptive Statistics

Panel A: Market Volume & Bond Characteristics

	USD	GBP	EUR	Others
Average Daily Volume (in £m)	292.92	859.47	472.07	8.40
Average Number of Trades (per day)	226.39	342.53	459.07	14.30
Number of Issuers	41	65	46	5
Number of Bonds	203	541	170	11
Investment Grade	82	201	93	7
High Yield	75	56	31	0
Not Rated	46	284	46	4
Median Residual Maturity (in Years)	5.11	7.68	5.69	5.51

Panel B: Daily Net Volume per Investor & Currency (in £m)

Baseline Sample (28 Feb - 20 Mar 2020)					
	p5	p25	p50	p75	p95
EUR	-3.00	-0.50	-0.10	0.25	3.00
GBP	-3.94	-0.50	-0.02	0.38	3.60
Others	-1.50	-0.07	0.00	0.10	1.40
USD	-4.05	-0.50	0.00	0.40	3.90
Tranquil Period (prior to Feb 28 2020)					
	p5	p25	p50	p75	p95
EUR	-3.00	-0.40	0.00	0.40	3.10
GBP	-4.10	-0.34	0.00	0.40	4.80
Others	-1.00	-0.07	0.02	0.10	0.96
USD	-2.71	-0.30	0.00	0.32	2.80

Note. This table reports summary statistics for the regulatory MiFID II bond transaction data, covering the period from January 2018 to May 2020. In Panel A, "Average Daily Volume" refers to the average gross trading volume of bonds in different currencies (US dollar, UK pound sterling, Euro and others) in the UK corporate bond market per day in £m. "Average Number of Transactions" measures the average number of trades in the market per day. "Number of Bonds" and "Number of Issuers" measure the number of distinctive bonds and issuers in the sample. "Investment grade" refers to bonds with a credit rating of BBB- or higher. "High yield" refers to bonds with a credit rating of BB+ or lower. "Not Rated" refers to bonds without a rating. "Residual Maturity" measures the median time in years until a bond reaches its maturity date. In Panel B, net volumes (in £ millions) are measured on the investor-day-currency level in the period between February 28th and March 20th, as well as for the pre-crisis period prior to February 28th 2020.

(203) and euro bonds (170). In terms of credit quality, for dollar bonds, we observe 82 investment grade bonds, 75 high yield bonds and 46 unrated bonds. The median residual maturity is 5.1 years for dollar bonds, 7.7 years for sterling bonds, and 5.7 years for euro

bonds. Panel B of Table 1 shows the distribution of the daily net volumes per investor and currency. Compared to the tranquil pre-crisis period, the baseline sample reveals a heavier left tail for dollar-denominated bonds, indicating that some investors increased their net selling of dollar bonds during this period. Finally, the average market share by investor type in the UK market for non-financial corporate bonds is dominated by banks and asset managers, each accounting for around 30% of the total trading volume. UK insurers & pension funds (ICPFs) account for 12% of the total trading volume, while hedge funds & principal trading firms (PTFs) account for 8% (see Figure A.1 in the Appendix).

2.3 Insurers' Holdings Data

For a subset of investors, we are able to match the transaction data with balance sheet information. We use data on the asset and derivative holdings of insurance companies regulated by the UK's Prudential Regulation Authority (PRA) and subject to the Solvency II Directive. Insurers within scope of the Solvency II Directive are required to submit quarterly returns, with the exception of some smaller firms with quarterly waivers. The asset holdings data cover 83 insurers with a total asset size of around £2tn in 2019 Q4. Among these 83 insurers, 37 also provide information on their derivative holdings. These insurers collectively represent 95% of the sector's total assets, hence giving us a comprehensive overview of the sector's asset and derivative holdings. Key facts on insurers' asset and derivative portfolios are presented in the following sections, with additional stylized facts detailed in section A.3 of the Appendix.

3 The Dash for Dollars

This section documents a dash for dollars in corporate bond markets during the COVID-19 crisis.

3.1 Corporate Bond Spreads

We estimate the following panel specification:

$$\Delta s_{b,t} = \alpha + \alpha_{i,t} + \beta_1 USD_b + \Gamma X_b + \varepsilon_{b,t} \quad (1)$$

where $\Delta s_{b,t}$ is the daily change in the (option-adjusted) spread of bond b issued by firm i over the period from February 28 to March 20. USD_b is our main variable of interest, i.e. an indicator variable that identifies US dollar-denominated bonds. X_b include additional bond-level control variables, including the bond face value, initial spread level as of February 28th, time-to-maturity (in years), a coupon type and an amortization type indicator variable. Finally, $\alpha_{i,t}$ is a firm-day fixed effect that controls for unobserved time-varying heterogeneity at the firm level. This allows the estimation of the currency denomination effect (as captured by β_1) by exploiting daily variations in spreads across bonds from the same firm in different currencies.

Table 2 reports the results. The coefficient estimates in column (1) show that US dollar-denominated bonds are associated with a larger increase in corporate bond spreads, in line with the unconditional evidence reported in Figure 1. Specifically, the spreads on dollar-denominated bonds increased (on average, per day) by nearly 8bps more than non-dollar bonds issued by the same firm. Over the 17 trading days between February 28 and March 20, this amounted to a total increase of approximately 120bps. Interestingly, we obtain a similar coefficient when controlling for a static firm fixed effect (column 2).

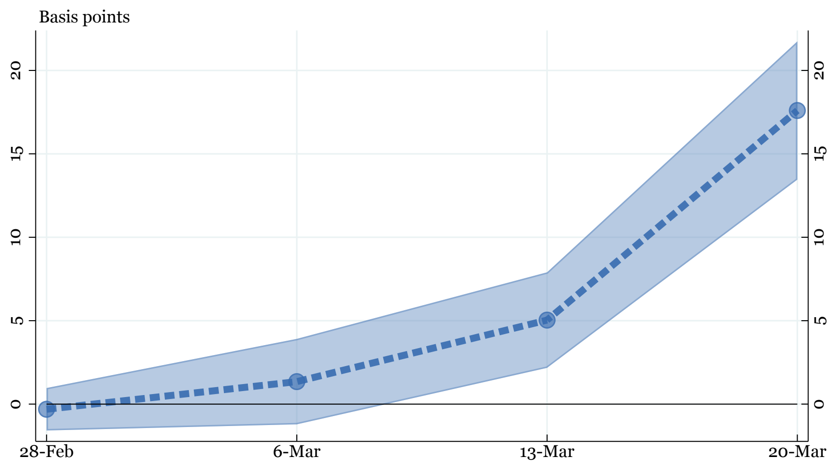
Table 2 Bond Spreads Widening: The Role of the US Dollar

	(1)	(2)
US dollar (β_1)	7.84***	7.83***
	(0.38)	(0.45)
Observations	50685	50685
R squared	0.356	0.060
Number of Firms	225	225
Controls	yes	no
Firm x Day FE	yes	yes

Note. Robust standard errors are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Coefficients corresponding to the constant, fixed effects, and controls (i.e. level of credit spread at the beginning of the sample, maturity, coupon type dummies, amortization type dummies, and bond face value) not reported.

To conduct a more detailed analysis of the different phases of the crisis, we leverage the daily nature of the data to examine the behavior of dollar spreads over time. Specifically, we interact a week fixed effect (α_w) with the dollar indicator variable (USD_b), which allows us to track the weekly evolution of β_1. The results of this analysis are shown in Figure 2. The figure indicates that the relative increase in dollar spreads, captured by the β_1 coefficient, rises over time and peaks at nearly 20bps in the week prior to the Federal Reserve announced its targeted measures on March 23rd.

Figure 2 Bond Spreads Differentials: Time-varying Estimates



Note. The figure shows weekly estimates of the differential increase in spreads of dollar-denominated bonds vis-a-vis non-dollar bonds using, using the following specification: $\Delta s_{b,t} = \alpha + \alpha_{i,t} + \alpha_w \times \beta_1 USD_b + \Gamma X_b + \varepsilon_{b,t}$, where α_w is a week fixed effect. The shaded areas display 99 percent confidence intervals based on robust standard errors clustered on the firm level.

In sum, in this section we have established that US dollar-denominated bonds experienced a larger increase in spreads than their counterparts in other currencies during the COVID-19 crisis. Appendix B reports an extensive set of additional exercises showing the robustness of our results and addressing some identification challenges. In the next section, we turn to inspecting the behavior of trading volumes.

3.2 Corporate Bond Trading Volumes

In this section, we further develop our analysis by exploiting the richness of the MiFID II transaction-level database. Despite a narrower bond coverage relative to the global bond-level data set, transaction-level data have the advantage of providing insights regarding trading volumes, as well as on the characteristics of buyers and sellers.

We begin by documenting the selling pressure affecting US dollar bonds, which we previously put forward as the main driver behind the pronounced spread increase. In particular, we run the following within-investor-firm specification:

$$NetVol_{b,j,t} = \alpha + \alpha_{i,j,t} + \beta_1 USD_b + \Gamma X_{b,t} + \varepsilon_{b,j,t} \tag{2}$$

where $NetVol_{b,j,t}$ is investor j's daily net trading volume (in terms of quantities) of bond b issued by firm i; α is a constant; $\alpha_{i,j,t}$ is a firm-investor-day fixed effect; USD_b is an indicator variable for USD-denominated bonds; and X_b are a set of additional controls which include the bond's time-to-maturity, time-since-issuance, coupon type, and rating. We are therefore able to compare the trades of the same investor, on the same day, across bonds of the same issuer. As before, we focus on the period between February 28 and March 20. Furthermore, we also run regressions separately for investors' buy volumes ($BuyVol_{b,j,t}$) and sell volumes ($SellVol_{b,j,t}$), depending on whether investor j was a net buyer or net seller of bond b on a given day. The focus is once more on estimates of β_1, which provide insights regarding the role of the US dollar in driving trading volumes.

Table 3 BOND TRADING VOLUMES: THE ROLE OF THE US DOLLAR

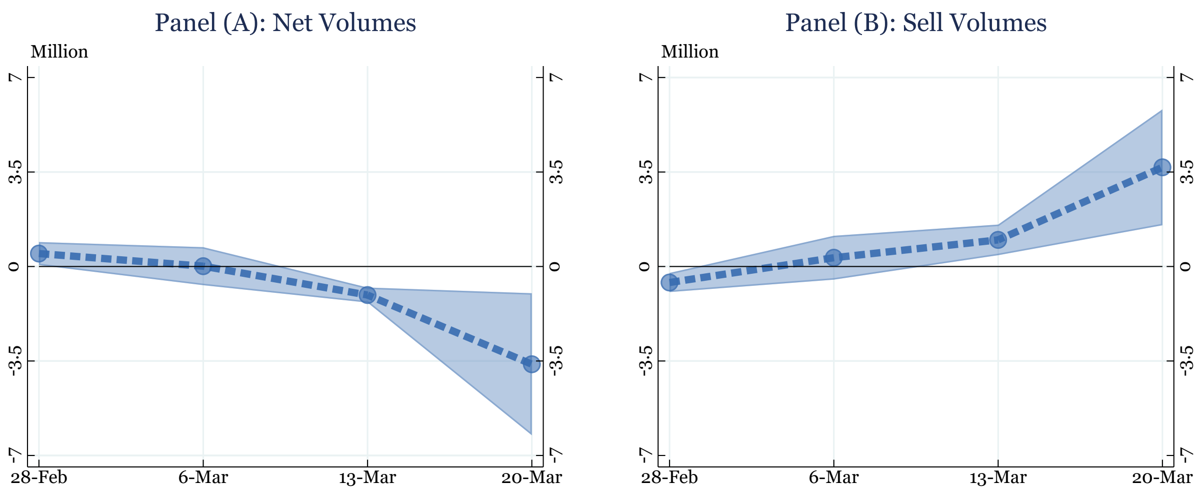
	(1)	(2)	(3)	(4)	(5)	(6)
	Net Volumes		Buy Volumes		Sell Volumes	
US dollar (β_1)	-0.90***	-0.54***	-0.04	-0.03	0.86***	0.51***
	(0.21)	(0.05)	(0.08)	(0.11)	(0.23)	(0.06)
Observations	7323	1444	7323	1444	7323	1444
R squared	0.390	0.770	0.573	0.810	0.234	0.752
# Investors	938	195	938	195	938	195
Firm FE	yes	no	yes	no	yes	no
Day FE	yes	no	yes	no	yes	no
Investor FE	yes	no	yes	no	yes	no
Firm × Day × Investor FE	no	yes	no	yes	no	yes

NOTE. Net volumes (in millions) are measured on the investor-day-bond level in the period between February 28th and March 20th. Buy (Sell) volume is equal to net volume if the given investor is a net buyer (seller) of investment grade bond b on day t, and zero otherwise. Robust standard errors clustered at the firm level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Coefficients corresponding to the constant, control variables and fixed effects not reported.

The results, reported in Table 3, show that investors' net trading volumes are significantly lower for dollar bonds compared to non-dollar bonds. Importantly, we find that the lower net trading volumes are driven by investors' higher sales of dollar bonds, rather than by increased purchases of non-dollar bonds. In terms of the economic magnitude, a given investor's daily sell volumes are on average £500k higher for dollar bonds compared to non-dollar bonds of the same firm—a relatively large amount considering that the median trade size is £360k. In other words, there is strong evidence that the pronounced fall in US dollar bond prices is indeed linked to investors' selling pressure.

To investigate the timing of this pattern in more detail, we repeat the estimation using weekly fixed effects interacted with the US dollar indicator, similar to our spread analysis in section 3. The coefficients are reported in Figure 3, which shows that investors' net (panel A) and sell (Panel B) trading volumes in dollar bonds were indistinguishable from trading volumes in non-dollar bonds in late February and early March 2020. However, starting in the week ending March 13th, investors sold dollar bonds in significantly higher quantities than non-dollar bonds. The results therefore emphasize the pronounced selling pressure in dollar bonds during the peak of the COVID-19 crisis.

Figure 3 Bond Trading Volumes Differentials: Time-varying Estimates



Note. Panel A shows weekly estimates of the difference in investors' net trading volumes between dollar bonds and non-dollar bonds, using the following specification: $NetVol_{b,j,t} = \alpha + \alpha_{i,j,t} + \alpha_w \times \beta_1 USD_b + \Gamma X_{b,t} + \varepsilon_{b,j,t}$. Panel B plots estimates of the same specification but using sell volumes $SellVol_{b,j,t}$ as a dependent variable. The trading volumes are measured on the investor-bond-day level. The shaded areas display 99 percent confidence intervals based on robust standard errors clustered on the firm level.

The granularity of our data also allows us to investigate whether a certain class of investors are driving the patterns that we document—something that will be important when we turn to understanding the mechanisms behind our findings in the next section. A first look at the unconditional sectoral trading volumes reveals that the ICPF sector was the largest net seller of dollar bonds during the COVID-19 period in our sample, while banks (both dealers and non-dealer banks) were the primary net buyers.[5] To examine this more formally, we estimate a variant of our specification (2) interacting the dollar dummy with an indicator variable for three key sectors: ICPFs, asset managers, and hedge funds. The results, presented in Table 4, are based on the most conservative specification with investor-firm-day fixed effects. The interaction term with the ICPF indicator is significantly

Table 4 Corporate Bond Sell Volumes by Sector

	(1)	(2)	(3)	(4)	(5)	(6)
	Net Volumes		Buy Volumes		Sell Volumes	
US dollar	-0.53***	-0.25***	-0.03	0.06	0.50***	0.31***
	(0.07)	(0.04)	(0.10)	(0.06)	(0.05)	(0.06)
US dollar × ICPF	-1.34***	-1.64***	0.84	0.75	2.18***	2.39***
	(0.09)	(0.14)	(0.73)	(0.85)	(0.71)	(0.76)
US dollar × Hedge Fund		-0.60***		-0.10		0.50***
		(0.16)		(0.19)		(0.08)
US dollar × Asset Manager		0.36		-0.16		-0.52
		(0.46)		(0.10)		(0.54)
Observations	1444	1444	1444	1444	1444	1444
R squared	0.770	0.770	0.810	0.810	0.752	0.752
# Investors	195	195	195	195	195	195
Firm × Day × Investor FE	yes	yes	yes	yes	yes	yes

Note. Net volumes (in millions) are measured on the investor-day-bond level in the period between February 28th and March 20th. Buy (Sell) volume is equal to net volume if the given investor is a net buyer (seller) of investment grade bond b on day t, and zero otherwise. The indicator variable "ICPF" captures insurers and pension funds, "Asset Manager" captures asset managers and mutual funds, and "Hedge Fund" captures hedge funds and principal trading firms. The non-interacted dollar variable accounts for all other investor groups, such as banks, other financial institutions, and non-financial entities. Robust standard errors clustered at the firm level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Coefficients corresponding to the constant, control variables and fixed effects not reported.

larger than for other investor types, suggesting that insurers and pension funds were the main drivers of the selling pressure in dollar-denominated bonds in the UK corporate bond market, consistent with the unconditional net trading volumes.[6] In terms of the economic magnitude, ICPF investors sold £2.7m more in dollar bonds of a given issuer per day compared to non-dollar bonds by the same issuer.

[5]See Figure A.2 in the Appendix for more details.

[6]Table C.6 in the Appendix shows that the ICPF sector's selling pressure contributed to the more pronounced spread increases of dollar bonds during the COVID-19 crisis period: in our sample, a one standard deviation decrease in ICPFs' net order flow is associated with a 7.3bps increase in dollar bond spreads.

3.3 Corporate Bond Liquidity

To complete the picture of the corporate bond market dynamics during the COVID-19 crisis, this section complements the previous analysis on prices and quantities with an examination of liquidity. Specifically, our granular data allows us to shed light on the evolution of trading costs for dollar versus non-dollar bonds.

Specifically, we test whether the trade costs of dollar bonds were higher than those of non-dollar bonds by estimating the following within-firm specification:

$$TradeCost_{b,t} = \alpha + \alpha_{i,t} + \beta_1 USD_b + \Gamma X_{b,t} + \varepsilon_{b,t} \tag{3}$$

where $TradeCost_{b,t}$ is the effective half spread of bond b issued by firm i, which is defined as the difference between the trade price and the weighted bid/ask midpoint (the midpoint is viewed as a proxy for the fundamental value of the asset); $\alpha_{i,t}$ is a firm-day fixed effect; and the remaining variables are defined in the same way as in specification (2). We thus compare the daily trade costs of dollar bonds vs. non-dollar bonds issued by the same firm, similar to specification (1) in section 3.1.

