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## **U.S. Dollar Currency Premium in Corporate Bonds**

by John Caramichael, Gita Gopinath, and Gordon Y. Liao

**I N T E R N A T I O N A L M O N E T A R Y F U N D**

# U.S. Dollar Currency Premium in Corporate Bonds

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We isolate a U.S. dollar *currency* premium by comparing corporate bonds issued in the dollar and the euro by firms outside the U.S. and euro area. We make several empirical observations that dissect the perceived advantage of borrowing in the dollar. First, while the dollar dominates global debt issuance, borrowing costs in the dollar are more expensive without a currency hedge and about the same with a currency hedge when compared to the euro. This observed parity in currency-hedged corporate borrowing stands in contrast to the persistent deviation from covered interest parity in risk-free rates. Second, we observe a dollar safety premium in relative hedged borrowing costs, found in the subset of bonds with high credit ratings and short maturities, attributes similar to those of safe sovereigns. Finally, we find that firms flexibly adjust the currency mix of their debt issuance depending on the relative borrowing cost between dollar and euro debt. In sum, the disproportionate demand for U.S. dollar debt is reflected in higher issuance volumes that drive up the currency hedged dollar borrowing costs such that at the margin they equate to euro borrowing costs.

*Keywords:* U.S. Dollar Dominance, Exorbitant Privilege, Exchange Rate, Global Corporate Debt, Covered Interest Rate Parity Deviation

*JEL Classifications:* E44, F31, F32, F41, G11, G15, G18, G20

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"The fact that many states accept dollars as equivalent to gold... in order to make up for the deficits of [the] American balance of payments has enabled the United States to be indebted to foreign countries free of charge. Indeed, what they owe those countries, they pay ... in dollars that they themselves can issue as they wish." (Charles de Gaulle, 1965)

It is long-held in international finance that the global financial architecture based on U.S. dollar hegemony bestows a special privilege to the United States and borrowers in dollar capital markets. Assessments of this "exorbitant privilege" have typically focused on the returns and yields on U.S. assets and liabilities at the country level ([Gourinchas, Rey, Govillot et al., 2010](#); [Lane and Milesi-Ferretti, 2007](#); [Eichengreen, 2011](#)). The privilege that the U.S. enjoys is then explained as either a unique attribute of the currency (the currency effect), or a result of the special qualities of its issuer, the U.S. (the country effect). In the latter paradigm, the U.S. acts as the "banker of the world" by providing liquidity transformation ([Kindleberger, 1965](#)) or as the "venture capitalist of the world" through risky investments backed by safe assets<sup>1</sup> ([Gourinchas and Rey, 2007](#)).

In this paper, we study the exorbitant privilege associated with the dollar through analyses on the prices and quantities of global corporate debt with denominations in the dollar and the euro. On the price side, we isolate the currency effect and assess the specialness of the dollar versus the euro for a unique set of securities — corporate debt issued by global firms outside the two currency regions. Examining the borrowing cost in this context provides a clean decomposition of the country versus the currency effects in their contribution to dollar dominance and currency specialness. This is because borrowers in "third-party" countries with access to international debt markets have a choice to denominate their debt in one of the two primary international currencies, the dollar or the euro, and this choice is

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<sup>1</sup>The safety of U.S. debt is supported by the relative strength of U.S. fundamentals, including the greater liquidity of U.S. Treasuries when global demand for safe assets is high ([He, Krishnamurthy and Milbradt, 2019](#)).

not influenced by the explicit or implicit backing of U.S. or euro area institutions, such as the U.S. Treasury.