Table 5 TRADE COSTS: THE ROLE OF THE US DOLLAR

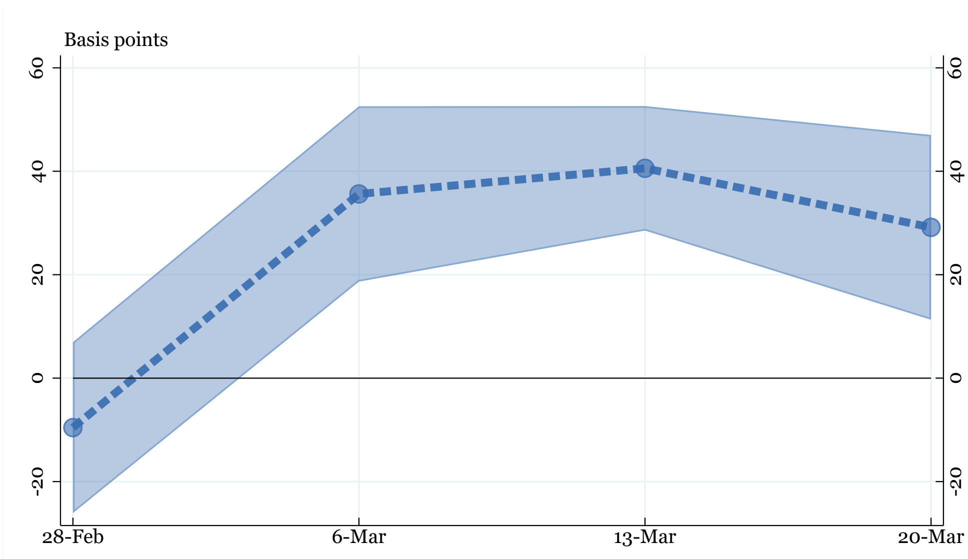
	(1)	(2)
	Trade Costs	
US dollar (β_1)	16.89***	18.41***
	(3.38)	(1.87)
Observations	502	327
R squared	0.290	0.439
Firm FE	yes	no
Day FE	yes	no
Firm x Day FE	no	yes

NOTE. The trade costs are measured on the bond-day level and defined as the difference between the trade price and the bid/ask midpoint. We focus on the Covid-19 crisis period between February 28th and March 20th 2020. Robust standard errors clustered on the firm level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Coefficients corresponding to the constant, control variables and fixed effects not reported.

The results, reported in Table 5, show that dollar bonds' trade costs were significantly higher than those of non-dollar bonds, consistent with the more pronounced selling pressure in dollar bonds. The effect is highly statistically significant and the economic magnitude is large: in the specification with firm-day fixed effects (column 2), the cost to trade dollar bonds was on average 18bps higher than those of non-dollar bonds. Alternative measures of market liquidity, such as the Amihud price impact and daily bond turnover, also show evidence of inferior liquidity of dollar-denominated bonds in relation to non-dollar bonds (see Table C.3 in Appendix C).

We further examine the liquidity dynamics of dollar bonds over time in Figure 4, which shows the weekly variation of the within-issuer difference in trade costs between dollar bonds and non-dollar bonds—in an analogous fashion to Figure 2 for bond spreads. We find that the trade costs of dollar bonds started to widen relative to non-dollar bonds in early March and reached its peak in the week ending March 13 (at around 40bps), before the gap started to close again towards the end of March.

Figure 4 TRADE COSTS DIFFERENTIALS: TIME-VARYING ESTIMATES



NOTE. The figure shows the weekly estimates of the difference in trade costs between dollar bonds and non-dollar bonds, using the following specification: $TradeCost_{b,t} = \alpha + \alpha_{i,t} + \alpha_w \times \beta_1 USD_b + \Gamma X_{b,t} + \varepsilon_{b,t}$. The trade costs are measured on the bond-day level and defined as the difference between the trade price and the weighted bid/ask midpoint. The shaded areas display 99 percent confidence intervals based on robust standard errors clustered on the firm level.

Our results run in apparent contrast to the notion of the dollar being the most liquid international currency (Eichengreen and Xia, 2019, e.g.), but are consistent with the notion of a "liquidity inversion" during the COVID-19 crisis (see, for example, Ma et al., 2022).

While individual investors may have initially chosen to sell their most liquid assets due to their (perceived) superior liquidity, the aggregate effect of these actions appears to contradict the original premise. As such, our findings complement the evidence in Haddad et al. (2021), who document that, during the COVID-19 crisis, more liquid short-maturity bonds experienced larger price drops than their more illiquid longer-maturity counterparts.

4 Inspecting the Mechanism

The previous section shows that the dash for cash during the COVID-19 crisis was effectively a dash for dollars, as dollar bonds experienced greater selling pressure and a sharper decline in prices and liquidity than non-dollar bonds. We now turn to the identification of the mechanism behind our empirical findings.

We argue that the dash for dollars is linked to the US dollar's role as the dominant currency in the international monetary and financial system. The widespread use of the dollar for denominating financial assets and liabilities creates systemic vulnerabilities, particularly during periods of financial stress when non-US institutions may have to meet unexpected dollar obligations. Investors with constrained access to dollar liquidity (e.g., through the repo market) may be compelled to sell dollar-denominated assets to meet their dollar liquidity needs.

To test this mechanism, we focus our analysis on the UK insurance sector. We do that for three key reasons: (i) the UK insurance sector is large (with a total size of around £2tn and £250m in dollar-denominated assets) and contributed to the dash for dollars, as documented in Table 4; (ii) insurers faced large variation margin (VM) calls on their derivative positions during this period, thus generating relevant variation in dollar liquidity needs; and (iii) we can match our bond transaction data with supervisory data on insurers' derivative holdings, allowing us to measure the differential exposure to unexpected dollar liquidity needs.While our analysis is specific in nature, it uncovers broader mechanisms that are likely common among various non-US investors, who collectively hold about one-third of dollar-denominated corporate bonds globally (Du and Huber, 2023).

The analysis in this section proceeds in three steps. First, consistent with our proposed dollar dominance mechanism, we show that insurers with a larger share of dollar-denominated derivative contracts (and, hence, higher dollar liquidity needs) sold more dollar bonds. Second, we present evidence explaining why these investors opted to meet their dollar liquidity needs by selling dollar-denominated bonds rather than non-dollar bonds. Finally, we systematically investigate alternative explanations for our findings and illustrate why they can be ruled out as an explanation for the dash for dollars.

4.1 The Role of Dollar Liquidity Needs

We exploit a distinctive feature of the COVID-19 crisis, namely that UK insurers were exposed to high and unexpected liquidity demands due to large VM calls on their derivative positions, as documented by Czech et al. (2021). Importantly, institutions are generally required to settle VM calls in the currency of the derivative contract. Moreover, the Solvency II data reveal that a considerable share of UK insurers' derivative portfolios is denominated in US dollars—around 20% on average, and ranging from 0% to more than 60%.[7]

We combine the MiFID II bond transaction data with the supervisory Solvency II data and match the bond trades of individual insurers to their pre-crisis derivative exposures. This enables us to test whether institutions with a larger share of dollar-denominated derivative contracts sold larger amounts of dollar bonds. To do so, we estimate the following specification:

$$SellVol_{b,j,t} = \alpha + \alpha_b + \alpha_j + \alpha_{i,t} + \beta_1 USD_b \times DollarShare_j + \varepsilon_{b,j,t} \tag{4}$$

where $DollarShare_j$ measures the share of dollar-denominated derivative contracts of insurer j at the end of Q4 2019; and the remaining variables are defined in the same way as in specification (2). We also include bond, investor, and firm-day fixed effects. To facilitate the interpretation of the coefficients, we standardize $DollarShare_j$, so that β_1 captures the differential sell volumes in US dollar bonds for an insurer whose share of dollar-denominated contracts is one standard deviation above average.

The results are reported in Table 6. We find that institutions with a higher share of dollar-denominated derivative contracts had substantially higher sell volumes in dollar bonds. More precisely, Columns (1) and (2) show that an insurer whose share of dollar-denominated contracts is one standard deviation above average sold between £9m and £13m more dollar bonds relative to the average insurer on a given day. Importantly, this result

[7]See Appendix A.2 for more details on insurers' asset and derivative holdings.

Table 6 USD Derivative Contracts and Bond Selling Pressure

	(1)	(2)	(3)	(4)
		Sell Volumes		
US dollar × Dollar share	8.89***	12.93***		
	(1.12)	(4.05)		
US dollar × High share			3.17***	4.61***
			(0.40)	(1.44)
Observations	368	243	368	243
R squared	0.517	0.675	0.517	0.675
# Investors	29	25	29	25
Investor FE	yes	yes	yes	yes
Bond FE	yes	yes	yes	yes
Day FE	yes	no	yes	no
Firm × Day FE	no	yes	no	yes

Note. Sell volumes (in millions) are measured on the investor-day-bond level for the period between February 28th and March 20th. *DollarShare* measures the share of dollar-denominated derivative contracts of investor j at the end of Q4 2019. To facilitate the interpretation of the coefficients, we transform the variable by subtracting the cross-sectional average, before dividing it by the standard deviation. To calculate *HighShare*, in Columns (3) and (4), we divide the sample of investors into below-average and above-average holders of USD derivative contracts, using the sample median as the cut-off point. Robust standard errors clustered at the investor level reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Coefficients corresponding to the constant and fixed effects not reported

is highly statistically significant and robust to the inclusion of various fixed effects, which control for a range of unobserved time-invariant and time-varying factors.

In an alternative specification, we divide the sample of insurers into 'high' and 'low' holders of USD derivative contracts, depending on whether they lie above or below the median of the $DollarShare_j$ distribution. Columns (3) and (4) of Table 6 show that our results are robust to this alternative classification. Furthermore, Table C.5 in the Appendix demonstrates that the results remain robust even when excluding contracts due for rollover during the crisis period in the calculation of $DollarShare_j$. This indicates that the observed selling pressure in our sample is likely driven by VM calls on dollar-denominated derivatives, rather than by hedge terminations.

In summary, the findings in this section indicate that selling pressure in US dollar bonds during the COVID-19 crisis was higher among investors with greater dollar liquidity needs. It is important to emphasize that our results for the UK insurance sector are illustrative, rather than a comprehensive explanation for the broader spread increase in dollar bonds during the outbreak of the COVID-19 pandemic.[8] Nonetheless, our evidence provides empirical support for a mechanism that emphasizes the dominant role of the dollar in the international monetary and financial system.

4.2 What to Sell? Dollar vs. Non-Dollar Bonds

Our empirical findings suggest that institutions with higher dollar liquidity needs met their obligations by selling larger amounts of dollar bonds. An alternative approach would have been to sell non-dollar bonds and convert the proceeds into dollars via the FX spot market. This section investigates the preference for selling dollar bonds over this alternative option, again using the UK insurance sector as a case study.

To understand why insurers choose to sell dollar bonds, we first examine their balance sheets. Insurers invest heavily in US dollar assets and manage the resulting exchange rate risk by selling dollars forward through FX forwards or swaps. Two key features stand out. First, UK insurers' hedging ratios are high and remarkably stable over time: in the first quarter of 2020, the average hedging ratio in our sample fell by just 0.8 percentage points (from 50.0% to 49.2%) compared to the previous quarter. Second, the maturity of FX derivatives is very short: nearly two-thirds of insurers' FX hedges mature within three months, hence requiring rollover within each quarter.[9]

To illustrate the choices available to institutions, consider a stylized example of a UK insurer with sterling-denominated liabilities which holds, inter alia, a dollar bond with a market value of z. The insurer targets an FX hedging ratio of 50% and therefore holds an FX forward contract for x dollars, where $x = \frac{1}{2}z$. The FX forward contract matures at time t, and the insurer also faces an unexpected dollar margin call of y dollars at time t. Assume, for simplicity, that $y = x = \frac{1}{2}z$. The insurer has two main interconnected choices to make: (i) to raise the needed dollar liquidity by selling the dollar-denominated bond vs. selling a non-dollar bond and converting the proceeds to dollars in the spot market; and

[8] Previous studies, such as Falato et al. (2021) and Ma et al. (2022), have shown that selling pressures from other groups, such as mutual funds, also contributed to the disruption in the corporate bond market.

[9] See Appendix A.3 for further details on insurers' hedging ratios (Table A.3) and the maturity profile of their FX derivatives (Figure A.6).

(ii) to roll over vs. let mature the FX forward contract.[10] The optimal choice depends on the preferred hedge ratio and the various costs associated with each option, including the transaction costs of liquidating dollar versus non-dollar bonds, conversion costs in the spot market, and FX hedge rollover costs.

Table 7 Conceptual framework

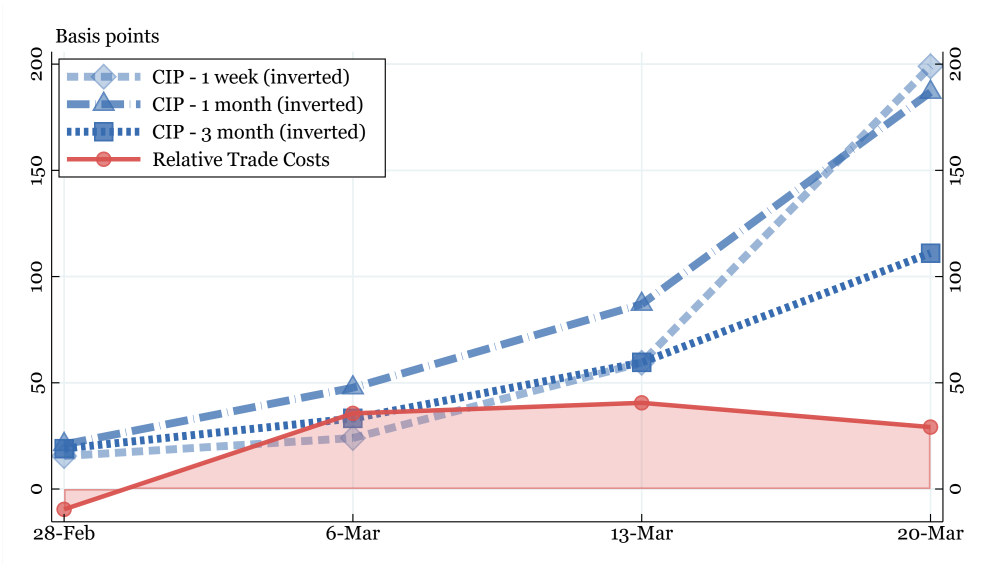
	Roll Over FX Hedges	Do Not Roll Over FX Hedges
Sell USD Assets	Option $\mathcal{A}$ *Hedging ratio*: • Increases *Cost*: • Dollar bond transaction costs • Hedging costs	Option $\mathcal{B}$ *Hedging ratio*: • Constant *Cost*: • Dollar bond transaction costs
Sell non-USD Assets	Option $\mathcal{C}$ *Hedging ratio*: • Constant *Cost*: • Non-dollar bond transaction costs • Spot market transaction costs • Hedging costs	Option $\mathcal{D}$ *Hedging ratio*: • Decreases *Cost*: • Non-dollar bond transaction costs • Spot market transaction costs

Table 7 presents these choices in a two-by-two matrix, outlining their implications for the hedge ratio and the various costs incurred. The table highlights two key points. First, two of the four possible options (highlighted in gray) are inconsistent with the stability of hedging ratios documented above. Under Option $\mathcal{A}$, where the insurer rolls over the FX forward contract and sells the dollar asset, the hedge ratio would increase. Conversely, under Option $\mathcal{D}$, where the insurer refrains from rolling over the FX forward contract and sells the non-dollar asset, the hedge ratio would decrease. Second, among the two remaining viable options, investors should select the one that minimizes costs, though the optimal choice is ambiguous ex-ante. In Option $\mathcal{B}$, the insurer incurs only the transaction cost of selling dollar

[10] In theory, institutions could also increase their borrowing in the secured or unsecured money markets to meet these liquidity demands. However, many non-bank entities—especially insurers and pension funds—tend to be relatively unsophisticated in managing their liquidity, and frequently do not have access to revolving bank credit lines or the repo market (see, e.g., Alfaro et al., 2024). Moreover, supply in credit markets tends to be severely constrained during crisis periods (see, e.g., Afonso et al., 2021; Duffie, 2022).

bonds. In Option $\mathcal{C}$, the insurer faces three costs: liquidating non-dollar bonds, converting the proceeds into dollars via the spot market, and rolling over the FX forward contract.

Figure 5 RELATIVE TRADE COSTS VS. CIP PREMIUM



NOTE. The red line and shaded area plots the weekly estimates of the difference in trade costs (measured at the bond-day level and defined as the difference between the trade price and the weighted bid/ask midpoint) between dollar bonds and non-dollar bonds, based on the specification used in Figure 4. The blue dashed lines plot CIP deviations (defined as the difference between the dollar borrowing rate less the synthetic dollar borrowing rate, here inverted) at different maturities (namely 1 week, 1 month, and 3 months). The CIP deviations are computed as a weekly average for the euro and the pound sterling against the US dollar.

Our granular data allows us to quantify the cost of each option, which we do in Figure 5. Specifically, we measure the trade cost of dollar bonds relative non-dollar bonds (issued by the same firm) as in Figure 4. To measure hedging costs, we rely on CIP deviations across different horizons (see, e.g., Liao and Zhang, 2024; Brauer and Hau, 2024; Kubitza et al., 2024).[11] Finally, we abstract from transaction costs in spot FX markets, as these are widely regarded as the most liquid in the world.[12] Figure 5 shows that the trade cost of dollar bonds relative to non-dollar bonds tends to be lower than CIP deviations during the period of interest. This is particularly evident during the final two weeks of our sample, i.e. when the dash for dollars we documented in section 3 was most pronounced. In other words, the figure shows that it was *not* more cost-efficient for institutions to sell their non-dollar assets (while paying a sizable premium to roll-over their dollar hedging positions

[11]See Appendix A.5 for details on the construction of CIP deviations and the underlying data.

[12]Spot transaction costs peaked at only 4 pips during the turmoil period, as shown in Figure A.8 in the Appendix. Moreover, accounting for spot transaction costs would further enhance the relative attractiveness of selling dollar-denominated bonds, as shown in Figure 5.

and maintain a stable hedge ratio) rather than selling dollar assets outright (while letting their dollar hedges mature). This holds true for relatively short hedging horizons (i.e. one week), but especially for longer horizons of one month or more. The relative cost dynamics suggest that institutions would have preferred to sell dollar bonds—despite their relatively high trade costs—to meet immediate dollar obligations, in line with our hypothesis. In the next section, we discuss a wide range of potential alternative explanations for the dash for dollars.

4.3 Ruling Out Alternative Explanations

In this section, we systematically investigate alternative explanations for our findings. Specifically, we consider the possibility that the selling pressure in dollar bonds was driven by (i) expectations of a dollar depreciation; (ii) expected central bank interventions; and (iii) a portfolio rebalancing mechanism. Additionally, the Appendix provides a comprehensive range of further robustness checks of our bond spread results in section B as well as of our transaction-level results in section C.

4.3.1 Expectations of Dollar Depreciation

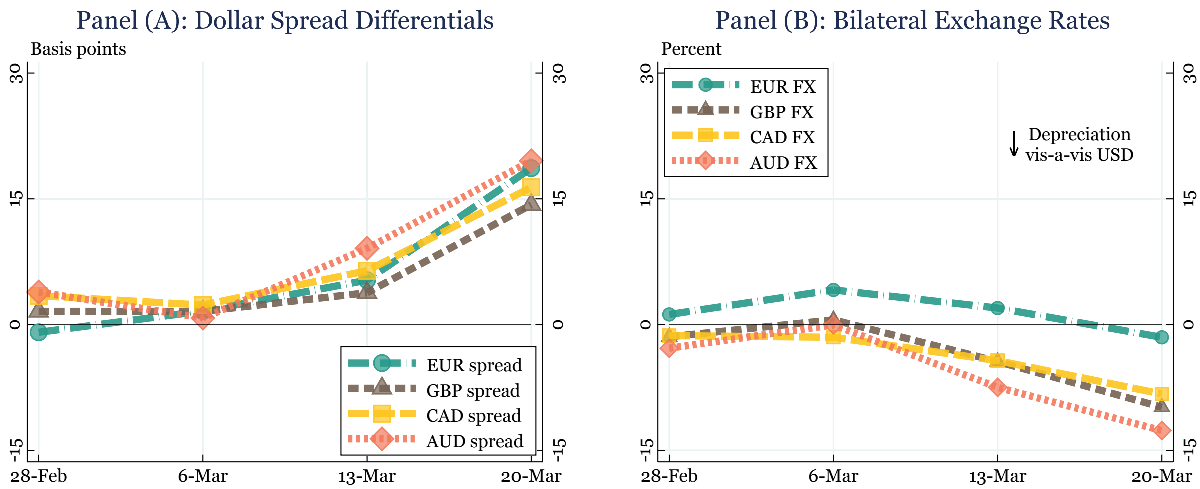
The sharp appreciation of the dollar against most currencies in March 2020 raises the question of whether expectations of a reversal in exchange rate movements drove the selling pressure in dollar-denominated bonds. We explore this question through two complementary empirical exercises.

Our first approach analyzes the relationship between dollar appreciation and spread widening across currencies. Specifically, if expectations of dollar depreciation drove the dash for dollars, we should observe a smaller dollar spread widening for currencies that depreciated less against the dollar. To empirically examine this alternative explanation, we estimate the following specification:

$$\Delta s_{b,t} = \alpha + \alpha_{i,t} + \alpha_w \times \alpha_c \times \beta_1 USD_b + \Gamma X_{b,t} + \varepsilon_{b,t} \tag{5}$$

which mirrors the specification underlying Figure 2, with the addition of a currency indicator (α_c). Panel A of Figure 6 shows the estimated weekly evolution of dollar spreads differentials, broken down by currency. Panel B shows the cumulative weekly changes in bilateral exchange rates since the start of the sample, with negative values indicating a currency's depreciation relative to the dollar. A comparison between the two panels shows that there is no clear correlation between the magnitude of dollar appreciation and the degree of dollar spread widening across currencies. For example, we find that dollar bond spreads widened significantly relative to euro bond spreads, despite the dollar having not appreciated substantially against the euro throughout the sample period.

Figure 6 Spread Differentials & Bilateral Exchange Rates



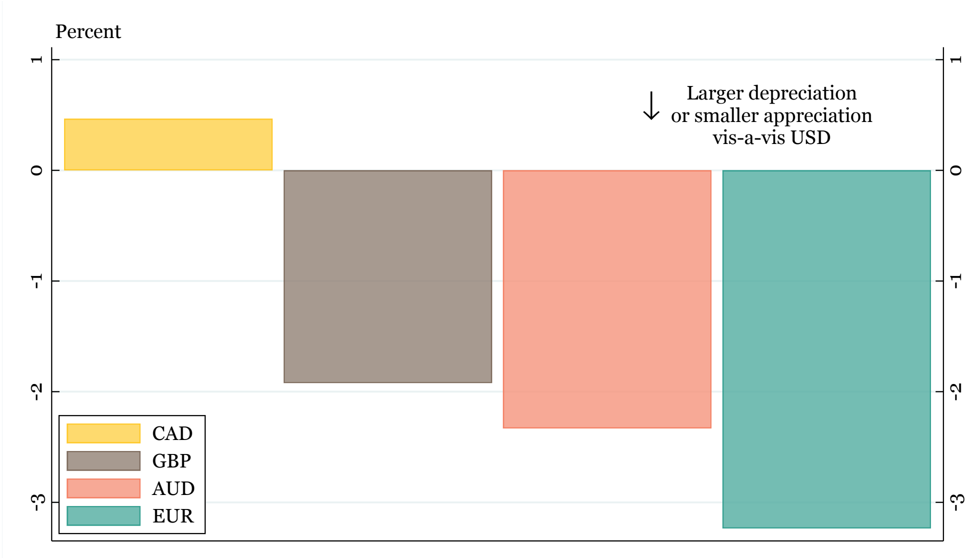
Note. Panel A shows the bond spread differentials between dollar bonds and bonds denominated in other currencies, as estimated from: $\Delta s_{b,t} = \alpha + \alpha_{i,t} + \alpha_w \times \alpha_c \times \beta_1 USD_b + \Gamma X_{b,t} + \varepsilon_{b,t}$, where α_c is a currency indicator variable. Panel B shows the cumulative FX changes against the US dollar since the start of our sample (negative values represent a depreciation vis-a-vis the dollar). Source: ICE Bank of America Merrill Lynch and Bloomberg.

A second approach to assess this alternative explanation is to use the forward premium—the difference between the spot exchange rate and the future exchange rate implied by the price of an FX forward. As before, exchange rates are defined as units of foreign currency per US dollar. Thus, negative values of the forward premium indicate a worsening future trajectory for a currency. Figure 7 shows changes in the 5-year forward premium of the US dollar against other currencies between end-February and March 20, the same time frame of our baseline regressions.[13] While exchange rate expectations inferred from forward paths may be distorted by FX risk premia and liquidity frictions, the figure provides indicative evidence that the implied paths for the US dollar improved against the euro,

[13] We use the 5-year forward to approximate the median maturity of bonds in our sample, though the results are consistent across alternative maturities.

pound sterling, and Australian dollar during this period, and worsened only marginally against the Canadian dollar.

Figure 7 Changes in FX Forward-implied Paths Against the US Dollar



Note. Change in the forward premium (the difference between the spot exchange rate and the price of a 5-year forward between February 28 and March 20, across a range of currencies against the US dollar. Negative values signal worsening implied paths for the currencies analyzed against the US dollar. Source: Bloomberg.

In summary, the evidence in this section suggests it is unlikely that revised exchange rate expectations drove the selling pressure in dollar-denominated bonds.

4.3.2 Expectations of Central Bank Corporate Bond Purchases

Another possibility is that the selling pressure in dollar-denominated bonds was driven by investors' expectations about central banks' policy responses to the crisis. Specifically, investors may have assigned different probabilities to potential interventions in corporate bond markets based on historical actions. For example, unlike the ECB, which had previously engaged in corporate bond purchases, the Federal Reserve had not done so prior to the COVID-19 period. This difference may have led investors to expect that dollar-denominated corporate bonds would not be part of a potential quantitative easing (QE) program in the U.S., thereby explaining the worsening spreads and liquidity for dollar bonds.

Panel A of Figure 6 shows that dollar bond spreads increased relative to each currency in isolation, including the Canadian and Australian dollars.[14] Since neither the Bank of Canada nor the Reserve Bank of Australia had included corporate bond purchases in their previous QE programs, this evidence suggests that expectations of central bank actions cannot explain the observed selling pressure in dollar-denominated corporate bonds.

4.3.3 Portfolio Rebalancing

Another potential concern with our main result is that the selling pressure on dollar bonds could be driven by a mechanical portfolio rebalancing effect. Specifically, investors may target a constant share of dollar assets in their portfolios, and the sharp appreciation of the dollar during the COVID-19 crisis may have prompted them to rebalance. As a result, the decision to buy or sell dollar assets could have been driven by this mechanical rebalancing rather than immediate dollar obligations.

Before addressing this issue with a formal empirical exercise, we note that managers of large portfolios (e.g., asset managers, pension funds, insurers) typically rebalance at relatively low frequencies, often monthly or quarterly (see, e.g., Zilbering et al., 2015). Therefore, it seems unlikely that portfolio managers would have adjusted their portfolio weights within a matter of days without urgent dollar liquidity needs. Additionally, the narrowing of dollar bond spreads observed after the peak of the crisis (as described in section B.4) suggests a rapid reversal of the dash for dollars, which contradicts the portfolio rebalancing hypothesis—especially considering the continued strength of the dollar after the FOMC announced the establishment of the Primary Market Corporate Credit Facility (PMCCF) and the Secondary Market Corporate Credit Facility (SMCCF).

To test this hypothesis more formally, we exploit the strength of the euro against other non-USD currencies during the COVID-19 crisis. In this test, we re-estimate a variant of our baseline trading volume regression in which we drop dollar bonds from the sample and replace the indicator for dollar bonds with an indicator for euro bonds:

$$Vol_{b,j,t} = \alpha + \alpha_{i,j,t} + \beta_1 EUR_b + \Gamma X_{b,t} + \varepsilon_{b,j,t} \tag{6}$$

where EUR_b is a euro bond indicator variable, and the remaining variables are defined as in

[14] Table B.10 reports the average coefficients by currency, using a specification that mirrors the specification underlying Table 2.

equation (2). The results, shown in Table 8, reveal no significant sell-off of euro-denominated bonds relative to other non-USD bonds in the UK corporate bond market, despite the euro's sharp appreciation against non-USD currencies in our sample. These results help rule out the portfolio rebalancing hypothesis, as one would expect similar selling pressures in euro bonds if the effect were driven by a mechanical rebalancing due to currency appreciations.

Table 8 Portfolio Rebalancing

	(1)	(2)	(3)	(4)	(5)	(6)
	Net Volumes		Buy Volumes		Sell Volumes	
Euro bond (β_1)	-0.20	-0.10	-0.16	0.15	0.04	0.25
	(0.15)	(0.19)	(0.13)	(0.19)	(0.07)	(0.19)
Observations	6354	1055	6354	1055	6354	1055
R squared	0.162	0.502	0.182	0.439	0.171	0.525
Firm FE	yes	no	yes	no	yes	no
Day FE	yes	no	yes	no	yes	no
Investor FE	yes	no	yes	no	yes	no
Firm×Day×Investor FE	no	yes	no	yes	no	yes

Note. Net volumes (in millions) are measured on the investor-day-bond level in the period between February 28th and March 20th. Buy (Sell) volume is equal to net volume if the given investor is a net buyer (seller) of investment grade bond b on day t, and zero otherwise. Robust standard errors clustered at the firm level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Coefficients corresponding to the constant, control variables and fixed effects not reported.

4.3.4 Dealer Intermediation Capacity

Another potential concern with our results is that dealers may have faced constraints when intermediating transactions involving certain currencies. Specifically, dealers specializing in dollar assets might have faced limitations in their intermediation capacity due to strains in the US Treasury markets during that period (see, e.g., Vissing-Jorgensen, 2021). Such constraints could have contributed to the observed widening of dollar corporate bond spreads and the associated decline in their liquidity.

Our transaction-level dataset offers a unique opportunity to investigate this possibility. By working with a version of the dataset structured at the investor-bond-day-*dealer* level, we can incorporate dealer-day fixed effects to control for time-varying dealer characteristics—

including, but not limited to, their daily capacity to intermediate dollar assets. This approach allows us to identify the effect *within* the same dealer, enabling a more precise analysis of dealer-specific constraints. Table 9 demonstrates that our baseline results are robust under this specification: the heightened selling pressure in dollar bonds remains highly significant after accounting for dealer-day fixed effects. Therefore, while dealer balance sheet constraints undoubtedly played a prominent role in the Covid-19 market turmoil (see, e.g., Duffie, 2022; Kargar et al., 2021; O'Hara and Zhou, 2021), our findings indicate that most dealers faced similar constraints in providing intermediation, not just those primarily dealing in dollar assets.

Table 9 TIME-VARYING DEALER CHARACTERISTICS

	(1)	(2)	(3)
	Net Volumes	Buy Volumes	Sell Volumes
US dollar (β_1)	-0.86***	-0.26	0.60**
	(0.28)	(0.16)	(0.28)
Observations	4153	4153	4153
R squared	0.304	0.371	0.336
Firm FE	yes	yes	yes
Investor FE	yes	yes	yes
Dealer × Day FE	yes	yes	yes

NOTE. Net volumes (in millions) are measured on the investor-dealer-day-bond level in the period between February 28th and March 20th. Buy (Sell) volume is equal to net volume if the given investor is a net buyer (seller) from a given dealer of investment grade bond b on day t, and zero otherwise. Robust standard errors clustered at the firm level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Coefficients corresponding to the constant, control variables and fixed effects not reported.

5 Conclusion

This paper documents a 'dash for dollars' in corporate bond markets during the COVID-19 crisis, uncovering a key dimension of the market turmoil that has so far received limited attention. Using bond-level and transaction-level data, we show that dollar-denominated corporate bonds experienced significantly greater selling pressure, price declines, and liquidity deterioration compared to non-dollar bonds.

Our findings reveal that the dash fro was partly driven by institutions' urgent need for dollar liquidity, particularly among non-US non-bank financial institutions. Using the UK insurance sector as a case study, we demonstrate that insurers faced substantial dollar liquidity shortfalls due to variation margin calls on their derivative positions. These institutions responded by selling dollar-denominated bonds, as this was a more cost-effective option than liquidating non-dollar assets and converting the proceeds into dollars. The sales by non-US institutions thereby amplified the price pressure stemming from mutual fund liquidations and constrained dealer intermediation (see, e.g., Ma et al., 2022; Falato et al., 2021; Kargar et al., 2021; O'Hara and Zhou, 2021).

Beyond documenting a new aspect of the US dollar's dominance, our results offer direct insights for policymakers. Notably, they highlight the importance of the Federal Reserve's dollar swap lines as a policy tool to mitigate dollar funding pressures during periods of financial stress (Bahaj and Reis, 2021). By reducing CIP deviations and alleviating liquidity shortages, swap lines can help stabilize financial markets, limiting the adverse effects of selling pressures in dollar-denominated bonds and preserving the functioning of the global financial system.

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Online Appendix to

"Dash for Dollars"

by A. Cesa-Bianchi, R. Czech, F. Eguren Martin

May 6, 2025

A Data: Summary Statistics & Additional Facts

This section of the Appendix provides additional summary statistics and stylized facts for the data used in the empirical analysis.

A.1 Bond Spread Data

Summary Statistics: Bond Spread Data Table A.1 reports the summary statistics for the dollar and non-dollar bond spreads in our sample. As shown in Figure 1, dollar bonds experienced a larger increase in spreads. The table also shows that dollar bonds have a larger face value, a higher coupon, and a longer maturity than non-dollar bonds.

Table A.1 Summary Statistics: Dollar vs. Non-dollar Bonds

	Δ Spread (28 Feb-20 Mar)	Face value	Coupon	Maturity (years)
	Dollar Bonds			
Mean	241	997	4.0	10.9
Median	207	750	3.9	6.9
Standard Dev.	171	756	1.3	9.2
25th Percentile	143	500	3.1	3.2
75th Percentile	297	1250	4.7	19.1
	Non-dollar Bonds			
Mean	111	728	2.3	7.2
Median	94	674	1.8	5.7
Standard Dev.	84	334	1.6	5.6
25th Percentile	77	500	1.1	3.4
75th Percentile	122	1000	3.1	9.0

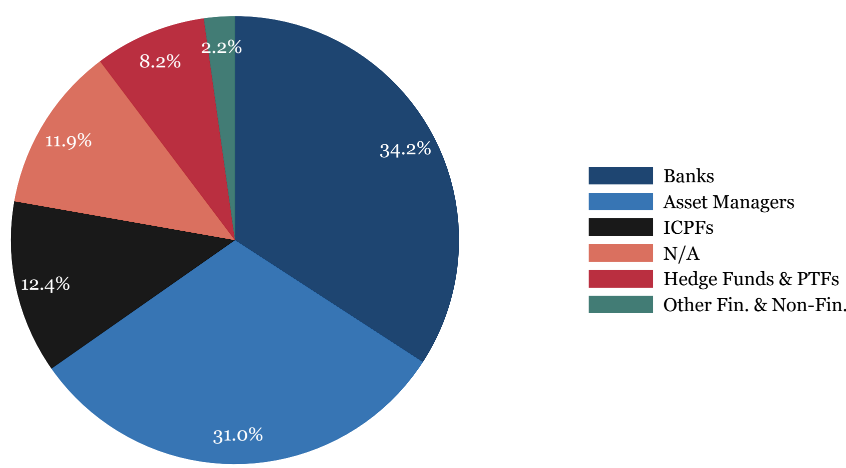
Note. Summary statistics for dollar and non-dollar bonds. The sample period covers the period between February 28th and March 20th 2020.

Note that, as we only keep multi-currency bonds issuers in our baseline data set, the bonds in our data set are typically issued by large and global corporates. As highlighted by Coppola et al. (2021), global firms often finance themselves through shell companies in "tax havens", raising concerns about a potential sample selection bias. However, the ICE BoAML data allocate the country of issuance based on the location of the majority of the holding company's operating assets, hence mitigating potential concerns related to the wrong assignment of issuance countries. If we exclude bonds issued in "tax havens" (97 in total), our results remain unchanged.

A.2 Transaction-level Data

Market Shares Figure A.1 shows the average market shares of different investor types in the UK market for non-financial corporate bonds. Banks and asset managers each account for around 30% of the total trading volume, while insurers & pension funds (ICPFs) account for 12% of the total trading volume. Other important investor types include hedge funds & principal trading firms (PTFs) (8%) and other financials & non-financials (2%). As some counterparties are not registered in the UK and hence not subject to the reporting requirement, the counterparty information is not available for around 12% of the total trading volume.

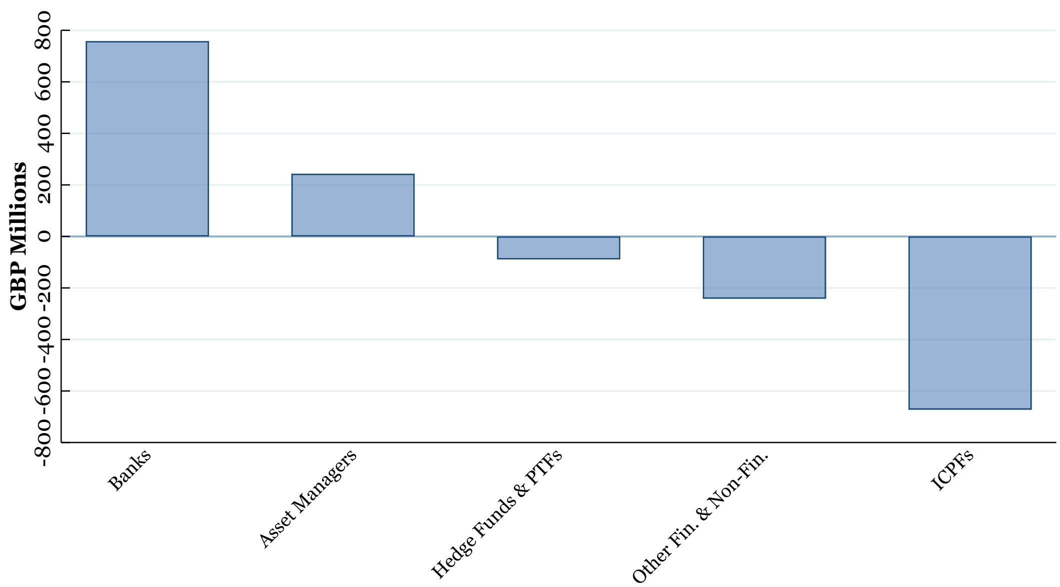
Figure A.1 Trading Volumes - Market Share by Sector



Note. Average market share (by trading volume) of different investor types in the UK market for non-financial corporate bonds. The investor types include: Dealer Banks, Asset Managers, Non-Dealer Banks, Hedge Funds & Principal Trading Firms (PTFs), Other Financial & Non-Financial Firms, Insurers & Pension Funds (ICPFs), and firms without a counterparty identifier (N/A). Source: MiFID II bond transaction database.

Net Selling by Sector Figure A.2 shows the net trading volumes of different investor types in dollar-denominated, non-financial corporate bonds in the UK bond market during the COVID-19 crisis (Feb 28 - Mar 20 2020). The figure shows that banks were the main net buyers of dollar bonds during that period, with net purchases of around £750m. We also find that ICPFs were the main net sellers of dollar bonds during that period with net sales of almost £700m, followed by other financial & non-financial firms that sold around £250m.

Figure A.2 Dollar Corporate Bond Net Trading Volumes During COVID-19



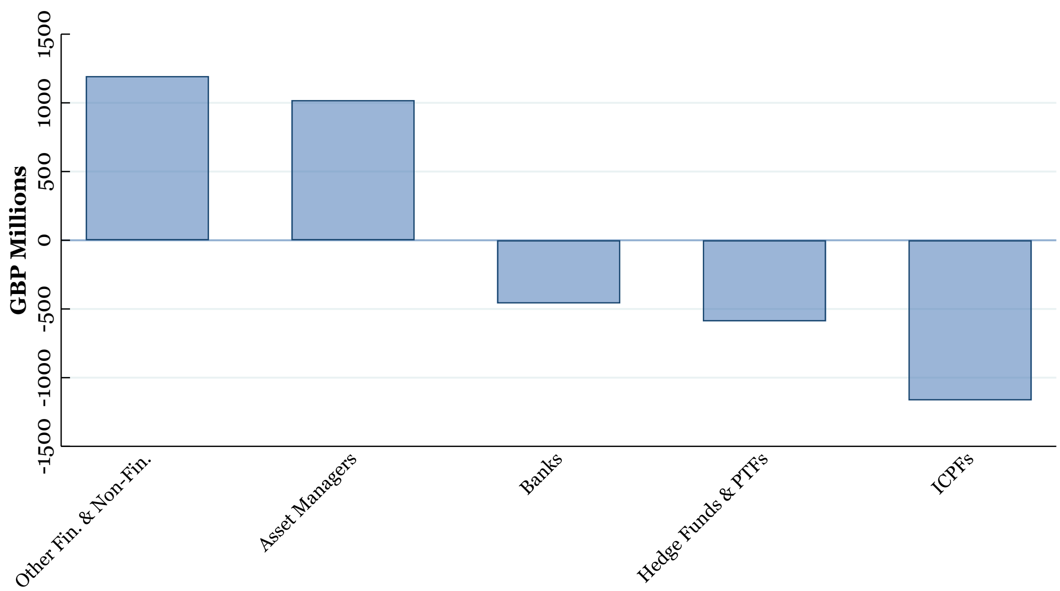
Note. Net trading volumes of different investor types in USD-denominated, non-financial corporate bonds in the UK market during the COVID-19 crisis (Feb 28 - Mar 20 2020). The investor types include: banks, asset managers, hedge funds & principal trading firms (PTFs), other financial & non-financial firms and insurers & pension funds (ICPFs). Source: MiFID II bond transaction database.

The MiFID II bond transaction data also allows us to examine the US treasury trades of UK counterparties during the COVID-19 crisis. This provides us with a valuable opportunity to explore the dash fro from a complementary angle. To do so, we extract around 1.2m trades in US treasuries that took place in February and March 2020 from the raw MiFID II database. We then carefully clean the treasury transaction data by removing duplicates, misreportings, and outliers.

Figure A.3 shows the treasury net trading volumes by investor type, similar to Figure A.2. Consistent with our findings for dollar corporate bonds, we observe that ICPFs were the primary net sellers of treasuries in our dataset, with net sales amounting to approximately

£1.2bn. In other words, ICPFs sold a part of their treasury holdings alongside their dollar corporate bonds, supporting our hypothesis that investors required cash dollars to meet dollar-denominated liabilities.

Figure A.3 US Treasury Bond Net Trading Volumes of UK-regulated Counterparties During COVID-19



Note. Net trading volumes of different investor types in US treasury bonds in the UK market during the COVID-19 crisis (Feb 28 - Mar 20 2020). The investor types include: banks, asset managers, hedge funds & principal trading firms (PTFs), other financial & non-financial firms and insurers & pension funds (ICPFs). Source: MiFID II bond transaction database.

A.3 Insurers' Holdings Data

Summary Statistics: Insurance Holdings Data Table A.2 reports the distribution of asset holdings across various categories for our main sample of 37 UK insurers—that also report their derivative holdings—from 2016 to 2020. For each category, it provides the mean, standard deviation (SD), and the 25th (P25), 50th (P50), and 75th (P75) percentiles. The table shows an increase in the average total assets from £34bn in 2016 to £49bn in 2020, with substantial variation across firms, as indicated by large standard deviations. Dollar-denominated holdings also grew steadily, with the mean rising from £5bn in 2016 to £8bn in 2020, reflecting significant dollar holdings among insurers. Sterling-denominated

Table A.2 Solvency II Summary Statistics

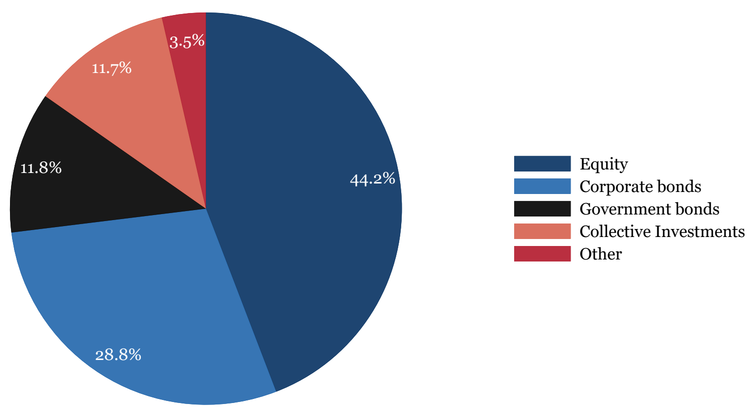
Year	Mean	SD	P25	P50	P75
			Total Assets		
2016	33663.99	51388.7	2693.73	14349.85	39963.75
2017	39568.07	61909.39	2291.04	11170.64	45960.11
2018	42918.05	66642.81	2097.78	13365.96	52829.62
2019	48744.47	72262.39	2838.33	21280.38	67024.33
2020	48629.46	72244.55	2056.66	19057.19	67412.41
			USD Holdings		
Year	Mean	SD	P25	P50	P75
2016	4595.93	11002.12	161.45	573.79	2409.73
2017	5749.62	13075.46	203.70	459.48	3070.17
2018	6507.00	13835.93	251.76	1288.68	3834.57
2019	7691.60	15728.45	249.37	1444.20	4379.70
2020	8467.14	16409.48	245.94	1483.25	9978.23
			GBP Holdings		
Year	Mean	SD	P25	P50	P75
2016	24445.48	33148.07	2503.08	9292.29	34495.32
2017	28863.41	40831.56	1575.64	8935.89	38573.68
2018	31589.98	46520.04	1561.16	8928.41	40594.79
2019	35953.29	50997.80	2403.54	13025.31	45901.30
2020	35381.72	50909.49	1647.81	11834.95	46826.52
			Other Currency Holdings		
Year	Mean	SD	P25	P50	P75
2016	4780.46	11379.75	83.08	663.92	3205.44
2017	5202.86	12997.58	110.69	790.19	2559.65
2018	5574.95	12902.12	171.41	987.42	3603.45
2019	6036.61	13489.10	182.67	1094.20	4051.13
2020	5994.36	13124.61	153.93	1313.51	4386.28

Note. This table reports annual insurer-level summary statistics for the supervisory Solvency II data, covering the period from 2016 Q1 to 2020 Q4. We report the mean, standard deviation (SD), 25th percentile (P25), the median (P50), and the 75th percentile of the distribution. "Total Assets" refers to the total assets of a given insurer in £m, "USD holdings" refers to the total dollar-denominated assets of a given insurer in £m, "GBP holdings" refers to the total sterling-denominated assets of a given insurer in £m, and "Other currency holdings" refers to the total assets of a given insurer denominated in currencies other than USD or GBP in £m.

holdings represent the largest category, with mean values increasing from £24bn in 2016 to £35bn in 2020. Other currency holdings remain relatively low in comparison, growing gradually from a mean of £5bn in 2016 to £6bn in 2020. Overall, the data suggest that UK insurers maintain diversified portfolios with substantial domestic and foreign currency assets, albeit with varying degrees of currency exposures across firms.

Furthermore, we are particularly interested in insurers' USD holdings across different asset classes. Figure A.4 demonstrates that equities constitute almost half of insurers' dollar asset holdings, followed by corporate bonds (29%), government bonds (12%) and collective investments (12%).

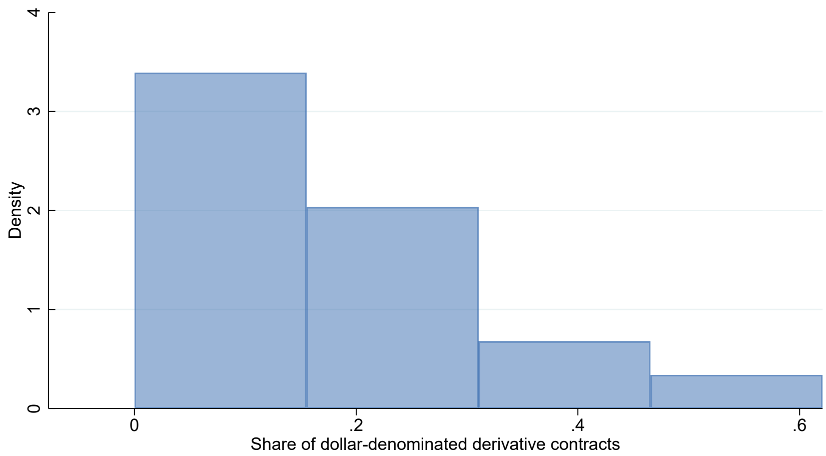
Figure A.4 Breakdown of Insurers' Dollar Asset Holdings



Note. Breakdown of insurers' dollar-denominated asset holdings at the end of Q4 2019. Source: Solvency II holdings database.

In section 4, we hypothesize that insurers with a high share of dollar-denominated derivative contracts had to sell dollar bonds to meet VM calls (in cash dollars) during the dash for cash. Importantly, this hypothesis is based on the assumption that a significant share of UK insurers' derivative contracts is denominated in US dollars, hence accounting for a meaningful share of their total VM demands during the dash for cash. Reassuringly, Figure A.5 shows that a prominent share (on average around 20%) of UK insurers' derivative portfolios is denominated in dollars, which makes it the second most important contract currency after pound sterling (with a share of approx. 60%). Importantly, only one insurer has a dollar share of 0%.

Figure A.5 INSURERS' SHARE OF DOLLAR-DENOMINATED DERIVATIVE CONTRACTS



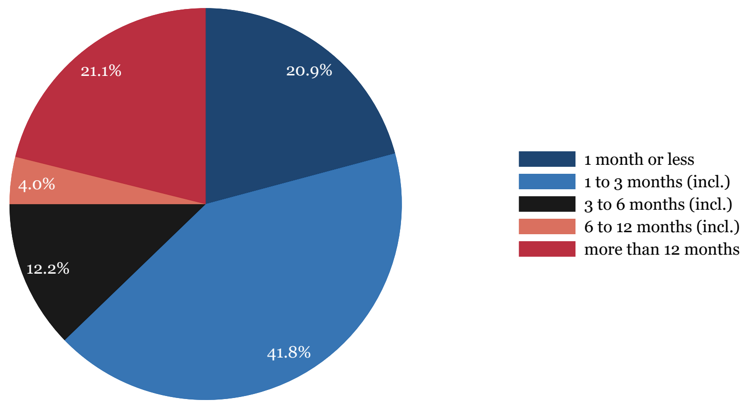
NOTE. Distribution of insurers' share of dollar-denominated derivative contracts at the end of Q4 2019. Source: Solvency II holdings database.

In section 4, we explain that insurers must regularly roll over their FX derivatives (particularly swaps and forwards) due to the short average maturities of these hedges. Figure A.6 confirms that most of insurers' FX derivatives have relatively short maturities: nearly two-thirds of trades mature within three months, requiring rollover within each quarter.[15]

Finally, Table A.3 reports the change in insurers' hedging ratios of their dollar asset holdings between the last quarter of 2019 and the first quarter of 2020. In the first quarter of 2020, the average hedging ratio in our sample remained remarkably stable at around 50% (a change of only 0.8 percentage points relative to the previous quarter). Importantly, this allows us to rule out the possibility that our results are driven by insurers increasing their hedge ratios (e.g. by selling their unhedged USD holdings), as frequently observed in other jurisdictions (see, e.g., Liao and Zhang, 2024).

[15] Du and Schreger (2022) also note that the most common FX hedging practice for institutional investors is to roll over short-term FX forwards on a one-month or three-month basis, a pattern that is also evident in our data.

Figure A.6 Maturity of Insurers' FX derivative contracts



Note. Initial time-to-maturity of insurers' FX derivative contracts at the end of Q4 2019. Source: Solvency II holdings database.

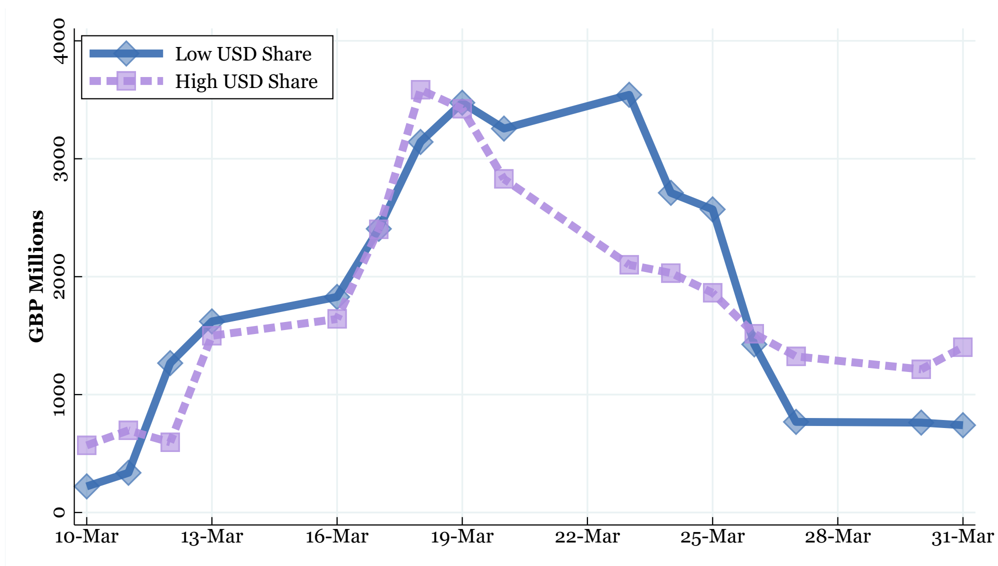
Table A.3 Hedging Ratios of UK Insurers

	USD Hedging Ratios (%)			
Period	Mean	P25	Median	P75
2019 Q4	49.98	8.69	66.25	89.60
2020 Q1	49.16	9.18	61.16	86.20

Note. Summary statistics for hedge ratios of UK insurers. Hedge ratios are defined as the USD net notional across a given insurer's FX derivatives, divided by the insurer's dollar asset holdings. The sample consists of 37 insurers.

Insurers' Variation Margin Calls A potential concern with Table 6 is that insurers with a higher share of dollar-denominated derivative contracts may have faced greater aggregate VM margin calls, and thus more severe liquidity pressures, than those with a lower share. To explore this, we estimate VM calls for UK insurers using EMIR Trade Repository data on interest rate swaps, forward rate agreements, inflation swaps, and cross-currency basis swaps, using the methodology in Bardoscia et al. (2021) (Figure A.7).

Figure A.7 INSURERS' CUMULATIVE VARIATION MARGIN DEMANDS



NOTE. This figure shows the dynamics of the total variation margin (VM) demands in March 2020 on UK insurers with a high share of dollar-denominated derivative contracts vs. those insurers with a low share of dollar contracts, using the sample median as the cut-off point. VM calls are estimated using the EMIR Trade Repository Data on interest rate swaps, forward rate agreements, inflation swaps, and cross-currency basis swaps. Positive (negative) values mean that the investor group was a net payer (receiver) of VM. The estimates are based on the methodology used in Bardoscia et al. (2021). The variation margin demands are in £ million.

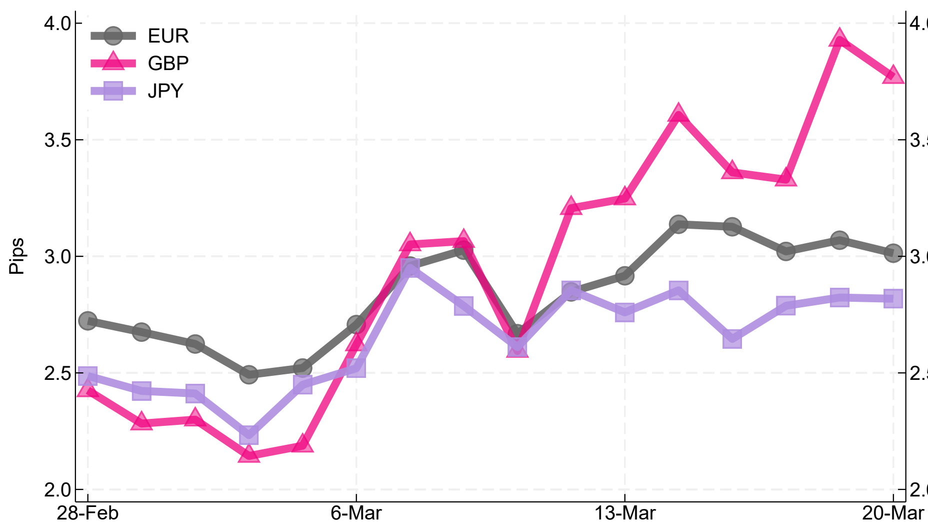
The estimates in Figure A.7 show a stark similarity in *overall* liquidity pressures (i.e., across all currencies and instruments) between insurers with a high share of dollar derivatives and those with a low share. This comparison demonstrates that insurers with a high dollar share were not systematically facing higher liquidity pressures (in all currencies) due to some unobserved factor. Furthermore, both groups faced a rapid succession of large VM calls in the eight trading days between March 10 and 19, consistent with their pronounced net sales of gilts and corporate bonds at the time (see also Czech et al., 2021).

A.4 Transaction Costs in the FX Spot Market

In section 4.2, we quantify the cost of selling dollar bonds relative to selling non-dollar bonds (and converting the proceeds into dollars) during the COVID-19 crisis. To support this analysis, we calculate the average daily bid-ask spreads in the FX spot market for the euro, pound sterling, and yen (against the dollar) using data from Refinitiv Tick History.

This involves constructing quoted bid-ask spreads at one-minute intervals and then computing the daily averages. As illustrated in Figure A.8, transaction costs remained relatively modest during the first two weeks of the crisis, before rising moderately to a peak of 4 pips for the pound sterling against the dollar.

Figure A.8 BID-ASK SPREADS IN THE FX SPOT MARKET

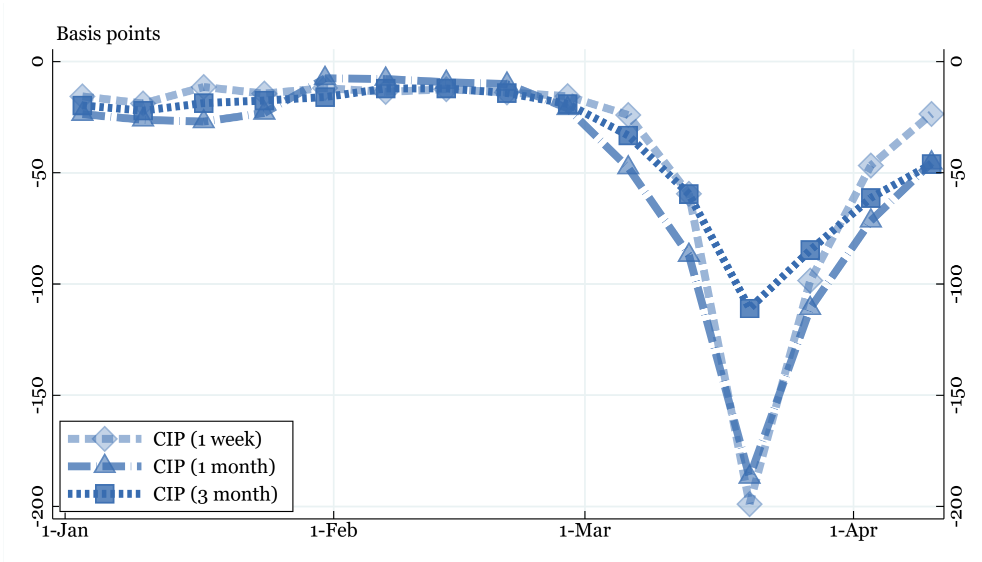


NOTE. We calculate the average daily spot bid-ask spreads for the euro, pound sterling and yen (against the dollar, all in pips), based on data from Refinitiv Tick History. To do so, we first construct the quoted bid-ask spreads at one-minute windows, and then calculate the daily average.

A.5 CIP Deviations

CIP deviations are defined as the difference between the US interest rate less the synthetic dollar borrowing rate (which, in turn, is defined as the foreign interest rate, multiplied with the quotient of the FX forward rate divided by the spot rate). To calculate the CIP deviations, we use daily spot, forward and OIS benchmark rates for one-week, one-month and three-month maturities from Bloomberg. The CIP deviations in Figure A.9 are then computed as a weekly average for the euro and the pound sterling against the US dollar.

Figure A.9 CIP Deviations



Note. CIP deviations (defined as the difference between the dollar borrowing rate less the synthetic dollar borrowing rate, here inverted) at different maturities (namely 1 week, 1 month, and 3 months). The CIP deviations are computed as a weekly average for the euro and the pound sterling against the US dollar.

B Robustness: Spread Regressions

This section reports an extensive set of additional exercises showing the robustness of the results presented in section 3, and addressing some remaining identification challenges. We summarize the exercises in separate subsections below.

B.1 Strengthening the Within-firm Identification

To increase the relative importance of within-firm information in the identification of our baseline effect, we take the within-firm argument to the limit and estimate our baseline specification on a firm-by-firm basis—i.e. by exploiting information across a given firm's outstanding bonds. This exercise is possible because some firms in our sample have a large number of outstanding bonds (for example, our sample contains data on 96 different bonds issued by AT&T). In the following, we use a set of individual firms that represent a broad range of different industries and countries of origin.

Table B.1 Bond Spreads Widening: Firm-level Regressions

	(1)	(2)	(3)	(4)	(5)	(6)
			$\Delta s_{b,t}$			
	British Pet.	AT&T	Toyota	Walmart	Vodafone	Mc Donald's
US dollar (β_1)	8.26**	11.32***	5.55**	4.12**	7.66*	9.60***
	(3.99)	(1.53)	(2.63)	(2.04)	(4.41)	(3.29)
Observations	630	1582	595	612	595	647
R squared	0.035	0.031	0.023	0.003	0.067	0.031
Number of Bonds	38	96	37	36	35	39

Note. The dependent variable is the daily change in bond spreads between February 28th and March 20th. The independent variable is an indicator variable for dollar-denominated bonds. Robust standard errors clustered at the firm level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Coefficients corresponding to the constant, level of credit spread at the beginning of the sample, maturity, coupon type dummies, amortization type dummies, and bond face value not reported.

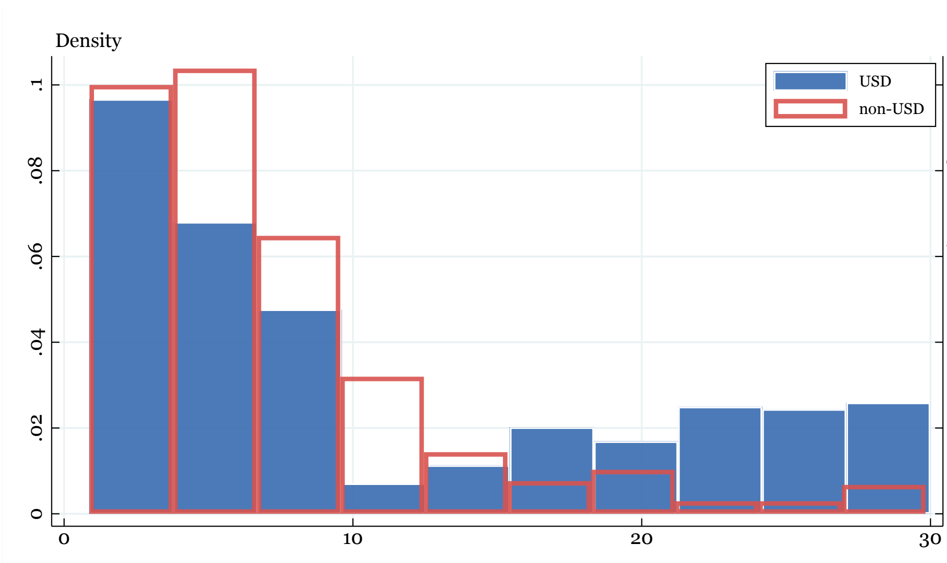
Table B.1 reports the results. The coefficient estimates are in line with our baseline specification. Specifically, we find that US dollar bonds experienced a larger increase in spreads, as evident from the positive and significant estimates of β_1 for all firms.

B.2 The Relation Between Maturity & Dollar Denomination

A bond's maturity and its currency of denomination both vary within-firm and could be correlated with each other. If this were to be the case, our interpretation of the empirical findings could be confounded by the role of maturity in explaining spread dynamics during the COVID-19 crisis. This concern is particularly important given the existing evidence that more liquid, shorter-term bonds experienced larger price drops than long-term bonds (see, among others, Haddad et al., 2021).

We address this concern by exploring the empirical relation between maturity and currency of issuance. Figure B.1 plots the distribution of bond maturity for dollar-denominated and non-dollar bonds in our sample. It shows that dollar bonds tend to have longer maturities than non-dollar bonds. Specifically, the average and median maturity are 11 and 7 years for dollar bonds; and 7 and 6 years for non-dollar bonds. This unconditional analysis of the data is reassuring: if the mechanism highlighted by Haddad et al. (2021) was also present in our sample—i.e. short-term bonds experiencing larger price falls than long-term bonds—then the omission of maturity would, if anything, result in an attenuation bias for the dollar effect.

Figure B.1 Distribution of Bond Maturity by Currency



Note. Distribution of bond maturity for dollar-denominated and non-dollar bonds in our sample. Average and median maturity is 11 and 7 years for dollar bonds; and 7 and 6 years for non-dollar bonds. The horizontal axis is in years.

A more formal exercise can help to shed some light on the distinctive effects of maturity and currency of denomination on bond spreads. Specifically, we estimate the following specification:

$$\Delta s_{b,t} = \alpha + \alpha_{i,t} + \beta_1 USD_b + \beta_2 Matu_{b,t} + \beta_3 \left(USD_b \times Matu_{b,t}\right) + \Gamma X_b + \varepsilon_{b,t} \qquad \text{(B.1)}$$

where $Matu_{b,t}$ is the remaining time-to-maturity of bond b issued by firm i, and all other variables are the same as in our baseline specification (1). The results are reported in Table B.2.

Table B.2 BOND SPREADS WIDENING: THE ROLE OF CURRENCY AND MATURITY

	(1)	(2)	(3)	(4)
		$\Delta s_{b,t}$		
US dollar (β_1)	7.54***		7.84***	10.44***
	(0.51)		(0.50)	(0.77)
Maturity (β_2)		0.04	-0.11**	0.19**
		(0.05)	(0.05)	(0.08)
US dollar × Maturity (β_3)				-0.34***
				(0.05)
Observations	50685	50685	50685	50685
R squared	0.355	0.350	0.356	0.356
Number of Firms	225	225	225	225
Firm x Day FE	yes	yes	yes	yes

NOTE. The dependent variable is the daily change in bond spreads between February 28th and March 20th. The independent variables are an indicator variable for dollar-denominated bonds and a variable capturing the time-to-maturity of a given bond, as well as an interaction term of these variables. Robust standard errors clustered at the firm level are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Coefficients corresponding to the constant, fixed effects, level of credit spread at the beginning of the sample, maturity, coupon type dummies, amortization type dummies, and bond face value not reported.

Column (1) only reports the coefficient of the dollar indicator variable. Column (2) reports the estimated coefficient of $Matu_{b,t}$, which is statistically not different from zero. Consistent with the unconditional evidence in Figure B.1, however, this result may be confounded by the correlation between currency of issuance and maturity. Column (3), which considers the currency and maturity dimensions jointly (as in our baseline specification in Equation 1), shows that the coefficient on maturity becomes negative and statistically significant; that is, shorter maturity bonds indeed experience a larger increase in spreads, in line with the findings in Haddad et al. (2021). Importantly, the coefficient on the dollar indicator variable remains significant and the magnitude actually becomes slightly larger in comparison to our baseline results.

Finally, we incorporate an interaction term between bond maturity and the US dollar indicator variable ($USD_b \times Matu_{b,t}$). The results from this specification are reported in column (4) of Table B.2. We highlight three results. First, US dollar spreads increase by more than the spreads of bonds denominated in other currencies (independent of the maturity), as shown by the positive sign of the coefficient on the dollar indicator variable (β_1). Second, within the group of dollar bonds, shorter maturity bonds are associated with a larger increase in spreads, as indicated by the negative coefficient of the interaction term (β_3)—and consistent with the findings (and interpretation) in previous studies that focused on US data. Third and finally, longer maturity bonds experience larger increases in spreads in the non-dollar sample, as shown by the positive sign of the coefficient on maturity (β_2).

Table B.3 Bond Spreads Widening: Maturity Buckets

	(1)	(2)	(3)	(4)	(5)
			$\Delta s_{b,t}$		
	0-3 years	3-5 years	5-10 years	10-15 years	15+ years
US dollar (β_1)	11.66***	11.21***	7.30***	7.46***	4.95***
	(1.12)	(1.47)	(0.54)	(1.96)	(0.68)
Observations	10034	8008	15046	2286	11469
R squared	0.523	0.469	0.498	0.791	0.592
Number of Firms	225	225	225	225	225
Firm × Day FE	yes	yes	yes	yes	yes

Note. The dependent variable is the daily change in spread of a bond in a given maturity bucket between February 28th and March 20th. The independent variable is an indicator variable for dollar-denominated bonds. Robust standard errors clustered at the firm level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Coefficients corresponding to the constant, fixed effects, level of credit spread at the beginning of the sample, coupon type dummies, amortization type dummies, bond face value, and maturity not reported.

To provide further insights into the heterogeneous dollar bond spread widening across different maturities, we now allocate bonds to five different maturity buckets: 0-3 years, 3-5 years, 5-10 years, 10-15 years and 15+ years. We run our baseline regression separately for these five different buckets, and the results are presented in Table B.3. Consistent with the previous test, we find the largest coefficient (11.7bps) for the 0-3 years maturity bucket. Our evidence highlights that the effect decreases monotonically for the longer-maturity buckets, in line with our previous findings.

A potential concern with our baseline results is that we do not control for the unobserved bond-level credit risk based on the place of a bond in its issuer's maturity structure (Bao and Hou, 2017). The intuition is that a bond that matures after most of the issuer's other bonds is de facto junior even if all of the firm's bonds have the same seniority. As shown in Table B.4, our results remain robust when we control for the proportion of an issuer's debt due before a given bond. Importantly, the effect is less pronounced for bonds that mature after most of the issuer's other bonds. In other words, during the COVID-19 crisis the spread widening of dollar bonds is negatively correlated with the bond-level credit risk based on the issuer's maturity structure.

Table B.4 Bond Spreads Widening: Maturity Structure

	(1)	(2)	(3)	(4)
		$\Delta s_{b,t}$		
US dollar (β_1)	7.84***		7.77***	11.28***
	(0.50)		(0.48)	(0.69)
Proportion due prior (β_2)		-4.41**	-2.41	1.13
		(1.74)	(1.76)	(1.79)
US dollar × Proportion due prior (β_3)				-8.60***
				(0.93)
Observations	50685	50685	50685	50685
R squared	0.356	0.350	0.356	0.356
Number of Firms	225	225	225	225
Firm × Day FE	yes	yes	yes	yes

Note. The dependent variable is the daily change in bond spreads between February 28th and March 20th. The independent variable is an indicator variable for dollar-denominated bonds. *Proportion due prior* measures the proportion of an issuer's face value of debt due prior to a given bond. Robust standard errors clustered at the firm level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Coefficients corresponding to the constant, fixed effects, level of credit spread at the beginning of the sample, coupon type dummies, amortization type dummies, bond face value, and maturity not reported.

B.3 Dynamics During the Global Financial Crisis

Having established that corporate bond spreads exhibited dynamics consistent with a dash fro during the peak of the COVID-19 crisis, it is natural to ask whether this phenomenon is common across other crisis episodes. To address this question, we examine the behavior of corporate bond spreads during the second half of 2008, at the height of the Global Financial Crisis (GFC), to determine whether the patterns identified in section 3 are also evident in that period.

Specifically, we estimate specification (1) for a sample of bonds included in the same corporate bond index used in our baseline results (i.e. investment-grade bonds from the ICE Bank of America Merrill Lynch Global Corporate Index).[16] Unlike in our baseline analysis, where daily changes are used, this exercise examines the cumulative change in spreads between June 16, 2008 (a local minimum for the Global Corporate Index, preceding the sharpest recorded acceleration), and December 8, 2008 (the all-time peak of the index). This period encompasses the bankruptcy of Lehman Brothers in September 2008, a key reference point for GFC-related dynamics.

The results, summarized in Table B.5, reveal that US dollar-denominated bonds experienced the largest widening in spreads during the GFC, mirroring the dynamics observed during the COVID-19 crisis. The magnitudes are also comparable: during the GFC sample period, spreads on dollar bonds increased by approximately 149bps more than those on non-dollar bonds issued by the same firm, compared to a differential of 120bps over the 16 trading days of the COVID-19 crisis.

The GFC and the financial turmoil of 2020 were triggered by vastly different events. The GFC stemmed from a housing market shock, compounded by weak underwriting standards and high leverage among financial institutions. By contrast, the 2020 turmoil was sparked by the COVID-19 pandemic and associated government-mandated lockdowns, which raised concerns about the smooth functioning of financial markets.

Despite their differing origins, our findings indicate that both crises triggered similar financial market responses, particularly a sharp increase in demand for US dollar liquidity. However, the mechanisms underlying this dollar shortage likely differed significantly. During the COVID-19 crisis, margin calls on leveraged positions in the non-bank financial sector played a key role, as we argue in the main text. In contrast, the global shortage of US dollars during the GFC was primarily driven by the funding needs of European banks.[17] As the GFC unfolded, crucial unsecured funding sources dried up—most notably, US money

[16] The overlap between the GFC and COVID-19 samples is only partial due to the issuance of new bonds and the existing bonds reaching maturity. However, the characteristics of the bonds in this exercise are very similar to those in our baseline sample.

[17] Leading up to the GFC, European banks had significantly expanded their holdings of dollar-denominated assets, financing these positions mainly through unsecured borrowing and FX swaps (Baba, McCauley, and Ramaswamy, 2009).

Table B.5 BOND SPREADS WIDENING: GLOBAL FINANCIAL CRISIS

	(1)	(2)
	Δs_b	
US dollar (β_1)	168.25***	149.71***
	(12.84)	(8.76)
Observations	1146	1144
R squared	0.142	0.751
Number of Firms	119	119
Firm FE	no	yes

NOTE. Results from specification $\Delta s_b = \alpha + \alpha_i + \beta_1 USD_b + \Gamma X_b + \varepsilon_b$. The dependent variable is the change in credit spreads between 8th December and 16th June 2008. Robust standard errors are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Coefficients corresponding to the constant, fixed effects, maturity, and bond face value not reported.

market funds stopped purchasing bank-issued commercial paper. At the same time, the cost of obtaining US dollars synthetically via FX swaps surged, as reflected in the widening of cross-currency basis (CIP) deviations. As a result, European banks were forced to offload dollar-denominated assets, putting additional downward pressure on asset prices (Kubitza et al., 2024).

B.4 The Way Down

On March 23rd, the Federal Reserve announced that it would explicitly take on credit risk (with a Treasury backstop) by directly buying investment grade corporate debt in primary (PMCCF program) and secondary markets (SMCCF) for the first time since Quantitative Easing was introduced in 2008.[18] This intervention, the first one directly targeting the asset class analyzed in our study, is associated with the end of the aggregate corporate spread widening documented in Figure 1. In this section, we analyze the dynamics of spreads in the subsequent compression phase.

[18]The March 23rd Fed announcement is available at this link `https://www.federalreserve.gov/newsevents/pressreleases/monetary20200323b.htm`. On April 9th, the scale of this program was increased, and eligibility was widened to include high-yield bonds, provided they were rated investment grade as of March 22nd (the so-called 'fallen angels'), see `https://www.federalreserve.gov/newsevents/pressreleases/monetary20200409a.htm`.

We follow an approach that mirrors the one employed in our main analysis. Specifically, we estimate within-firm regressions matching those in section 3 for the period following the PMCCF/SMCCF policy announcement date. Table B.6 reports the results. We run our baseline specification by focusing on the change in spreads in the first five trading days after the PMCCF/SMCCF announcement.[19] The results show that US dollar-denominated bonds experienced a larger fall in spreads than bonds denominated in other currencies, as shown by the (strongly significant) negative coefficient on USD_b. This emphasizes the reversion of the dash for dollar dynamics in the days following the PMCCF/SMCCF announcement.

Table B.6 The Way Down

	(1)	(2)
	$\Delta s_{b,t}$	
US dollar (β_1)	-8.57***	-9.09***
	(0.81)	(0.90)
Observations	34406	33926
R^2	0.315	0.318
Number of Firms	286	286
Firm x Day FE	yes	yes

Note. The dependent variable is the daily change in bond spreads in the five trading days following the PMCCF/SMCCF announcement. The independent variable is an indicator variable for dollar-denominated bonds. *** p<0.01, ** p<0.05, * p<0.1. Coefficients corresponding to the constant, fixed effects, and controls (i.e. level of credit spread at the beginning of the sample, maturity, coupon type dummies, amortization type dummies, and bond face value) not reported.

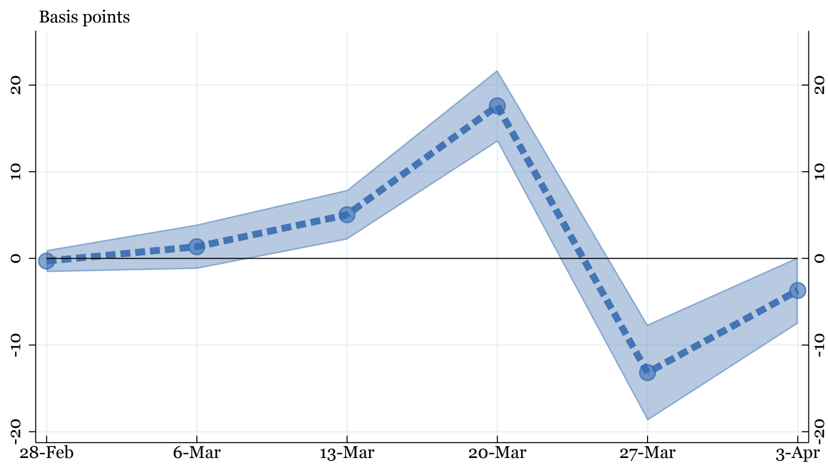
Can the timing and characteristics of the spread compression be informative about the mechanisms at play? In principle, the Fed actions might have eased the dash fro through two complementary channels. First, the direct provision of US dollars to foreign central banks via swap lines might have eased access to US dollars for non-US financial institutions.[20] Second, any type of Fed action resulting in looser monetary and financial conditions might have also led to the easing of intermediaries' balance sheet constraints via a reduction in

[19] The length of the window for this exercise is similar to past studies analyzing corporate spread dynamics. For example, Gertler and Karadi (2015) consider a 10-day window in an event study similar to ours. Our results remain robust when using a 10-day window.

[20] The Federal Reserve announced an improvement in the terms of its swap lines with the central banks on its standing network on March 15, an expansion of the network on March 19, and an increase in the frequency of operations for the original set of counterparties on March 20.

risk perceptions and an increase in prices across asset classes. With increased balance sheet capacity, financial intermediaries might have exploited the arbitrage opportunity provided by CIP deviations, thereby inevitably closing the gaps.[21] This, in turn, could have led to a reduction in the cost of accessing US dollars synthetically, therefore reducing the need to fire-sell dollar securities.

Figure B.2 The dash for dollars over time: The way down



Note. Time-varying (weekly) estimates of the differential spread increase for dollar-denominated bonds vis-a-vis non-dollar bonds in the specification with firm-by-day fixed effects (β_1). Shaded areas show 99% confidence intervals based on robust standard errors clustered on the firm level.

The data suggest that the spreads did not revert following the first Fed announcements—i.e. those covering 'standard' easing policies through rate cuts and traditional Quantitative Easing (i.e. the purchase of Treasuries and MBS), as well as those covering cheaper and more extensive swap lines. Indeed, credit spreads kept increasing until March 23 (see Figure 1), with US dollar bonds displaying the largest increases. The conditional analysis in Figure 2 shows that the dash fro dynamics intensified rather than abated in the days following those announcements. This, together with results in Table B.6, lends some weight to the hypothesis that the direct purchases of corporate bonds by the Fed led to a reversion of the dash fro dynamics documented in the widening period.

A series of studies, complementary to ours, focus more narrowly on the effect of the Fed interventions (PMCCF/SMCCF announcements in particular), but do not explore the role of the underlying bond characteristics beyond those warranting inclusion in the purchase

[21] This mechanism has been highlighted, among others, by Du et al. (2018).

programs. Specifically, Haddad et al. (2021) find that investment grade bonds with maturities of five years and less (i.e. those targeted by the Fed) experienced particularly large gains on the day of the PMCCF/SMCCF announcement. Closer to our study, Gilchrist et al. (2020) use firm fixed effects and a longer time window to find that bonds included in Fed programs experienced more pronounced increases in prices than excluded bonds of the same firm. However, neither of these studies explore the currency dimension of the bond spread dynamics resulting from the Fed's actions.

In sum, the results in this section are insightful even without narrowly identifying the effect of a particular Fed program. They show that in the week following the announcement of PMCCF/SMCCF, when the market for corporate bonds 'turned', spreads of dollar-denominated bonds compressed the most, even when accounting for unobserved firm heterogeneity. This is consistent with a reversion of the dynamics observed during the dash fro episode uncovered in section 3.

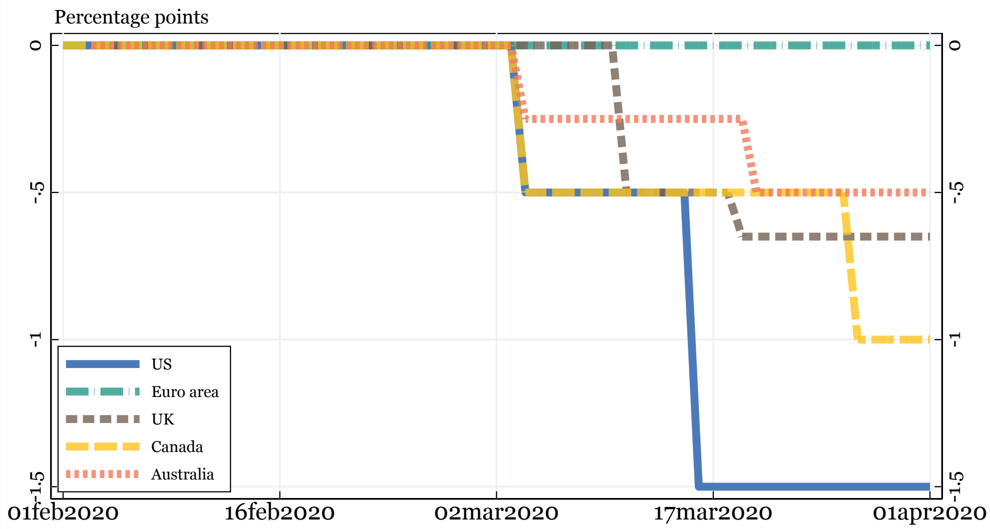
B.5 Central Bank Interventions & Bond Staleness

There were a significant number of central bank interventions in early 2020 as most central banks were lowering rates aggressively in response to the pandemic. Figure B.3 reports the cumulative change in the policy rate by the central banks of the countries in our sample (namely, Australia, Canada, UK, Euro Area, and US) from the 1st of February to the 1st of April. The figure shows that the Federal Reserve loosened its policy stance more aggressively than the other central banks in our sample. Over the first two weeks of March, the Federal Reserve lowered its policy rate by 150bps, compared to a 50bps cut by the BoC and the BoE, a 25bps cut by the RBA, and no change by the ECB.

The patterns documented in Figure B.3 raise a concern: if bond prices were 'stale', then the widening in dollar bond spreads could simply reflect the more aggressive policy stance of the Federal Reserve. We can address this concern by re-running our baseline specification using bond yields, rather than credit spreads. Table B.7 reports the results from this exercise.

Columns (1) and (2) report the results for spreads and yields, respectively. The positive and statistically significant coefficient in column (2) shows that, despite the much larger fall in US policy rates, dollar bond *yields* increased by more than non-dollar bond yields during the COVID-19 period.

Figure B.3 EVOLUTION OF POLICY RATES



NOTE. The figure shows the cumulative change in the policy rates by the central banks in the countries in our sample from the 1st of February to the 1st of April 2020.

Table B.7 BOND YIELDS WIDENING

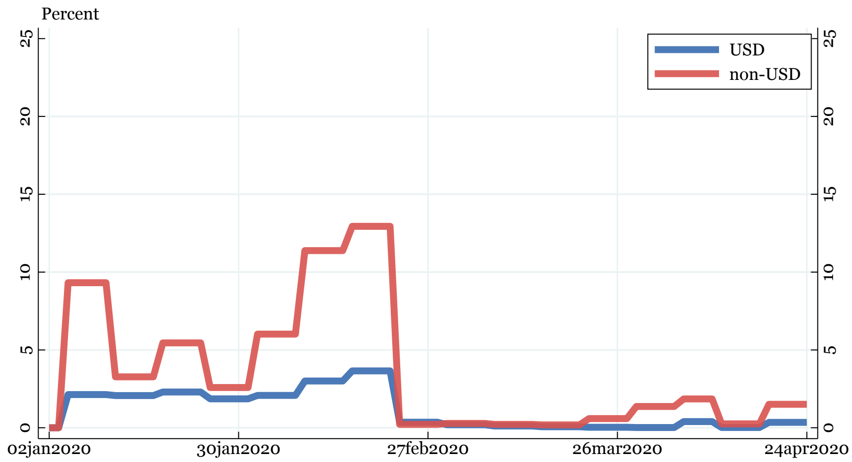
	(1)	(2)
	$\Delta s_{b,t}$	$\Delta y_{b,t}$
US dollar (β_1)	7.84***	3.60***
	(0.50)	(0.51)
Observations	50685	50685
R squared	0.356	0.369
Number of Firms	225	225
Firm x Day FE	yes	yes

NOTE. The dependent variable is the daily change in bond spreads (Column 1) or yields (Column 2) between February 28th and March 20th. The independent variable is an indicator variable for dollar-denominated bonds. Robust standard errors clustered at the firm level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Coefficients corresponding to the constant, fixed effects, level of credit spread at the beginning of the sample, maturity, coupon type dummies, amortization type dummies, and bond face value not reported.

Another way to test the potential impact of price staleness is to analyze how often bond spreads changed over time and whether there is a difference between spreads of dollar and non-dollar bonds. Figure B.4 shows the share of bonds that display no change in their spreads over five trading days, separately for dollar and non-dollar bonds. The figure highlights that our measure of price staleness dropped sharply during our period of interest

(Feb 28 - Mar 20), with almost no stale bond spreads for dollar or non-dollar bonds.

Figure B.4 Bond Staleness



Note. Share of bonds that display no change in their spread over five trading days, by currency.

B.6 Adding High Yield Bonds to the Sample

We present additional results on the dash fro using an extended sample that also includes high yield bonds. Table B.8 reports our baseline estimate of β_1 in column (1) and compares it with a sample that includes high yield bonds (column 2) and that keep high yield bonds only (column 3). The results show that the sharper widening in spreads of US dollar-denominated bonds is robust to using these extended samples.

Table B.8 Including High Yield Bonds

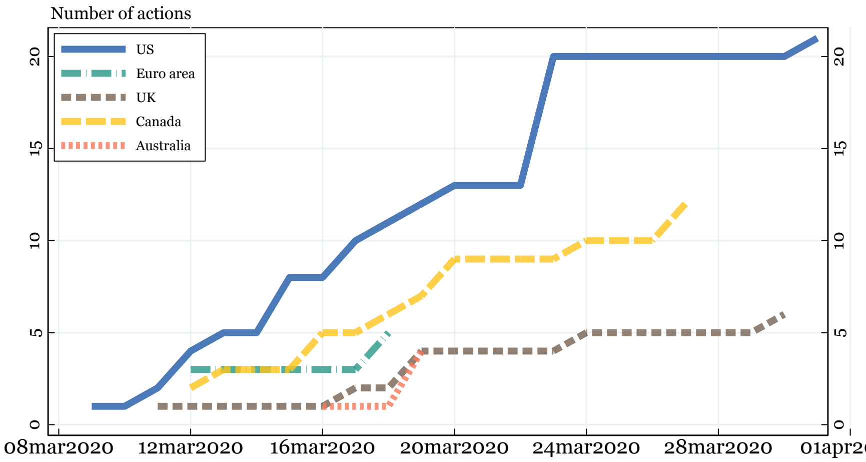
	(1)	(2)	(3)
		$\Delta s_{b,t}$	
	Baseline (IG only)	All bonds	High Yield Only
US dollar (β_1)	7.84***	7.69***	6.43***
	(0.50)	(0.48)	(1.43)
Observations	50685	55029	4344
R squared	0.356	0.406	0.584
Number of Firms	225	282	57
Firm x Day FE	yes	yes	yes

Note. The dependent variable is the daily change in bond spreads between February 28th and March 20th. The independent variable is an indicator variable for dollar-denominated bonds. Robust standard errors clustered at the firm level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Coefficients corresponding to the constant, fixed effects, level of credit spread at the beginning of the sample, maturity, coupon type dummies, amortization type dummies, and bond face value not reported.

B.7 Different Sample Periods

Finally, another potential concern is that there were many unconventional policy actions during our sample period. Table D.1 in Appendix D reports a full list of unconventional policy actions from the central banks in our sample. The table emphasizes the large number of policy interventions during March 2020. The first policy action was as early as the 9th of March, by the Federal Reserve. To visualize the timing of central bank interventions in different jurisdictions, Figure B.5 reports the cumulative *number* of unconventional policy actions taken by the central banks in our sample. The figure shows that the Federal Reserve has acted earlier and more frequently than the other central banks in our sample, in line with the evidence reported in Figure B.3.

Figure B.5 CUMULATIVE UNCONVENTIONAL POLICY ACTIONS



NOTE. Cumulative number of unconventional policy actions taken by the central banks in our sample from March 1st to March 31st 2020. Source: BIS.

To check the robustness of our results, we re-estimate our spreads specification using different sample periods. Specifically, we consider four samples: (i) Sample ending before March 17, when HM Treasury and the Bank of England announced a COVID-19 Corporate Financing Facility (CCFF); (ii) Sample ending before March 15, when the Bank of Canada, the Bank of England, the Bank of Japan, the European Central Bank, the Federal Reserve, and the Swiss National Bank announced a coordinated swap line intervention; (iii) sample ending before March 11, as there were 11 central bank interventions between March 11 and 13 ; (iv) Sample ending before March 9, when the Fed started its first lending operation in response to Covid.

The results are reported in Table B.9. The magnitude of the coefficients on the dollar indicator variable decreases with the length of the sample, as one would expect. But the statistical significance remains robust in all specifications.

Table B.9 Alternative Sample Periods

	(1)	(2)	(3)	(4)	(5)
			$\Delta s_{b,t}$		
	Baseline	End date: 17 Mar	End date: 15 Mar	End date: 11 Mar	End date: 9 Mar
US dollar (β_1)	7.84***	2.94***	2.94***	1.67***	1.67***
	(0.50)	(0.31)	(0.31)	(0.36)	(0.36)
Observations	50685	32840	32840	23912	23912
R squared	0.356	0.500	0.500	0.604	0.604
Number of Firms	225	225	225	225	225
Firm x Day FE	yes	yes	yes	yes	yes

Note. The dependent variable is the daily change in bond spreads between February 28th and various different end dates. The independent variable is an indicator variable for dollar-denominated bonds. Robust standard errors clustered at the firm level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Coefficients corresponding to the constant, fixed effects, level of credit spread at the beginning of the sample, maturity, coupon type dummies, amortization type dummies, and bond face value not reported.

B.8 Results by Currency

In this section, we again exploit the currency-specific dimension of our data, similar to section 4.3.1. Specifically, and differently from our baseline analysis where we only distinguish between dollar and non-dollar bonds, we estimate the differential increase in spreads of dollar-denominated bonds relative to each currency separately. We do that by estimating a variant of our baseline specification, with the addition of a currency indicator (α_c):

$$\Delta s_{b,t} = \alpha + \alpha_{i,t} + \alpha_c \times \beta_1 USD_b + \Gamma X_{b,t} + \varepsilon_{b,t} \tag{B.2}$$

Table B.10 shows that our main results—i.e. that dollar bond spreads increased by more than non-dollar bond spreads—hold for each currency in isolation, thus supporting the findings in Figure 6.

Table B.10 BOND SPREADS WIDENING: RESULTS BY CURRENCY

	(1)	(2)	(3)	(4)	(5)
			$\Delta s_{b,t}$		
	All currencies	AUD	CAD	EUR	GBP
US dollar (β_1)	7.84***	8.41***	8.47***	7.99***	5.92***
	(0.50)	(2.19)	(1.82)	(0.47)	(0.90)
Observations	50685	5718	6756	42230	16989
R squared	0.356	0.371	0.363	0.367	0.391
Number of Firms	225	22	25	198	81
Firm x Day FE	yes	yes	yes	yes	yes

NOTE. The dependent variable is the daily change in spread of a bond in a given currency. The independent variable is an indicator variable for dollar-denominated bonds. Robust standard errors clustered on the firm level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Coefficients corresponding to the constant, fixed effects, level of credit spread at the beginning of the sample, maturity, coupon type dummies, amortization type dummies, and bond face value not reported.

B.9 Geographical Heterogeneity

One potential concern about our baseline results in Table 2 is that the effect might not be truly global in nature, but may instead reflect particular dynamics in a given geography. This could arise, for example, due to heterogeneity in regulations or balance sheet practices across different jurisdictions. To address this concern, and assess the robustness of our baseline results, we again use specification (1) and split our sample into different groups of countries. Table B.11 reports the results from this exercise. It shows that our benchmark results hold for samples of (i) advanced economies, (ii) US, (iii) non-US, (iv) advanced economies ex-US and (v) European Union headquartered firms. More precisely, the dollar-denomination is a central variable for understanding the spread dynamics of corporate bonds issued by companies both inside and outside the United States.

B.10 Further Robustness Checks

In this section we conduct a series of robustness checks for our main result that dollar bonds experienced larger spread increases than non-dollar bonds during the COVID-19

Table B.11 Bond Spreads Widening: Geographical splits

	(1)	(2)	(3)	(4)	(5)
			$\Delta s_{b,t}$		
	US	non-US	Advanced Ec.	Advanced Ec. excl. US	European Union
US dollar (β_1)	8.74***	6.98***	7.95***	6.63***	6.04***
	(0.74)	(0.65)	(0.51)	(0.66)	(0.83)
Observations	28565	22119	47946	19380	9753
R squared	0.338	0.395	0.334	0.317	0.227
Number of Firms	108	121	206	102	45
Firm x Day FE	yes	yes	yes	yes	yes

Note. The dependent variable is the daily change in bond spreads between February 28th and March 20th. The independent variable is an indicator variable for dollar-denominated bonds. Robust standard errors clustered at the firm level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Coefficients corresponding to the constant, level of credit spread at the beginning of the sample, maturity, coupon type dummies, amortization type dummies, and bond face value not reported.

crisis. Specifically, we consider additional exercises that exclude local currency bonds, keep fixed coupon bonds only, and include financial bonds.

In column (2) of Table B.12, as an important cross-check, we exclude local currency bonds. The intuition is that the default risk might potentially be higher for foreign currency bonds than for local-currency bonds, so the increase in dollar spreads would then be driven by compensation for this additional risk. We therefore compare dollar spreads of non-US firms with other foreign-currency spreads (for example, dollar vs. pound sterling bonds for euro area firms), and find that our results remain robust.

As shown in column (3) of Table B.12, our results also remain robust to the exclusion of bonds that are not of a zero coupon type, as well as to the inclusion of bonds issued by firms in the financial sector (column 4). The coefficients on our main variable of interest remain statistically and economically highly significant.

Table B.12 Further Robustness Checks

	(1)	(2)	(3)	(4)
		$\Delta s_{b,t}$		
	Baseline	Excl. Local Currency Bonds	Zero coupon	Incl. Financials
US dollar (β_1)	7.84***	7.95***	7.57***	8.11***
	(0.50)	(0.53)	(0.52)	(0.38)
Observations	50685	24042	40447	68167
R squared	0.356	0.382	0.362	0.350
Number of Firms	225	176	215	296
Firm x Day FE	yes	yes	yes	yes

Note. The dependent variable is the daily change in bond spreads between February 28th and March 20th. The independent variable is an indicator variable for dollar-denominated bonds. *** p<0.01, ** p<0.05, * p<0.1. Coefficients corresponding to the constant, fixed effects, level of credit spread at the beginning of the sample, maturity, coupon type dummies, amortization type dummies, and bond face value not reported.

C Robustness: Transaction-level Regressions

C.1 Spreads Regressions using Transaction Data

A potential concern with our baseline bond-level spread regression is the potential staleness of the ICE Bank of America Merrill Lynch credit spreads data, as discussed in section B. To further address this concern, we merge the credit spread data with our transaction-level MiFID II data set, which covers the UK corporate bond market. This allows us to re-run our baseline regression model for bonds traded in the MiFID II data, and we can also use the change in transaction prices rather than credit spreads.

Table C.1 BASELINE REGRESSION USING MIFID II TRANSACTION DATA

	(1)	(2)
	$\Delta s_{b,t}$	$\Delta p_{b,t}$
US dollar (β_1)	16.37***	-57.04*
	(3.37)	(28.47)
Observations	877	877
R squared	0.651	0.442
Firm × Day FE	yes	yes

NOTE. This table provides estimates for our baseline regression using spreads and prices of bonds that are traded in the sterling corporate bond market. In the first column, we use changes in spread, which are measured on the bond-day level (in bps). In the second column, we focus on changes in transaction prices, which are measured on the bond-day level and defined as the logarithmic change in the trade-weighted average price compared to the previous trading day (in bps). We focus on the Covid-19 period between February 28th and March 20th 2020. Robust standard errors clustered on the firm level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Coefficients corresponding to the constant, control variables and fixed effects not reported.

The results are presented in Table C.1. The first column shows that our results continue to hold in the UK corporate bond market. The effect remains statistically highly significant, and the economic magnitude is with around 16bps even larger than in the global spread data set. Consistent with our baseline spread results, we also find that dollar bonds traded at significantly lower prices relative to non-dollar bonds of the same firm in the UK corporate bond market (column 2). The economic magnitude is large, with transaction prices for dollar bonds around 57bps higher. Importantly, this test helps to further mitigate concerns about the potential staleness of bond spreads used in our baseline regression.

C.2 Corporate Bond Liquidity incl. High Yield Bonds

In section 3.3, we find that dollar bonds experienced sharper increases in trade costs than non-dollar bonds. Importantly, this comes against the backdrop that dollar bonds are usually viewed as more liquid in non-stress periods, consistent with Table 5. In Table C.2, using our within-issuer regression specification (3), we provide further evidence for the liquidity of dollar bonds using our entire sample, i.e. in tranquil periods and including high yield bonds.

We find that trade costs of a given issuer's dollar bonds are on average around 1.4bps lower than those of the issuer's non-dollar bonds in tranquil times. The effect is statistically significant for the whole bond sample and investment grade bonds, but insignificant in our sample of high yield bonds. These results are consistent with the superior liquidity of high-quality dollar bonds during quiet periods in the market, although the evidence is relatively weak in our sample. In the COVID-19 crisis period, however, we find that trade costs of dollar bonds rose significantly more than those of non-dollar bonds of the same firm. Importantly, this effect is absent for high-yield issuers, indicating that the dash fro was more pronounced for investment grade issuers, consistent with prior studies documenting a "reverse flight to liquidity" at the time.

Table C.2 Trade Costs (Including High Yield Bonds)

Panel A: Tranquil times (pre 28 Feb 2020)						
	(1)	(2)	(3)	(4)	(5)	(6)
	Trade Costs					
	Whole Sample		IG Only		HY Only	
US dollar (β_1)	-0.77	-1.35***	-0.79	-1.40*	-1.10	0.03
	(0.63)	(0.41)	(0.98)	(0.74)	(1.83)	(0.79)
Observations	23526	13581	14671	9172	8055	3878
R squared	0.153	0.324	0.182	0.265	0.166	0.454
Firm FE	yes	no	yes	no	yes	no
Day FE	yes	no	yes	no	yes	no
Firm × Day FE	no	yes	no	yes	no	yes

Panel B: Baseline sample (28 Feb to 20 Mar 2020)						
	(1)	(2)	(3)	(4)	(5)	(6)
	Trade Costs					
	Whole Sample		IG Only		HY Only	
US dollar (β_1)	11.15**	7.78**	16.89***	18.41***	0.80	-2.57
	(4.31)	(3.76)	(3.38)	(1.87)	(4.26)	(1.69)
Observations	972	639	502	327	366	239
R squared	0.208	0.410	0.290	0.439	0.155	0.440
Firm FE	yes	no	yes	no	yes	no
Day FE	yes	no	yes	no	yes	no
Firm × Day FE	no	yes	no	yes	no	yes

Note. Results from specification (3). In Panel A, we focus on the pre-Covid period between January 3rd 2018 and February 27th 2020. In Panel B, we focus on the Covid-19 period between February 28th and March 20th 2020. The trade costs are measured on the bond-day level and defined as the difference between the trade price and the bid/ask midpoint. Robust standard errors clustered on the firm level are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Coefficients corresponding to the constant, control variables and fixed effects not reported.

C.3 Alternative Measures of Bond Liquidity

The evidence for the liquidity inversion affecting dollar bonds presented in section 3.3 is based on the dynamics of bonds' trade costs. Alternative liquidity proxies, such as the Amihud price impact or the daily bond turnover, confirm this insight – see Table C.3).

Table C.3 Dollar Bond Liquidity: Amihud & Bond Turnover

	(1)	(2)	(3)	(4)
	Amihud Price Impact		Bond Turnover	
US dollar (β_1)	1.71***	1.74**	-0.68***	-0.64***
	(0.63)	(0.65)	(0.21)	(0.21)
Observations	2110	1657	2110	1657
R squared	0.163	0.284	0.379	0.542
Firm FE	yes	no	yes	no
Day FE	yes	no	yes	no
Firm x Day FE	no	yes	no	yes

Note. The Amihud illiquidity measure estimates the price impact of trades on each day, and is defined as the daily average of absolute returns divided by the trade size (in millions) of consecutive transactions. Bond turnover is defined as the bond's total daily trading volume divided by the amount issued. Both measures are reported in percentage points. We focus on the Covid-19 period between February 28th and March 20th 2020. Robust standard errors clustered on the firm level are reported in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Coefficients corresponding to the constant, control variables and fixed effects not reported.

The results from this exercise show that transactions in dollar bonds had a larger price impact than transactions in non-dollar bonds (columns 1-2), and that the daily turnover of dollar bonds was lower than that of non-dollar bonds (columns 3-4).

C.4 Investor Domicile

Our granular transaction data can provide deeper insights into who was selling dollar bonds during the COVID-19 crisis. We now conduct a robustness test that examines the interaction between selling pressure in dollar bonds and investor domicile. Specifically, we re-estimate our baseline trading volume regressions with an indicator variable for US investors (i.e., entities whose legal address or headquarters are located in the United States), as shown in Table C.4. The results indicate that the selling pressure in our sample originates entirely from non-US investors. Consistent with our findings in section 4, these results suggest that non-US investors faced an urgent need for US dollars, likely to meet immediate dollar-denominated obligations.

Table C.4 Bond Trading Volumes and Investor Domicile

	(1)	(2)	(3)	(4)	(5)	(6)
	Net Volumes		Buy Volumes		Sell Volumes	
US dollar	-1.02***	-0.60***	-0.03	-0.02	0.98***	0.58***
	(0.23)	(0.07)	(0.08)	(0.12)	(0.25)	(0.06)
US dollar × US Investor	1.32***	1.25***	-0.08	-0.03	-1.40***	-1.27***
	(0.47)	(0.09)	(0.27)	(0.25)	(0.28)	(0.17)
Observations	7323	1444	7323	1444	7323	1444
R squared	0.390	0.770	0.573	0.810	0.234	0.752
# Investors	938	195	938	195	938	195
Firm FE	yes	no	yes	no	yes	no
Day FE	yes	no	yes	no	yes	no
Investor FE	yes	no	yes	no	yes	no
Firm × Day × Investor FE	no	yes	no	yes	no	yes

Note. Net volumes (in millions) are measured on the investor-day-bond level in the period between February 28th and March 20th. Buy (Sell) volume is equal to net volume if the given investor is a net buyer (seller) of investment grade bond b on day t, and zero otherwise. The indicator variable US Investor is equal to one if the legal address or the headquarter of the entity is located in the United States. Robust standard errors clustered at the issuer level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Coefficients corresponding to the constant, control variables and fixed effects not reported.

C.5 The Role of Dollar Liquidity Needs—Robustness

In section 4.1, we show that insurers with a higher proportion of dollar-denominated derivatives had significantly larger sell volumes during the pandemic-era market turmoil compared to insurers with fewer dollar-denominated derivatives. A potential concern with this finding is that the $DollarShare_j$ variable might also reflect selling pressure arising from the termination of FX hedges, as dollar hedgers would need to deliver US dollars to their derivative counterparties at contract maturity (see also Kubitza et al., 2024).

To address this concern, we re-run our regressions using an alternative definition of the $DollarShare_j$ variable. Specifically, we exclude contracts set to roll over during the crisis period (February 28 to March 20) from the calculation of $DollarShare_j$, so the revised variable better isolates the effect by reducing potentially confounding effects from selling pressure related to hedge terminations.

The results, shown in Table C.5, indicate that the effect remains highly significant, with an even larger coefficient than in Table 6. The larger magnitude of the effect is consistent with the notion that VM calls increase with the maturity of a FX derivative contract, as documented by Bardoscia et al. (2021). Overall, these findings suggest that the documented selling pressure is likely driven by VM calls on dollar-denominated derivatives rather than by terminations of FX hedging positions—which are more likely to have an impact over longer horizons (Kubitza et al., 2024).

Table C.5 USD DERIVATIVE CONTRACTS AND BOND SELLING PRESSURE EXCL. ROLL-OVER CONTRACTS

	(1)	(2)
	Sell Volume	
US dollar x Dollar share	22.70***	33.00***
	(2.87)	(10.33)
Observations	368	243
R squared	0.517	0.675
Investor FE	yes	yes
Bond FE	yes	yes
Day FE	yes	no
Firm × Day FE	no	yes

NOTE. Sell volumes (in millions) are measured on the investor-day-bond level for the period between February 28th and March 20th. *DollarShare* measures the share of dollar-denominated derivative contracts of investor j at the end of Q4 2019, excluding derivative contracts that expire during the Covid-19 market turmoil period. To facilitate the interpretation of the coefficients, we transform the variable by subtracting the cross-sectional average, before dividing it by the standard deviation. Robust standard errors clustered at the investor level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Coefficients corresponding to the constant and fixed effects not reported

C.6 Price Impact of ICPF Order Flow

In section 3.2, we established that the UK insurance companies and pension funds (ICPF) sold dollar bonds in larger quantities than non-dollar bonds during the COVID-19 crisis, more so than any other investor type. What remains unanswered is whether the ICPF sector's selling pressure contributed to the more pronounced spread increases of dollar bonds during this period. To answer this question, we estimate the following specification:

$$\Delta s^{Dollar}_{b,t+k} = \alpha + \alpha_i + \alpha_t + \beta_1 OrderFlow_{b,t} + \Gamma X_{b,t} + \varepsilon_{b,t+k} \tag{C.1}$$

where $\Delta s^{Dollar}_{b,t+k}$ is the change in the (option-adjusted) spread of dollar-denominated bond b issued by firm i, for contemporaneous spread changes and for longer horizons of five, ten and twenty trading days. $OrderFlow_{b,t}$ is defined as ICPFs' daily net volume in the given bond, divided by the bond's total daily trading volume across all investor types (measured on the bond-day level). $\Gamma X_{b,t}$ is defined in the same way as in specification (2). We also include firm and day fixed effects. To facilitate the interpretation of the coefficients, we again standardize $OrderFlow_{b,t}$.

Table C.6 ICPF Order Flow and Dollar Bond Spreads

	(1)	(2)	(3)	(4)
	$\Delta s_{b,t}$	$\Delta s_{b,t+5}$	$\Delta s_{b,t+10}$	$\Delta s_{b,t+20}$
ICPF Order Flow	-7.25**	-2.37	2.44	6.53
	(2.36)	(4.92)	(7.65)	(7.76)
Observations	85	85	85	85
R squared	0.628	0.630	0.788	0.891
Firm FE	yes	yes	yes	yes
Day FE	yes	yes	yes	yes

Note. ICPF order flow is measured on the bond-day level and defined as the ICPFs' daily net volume in the given bond, divided by the bond's total daily trading volume across all investor types. To facilitate the interpretation of the coefficients, we transform the variable by subtracting the cross-sectional average, before dividing it by the standard deviation. The dependent variable is the bond's spread change (in bps) from day t-1 to day t+k. Robust standard errors clustered on the firm level are reported in parentheses. *** p<0.01, ** p<0.05, * p<0.1. Coefficients corresponding to the constant, control variables and fixed effects not reported.

Table C.6 presents the results. We find that ICPFs' selling pressure contributed to the sharp spread increase: dollar bonds with a daily order flow of insurers and pension funds that is one standard deviation below average experienced a 7.3bps larger increase in spreads, which is equivalent to almost 50% of the total daily effect in the UK corporate bond market.[22]

A potential concern with this result is that ICPFs' trades might have been based on

[22] When replicating our baseline results with bonds traded in the UK corporate bond market, the baseline effect increases from around 8bps to 16bps. The results are presented in Table C.1.

fundamental information, rather than stemming from liquidity pressures. According to this hypothesis, we should see a longer-term underperformance of the bonds that were sold by these investors. As shown in column 3, however, the effect is fully reversed after ten trading days, emphasizing the non-fundamental nature of the sector's selling pressure. The results therefore strengthen our interpretation that ICPFs traded due to liquidity pressures rather than fundamental information.

D List of Unconventional Central Bank Interventions in March 2020

Table D.1 Central Bank Announcements

Date	ID	Policy	Announcement
09/03/2020	US	Lending operations	Beginning with today's operation and through March 12, 2020, the FRBNY's Open Market Trading Desk will increase the amount offered in daily overnight repo operations from at least $100 billion to at least $150 billion. In addition, the Desk will increase the amount offered in the two-week term repo operations on Tuesday, March 10, 2020 and Thursday, March 12, 2020 from at least $20 billion to at least $45 billion.
11/03/2020	GB	Lending operations	BoE introduces a Term Funding scheme with additional incentives for Small and Medium-sized Enterprises, financed by the issuance of central bank reserves. The scheme will offer four-year funding of at least 5% of participants' stock of real economy lending at interest rates at, or very close to, Bank Rate.
11/03/2020	US	Lending operations	Beginning Thursday, March 12, 2020 and continuing through Monday, April 13, 2020, FRBNY's Open Market Trading Desk will offer at least $175 billion in daily overnight repo operations and at least $45 billion in two-week term repo operations twice per week over this period. In addition, the Desk will also offer three one-month term repo operations, with the first operation occurring on Thursday, March 12, 2020. The amount offered for each of these three operations will be at least $50 billion.
12/03/2020	CA	Lending operations	To proactively support interbank funding, the Bank of Canada will temporarily add new Term Repo operations with terms of 6 and 12 months. These operations will occur bi-weekly starting with the first operation on Tuesday, 17 March 2020. The list of collateral eligible for term repos is extended to include the full range of collateral eligible under the Standing Liquidity Facility.
12/03/2020	CA	Asset purchases	Bank of Canada announces the expansion of its Bond Buyback Program, starting with $500 million purchase of 30-year bonds on 16.03. Until further notice, buybacks will extend across all benchmark maturity sectors and will be conducted at least weekly.
12/03/2020	EA	Lending operations	From June 2020 to June 2021 the interest rate on all TLTRO III operations outstanding will be 25 basis points below the average MRO rate. For counterparties that maintain their levels of credit provision, the rate applied in these operations will be lower, and, over the period ending in June 2021, can be as low as 25 basis points below the average DF rate. Moreover, the maximum total amount that counterparties will henceforth be entitled to borrow in TLTRO III operations is raised to 50% of their stock of eligible loans.
12/03/2020	EA	Lending operations	Additional longer-term refinancing operations (LTROs) will be conducted to provide immediate liquidity at favourable terms to bridge the period until the TLTRO III operation in June 2020.
12/03/2020	EA	Asset purchases	A temporary envelope of additional net asset purchases of €120 billion will be added until the end of the year, ensuring a strong contribution from the private sector purchase programmes. In combination with the existing asset purchase programme (APP), this will support favourable financing conditions for the real economy in times of heightened uncertainty. The Governing Council continues to expect net asset purchases to run for as long as necessary to reinforce the accommodative impact of its policy rates, and to end shortly before it starts raising the key ECB interest rates.
12/03/2020	US	Lending operations	FRBNY's Open Market Trading Desk has released a new monthly schedule of Treasury securities operations and has updated the current monthly schedule of repurchase agreement (repo) operations to address temporary disruptions in Treasury financing markets. Three-month and one-month repo operations for $500 billion will be offered on a weekly basis for the remainder of the monthly schedule. The Desk will continue to offer at least $175 billion in daily overnight repo operations and at least $45 billion in two-week term repo operations twice per week over this period.
12/03/2020	US	Asset purchases	As a part of its $60 billion reserve management purchases for the monthly period beginning March 13, 2020 and continuing through April 13, 2020, the FRBNY's Open Market Trading Desk will conduct purchases across a range of maturities to roughly match the maturity composition of Treasury securities outstanding. (Note: before the Desk was only purchasing shorter term bills, so they are now doing QE)
13/03/2020	CA	Asset purchases	The Bank of Canada (Bank) is announcing its intention to launch the Bankers' Acceptance Purchase Facility (BAPF). Starting the week of Monday, 23 March 2020 the Bank will conduct secondary market purchases of 1-month Bankers' Acceptances issued and guaranteed by any Canadian bank and of sufficiently high quality, broadly equivalent to a minimum short-term credit rating of R-1 (low).
13/03/2020	US	Asset purchases	FRBNY's Open Market Trading Desk announced that it would purchase later in the day roughly half of some $80 billion (60 +20 of reinvestments) in Treasury securities that it had said Thursday would be purchased over the next month. These purchases are intended to address highly unusual disruptions in the market for Treasury securities associated with the coronavirus outbreak.
15/03/2020	US	Foreign exchange	The Bank of Canada, the Bank of England, the Bank of Japan, the European Central Bank, the Federal Reserve, and the Swiss National Bank are announced a coordinated action to enhance the provision of liquidity via the standing U.S. dollar liquidity swap line arrangements. These central banks have agreed to lower the pricing on the standing U.S. dollar liquidity swap arrangements by 25 basis points, so that the new rate will be the U.S. dollar overnight index swap (OIS) rate plus 25 basis points. To increase the swap lines' effectiveness in providing term liquidity, the foreign central banks with regular U.S. dollar liquidity operations have also agreed to begin offering U.S. dollars weekly in each jurisdiction with an 84-day maturity, in addition to the 1-week maturity operations currently offered.

15/03/2020	US	Asset purchases	To support the smooth functioning of markets for Treasury securities and agency mortgage-backed securities that are central to the flow of credit to households and businesses, over coming months the Committee will increase its holdings of Treasury securities by at least $500 billion and its holdings of agency mortgage-backed securities by at least $200 billion. The Committee will reinvest all principal payments from the Fed's holdings of agency debt and agency MBS, into agency MBS.
15/03/2020	US	Lending operations	The Federal Reserve encourages depository institutions to turn to the discount window to help meet demands for credit from households and businesses at this time. In support of this goal, the Board today announced that it will lower the primary credit rate by 150 basis points to 0.25%. The Board also today announced that depository institutions may borrow from the discount window for periods as long as 90 days, prepayable and renewable by the borrower on a daily basis.
16/03/2020	AU	Lending operations	The RBA announced it will be conducting one-month and three-month repo operations in its daily market operations until further notice to provide liquidity to Australian financial markets. In addition the Bank will conduct longer term repo operations of six-months maturity or longer at least weekly, as long as market conditions warrant.
16/03/2020	CA	Lending operations	The Bank is announcing that it will broaden eligible collateral for its term repo facility to include the full range of collateral eligible under the Standing Liquidity Facility, with the exception of the non-mortgage loan portfolio.
16/03/2020	CA	Asset purchases	To provide support to the Canada Mortgage Bond (CMB) market, the Bank will purchase CMBs in the secondary market. As a starting point, the Bank will target purchases of up to $500 million per week. Operations will be conducted twice weekly and will continue for as long as market conditions warrant.
17/03/2020	GB	Asset purchases	HM Treasury and BoE announces launch a COVID-19 Corporate Financing Facility (CCFF). The CCFF will provide funding to businesses by purchasing commercial paper of up to one-year maturity, issued by firms making a material contribution to the UK economy.
17/03/2020	US	Lending operations	The Federal Reserve Board announced the establishment of a Primary Dealer Credit Facility (PDCF), offering overnight and term funding with maturities up to 90 days. It will be in place for at least six months. Credit extended to primary dealers under this facility may be collateralized by a broad range of investment grade debt securities, including commercial paper and municipal bonds, and a broad range of equity securities. The interest rate charged will be the primary credit rate (discount rate).
17/03/2020	US	Asset purchases	The Federal Reserve Board announced today the establishment of a Commercial Paper Funding Facility (CPFF). This facility will provide liquidity to CP issuers in the US though a SPV that will purchase highly rated (A1/P1) unsecured and Asset-backed CPs. The Fed will provide financing to the SPV under the CPFF, and its loans will be secured by the assets of the SPV. The Treasury provides a $10 billion protection in connection to the CPFF to the Fed.
18/03/2020	CA	Lending operations	To give institutions greater flexibility in managing their collateral, effective immediately, the Bank of Canada will allow Large Value Transfer System (LVTS) participants to temporarily assign 100 per cent of their non-mortgage loan portfolio (NMLP) as pledged collateral for the SLF. For LVTS participants who do not use their NMLP, effective immediately, these participants will be able to hold up to 100 per cent of their pledged collateral for the SLF in securities that are currently subject to concentration limits. In addition to this exceptional liquidity initiative, effective March 19, 2020, the Bank of Canada is increasing the target for the minimum daily level of settlement balances to $2 billion, from its current level of $1 billion.
18/03/2020	EA	Asset purchases	ECB decided to expand the range of eligible assets under the corporate sector purchase programme (CSPP) to non-financial commercial paper, making all commercial papers of sufficient credit quality eligible for purchase under CSPP, and to ease the collateral standards by adjusting the main risk parameters of the collateral framework.
18/03/2020	EA	Asset purchases	ECB decided to launch a new temporary asset purchase programme of private and public sector securities with an overall envelope of €750 billion. Purchases will be conducted until the end of 2020 and will include all the asset categories eligible under the existing asset purchase programme (APP). For the purchases of public sector securities, the benchmark allocation across jurisdictions will continue to be the capital key of the national central banks. At the same time, purchases under the new PEPP will be conducted in a flexible manner. A waiver of the eligibility requirements for securities issued by the Greek government will be granted for purchases under PEPP. The Governing Council will terminate net asset purchases under PEPP once it judges that the coronavirus COVID-19 crisis phase is over, but in any case not before the end of the year. ECB also decided to expand the range of eligible assets under the corporate sector purchase programme (CSPP) to non-financial commercial paper, making all commercial papers of sufficient credit quality eligible for purchase under CSPP, and to ease the collateral standards by adjusting the main risk parameters of the collateral framework.
18/03/2020	US	Lending operations	The Fed announced the establishment of a Money Market Mutual Fund Liquidity Facility (MMLF) which will make loans available to eligible financial institutions secured by high-quality assets purchased by the financial institution from money market mutual funds.
19/03/2020	AU	Foreign exchange	Federal Reserve announced the establishment of temporary U.S. dollar liquidity arrangements (swap lines) that will support the provision of U.S. dollar liquidity in amounts up to $60 billion each for the Reserve Bank of Australia, the Banco Central do Brasil, the Bank of Korea, the Banco de Mexico, the Monetary Authority of Singapore, and the Sveriges Riksbank and $30 billion each for the Danmarks Nationalbank, the Norges Bank, and the Reserve Bank of New Zealand. These U.S. dollar liquidity arrangements will be in place for at least six months.

19/03/2020	AU	Lending operations	RBA launched term funding facility for the banking system, with particular support for credit to small and medium-sized businesses. The Reserve Bank will provide a three-year funding facility to authorised deposit-taking institutions (ADIs) at a fixed rate of 0.25 per cent. ADIs will be able to obtain initial funding of up to 3 per cent of their existing outstanding credit. They will have access to additional funding if they increase lending to business, especially to small and medium-sized businesses. This facility is for at least $90 billion.
19/03/2020	AU	Asset purchases	RBA is setting a target for the yield on 3-year Australian Government bonds of around 0.25%. This will be achieved through purchases of Government bonds in the secondary market. Purchases of Government bonds and semi-government securities across the yield curve will be conducted to help achieve this target as well as to address market dislocations. These purchases will commence tomorrow.
19/03/2020	CA	Lending operations	The Bank of Canada is announcing the launch of its new liquidity facility, the Standing Term Liquidity Facility (STLF), effective March 30, 2020. Under the STLF, the Bank can provide loans to eligible financial institutions in need of temporary liquidity support and where the Bank has no concerns about their financial soundness.
19/03/2020	GB	Lending operations	BoE enlarges the Term Funding Scheme with additional incentives for SMEs (TFSME). The Initial Borrowing Allowance for the TFSME will be increased from 5% to 10% of participants' stock of real economy lending, based on the Base Stock of Applicable Loans.
19/03/2020	GB	Asset purchases	BoE increases its holdings of UK government bonds and sterling non-financial investment-grade corporate bonds by £200 billion to a total of £645 billion, financed by the issuance of central bank reserves.
19/03/2020	US	Foreign exchange	Federal Reserve announced the establishment of temporary U.S. dollar liquidity arrangements (swap lines) that will support the provision of U.S. dollar liquidity in amounts up to $60 billion each for the Reserve Bank of Australia, the Banco Central do Brasil, the Bank of Korea, the Banco de Mexico, the Monetary Authority of Singapore, and the Sveriges Riksbank and $30 billion each for the Danmarks Nationalbank, the Norges Bank, and the Reserve Bank of New Zealand. These U.S. dollar liquidity arrangements will be in place for at least six months.
20/03/2020	CA	Lending operations	The Bank is increasing the frequency of its Term Repo operations to at least twice a week starting Tuesday March 24, 2020.
20/03/2020	CA	Foreign exchange	The Bank of Canada, the Bank of England, the Bank of Japan, the European Central Bank, the Federal Reserve, and the Swiss National Bank are announcing a coordinated action to improve the swap lines' effectiveness in providing U.S. dollar funding by increasing the frequency of 7-day maturity operations from weekly to daily. The central banks also will continue to hold weekly 84-day maturity operations.
20/03/2020	CA	Lending operations	The Bank is announcing its intention to activate the Contingent Term Repo Facility (CTRF) by April 3rd to counter any severe market-wide liquidity stresses and further support the stability of the Canadian financial system. Upon activation, the CTRF would offer Canadian dollar term funding to eligible counterparties on a standing, bilateral basis.
20/03/2020	US	Foreign exchange	The Bank of Canada, the Bank of England, the Bank of Japan, the European Central Bank, the Federal Reserve, and the Swiss National Bank are announcing a coordinated action to improve the swap lines' effectiveness in providing U.S. dollar funding by increasing the frequency of 7-day maturity operations from weekly to daily. The central banks also will continue to hold weekly 84-day maturity operations.
23/03/2020	US	Asset purchases	The FOMC will purchase Treasury securities and agency mortgage-backed securities in the amounts needed to support smooth market functioning and effective transmission of monetary policy to broader financial conditions and the economy (ie unlimited). In addition, the FOMC will include purchases of agency commercial mortgage-backed securities in its agency mortgage-backed security purchases.
23/03/2020	US	Asset purchases	The FOMC announced the expansion of the Commercial Paper Funding Facility (CPFF) to include high-quality, tax-exempt commercial paper as eligible securities. In addition, the pricing of the facility has been reduced.
23/03/2020	US	Lending operations	The FOMC announced the expansion of the MMLF to include a wider range of securities, including municipal variable rate demand notes (VRDNs) and bank certificates of deposit.
23/03/2020	US	Asset purchases	The FOMC announced the establishment of the Primary Market Corporate Credit Facility (PMCCF) for new bond and loan issuance is open to investment grade companies and will provide bridge financing of four years. Borrowers may elect to defer interest and principal payments during the first six months of the loan, extendable at the Federal Reserve's discretion, in order to have additional cash on hand that can be used to pay employees and suppliers.
23/03/2020	US	Asset purchases	The FOMC announced the establishment of the Secondary Market Corporate Credit Facility (SMCCF) will purchase in the secondary market corporate bonds issued by investment grade U.S. companies and U.S.-listed exchange-traded funds whose investment objective is to provide broad exposure to the market for U.S. investment grade corporate bonds.
23/03/2020	US	Lending operations	The FOMC announced the establishment of the Term Asset-Backed Securities Loan Facility (TALF). Under the TALF, the Federal Reserve will lend on a non-recourse basis to holders of certain AAA-rated ABS backed by newly and recently originated consumer and small business loans. The Federal Reserve will lend an amount equal to the market value of the ABS less a haircut and will be secured at all times by the ABS.
23/03/2020	US	Lending operations	The Federal Reserve expects to announce soon the establishment of a Main Street Business Lending Program to support lending to eligible small-and-medium sized businesses, complementing efforts by the SBA.
24/03/2020	CA	Asset purchases	The Bank of Canada today announced a new program to support the liquidity and efficiency of provincial government funding markets. The Provincial Money Market Purchase (PMMP) program is an asset purchase facility that will acquire provincially-issued money market securities through the primary issuance market.

24/03/2020	GB	Lending operations	The Bank of England is today activating the Contingent Term Repo Facility (CTRF) - a temporary enhancement to its sterling liquidity insurance facilities. The CTRF will lend reserves for a period of three months. The price will be a fixed rate of Bank Rate plus 15bps.
27/03/2020	CA	Asset purchases	In order to support the continuous functioning of financial markets, the Bank of Canada is announcing the Commercial Paper Purchase Program (CPPP). The Canadian commercial paper (CP) market is a key source of short-term financing to support the ongoing needs of a wide range of firms and public authorities.
27/03/2020	CA	Asset purchases	To address strains in the Government of Canada debt market and to enhance the effectiveness of all other actions taken so far, the Bank will begin acquiring Government of Canada securities in the secondary market. Purchases will begin with a minimum of $5 billion per week, across the yield curve.
30/03/2020	GB	Lending operations	The Bank of England is today announcing that it will continue to offer the Contingent Term Repo Facility (CTRF) on a weekly basis through April 2020.
31/03/2020	US	Foreign exchange	The Fed announced the establishment of a temporary repurchase agreement facility for foreign and international monetary authorities (FIMA Repo Facility). It will allow FIMA account holders to enter into repurchase agreements with the Federal Reserve. In these transactions, FIMA account holders temporarily exchange their U.S. Treasury securities held with the Federal Reserve for U.S. dollars, which can then be made available to institutions in their jurisdictions.