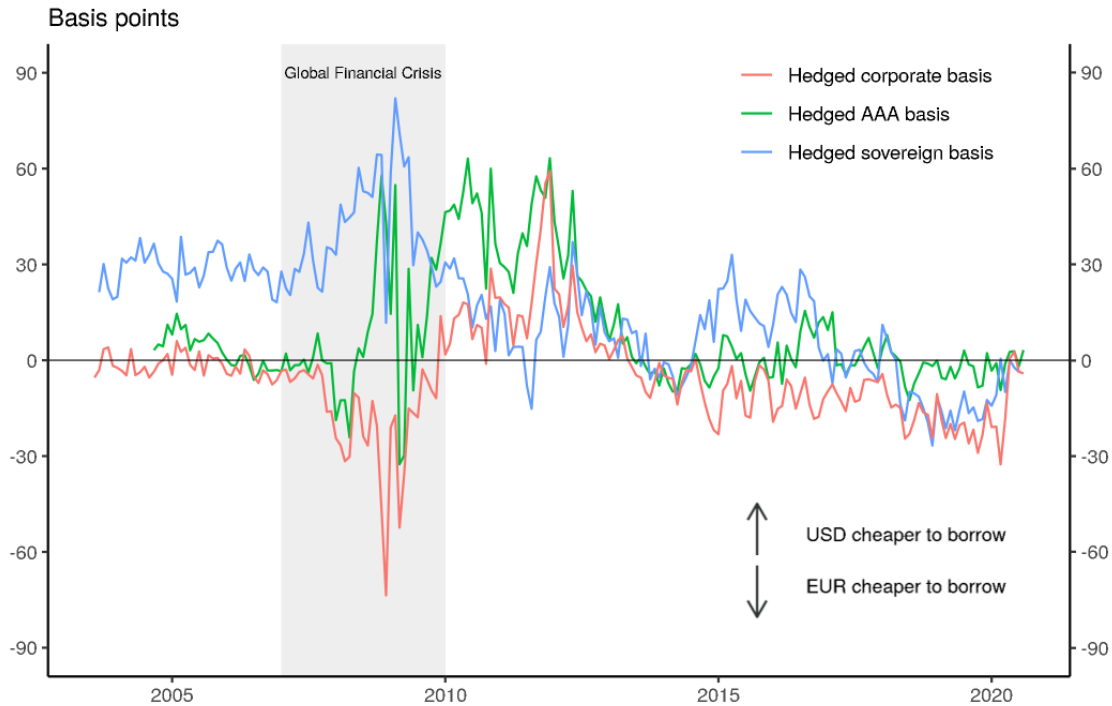
The relative price of these firms' dollar and euro debt, and their choice to issue in either currency, provides insight into the attractiveness of the dollar that is independent of sovereign risk and bias with respect to the local currency. This is especially true because we compare borrowing costs with and without a currency hedge. As currency hedging removes exchange rate volatility, the debt denomination choice more clearly reflects currency preference without exchange rate risk considerations.

Figure 1 highlights our key findings on the relative pricing of global debt. The sovereign hedged basis (blue line) is the currency-hedged relative borrowing cost in the euro versus the dollar for sovereigns absent of credit risk, constructed in a method consistent with the literature on sovereign premiums (e.g. [Du, Im and Schreger \(2018b\)](#); [Jiang, Krishnamurthy and Lustig \(2018\)](#)). This sovereign basis entangles the currency effect with the country effect. In contrast, we examine dollar and euro corporate bonds issued by firms outside the U.S. and euro area, and we construct the hedged corporate basis (red) that isolates the currency effect conditional on the same firm and bond characteristics. We also calculate the hedged corporate basis (green) for "safe" corporate bonds that are rated AAA to identify a dollar safety premium. These bases were distinctly different in earlier periods of the sample, but they have largely converged around zero in recent years.

On the quantity side, we revisit the canonical facts related to the size of the global dollar debt market relative to those of other major currencies. Combined with our observations on pricing, we find that the greater issuance of dollar debt, taken together with the observation of similar borrowing costs in currency-hedged dollar and euro debt, signals that the dollar's exorbitant privilege shows up more prominently in quantities of debt rather than pricing in global debt markets.

This paper documents several empirical facts on the global corporate bond market and the specialness of the dollar. First, we find that while the dollar dominates in the quantity

Figure 1: EUR-USD hedged corporate and sovereign relative borrowing costs



The hedged corporate basis is the currency-hedged relative borrowing cost for the full sample of corporate bonds issued by firms in third-party countries. The hedged AAA basis is the currency-hedged relative borrowing cost calculated for the subsample of bonds with the highest credit rating. The hedged sovereign basis is the currency hedged yield differential between German bunds and U.S. Treasuries. The 5-year maturity is chosen to match the median maturity in the sample of corporate bonds.

of debt issuance, it is generally not cheaper at the margin to issue debt in the dollar. On a currency unhedged basis, the yield on dollar bonds is on average 103 basis points higher than the yield on euro bonds, after controlling for firm and bond characteristics. Most of this difference can be attributed to differences across risk-free rates in our sample period between 2003 and 2020. However, after we use currency hedging instruments to strip away the differences in risk-free rates, we find that credit spreads on euro bonds are about the same or slightly lower than credit spreads on dollar bonds, as indicated by the hedged corporate basis in Figure 1. We argue that this reflects the disproportionate demand for

U.S. dollar corporate debt, where high dollar issuance volumes drive up currency hedged dollar borrowing costs so that at the margin it costs about the same to borrow in the euro.

Furthermore, the observed parity in currency-hedged corporate borrowing costs in the euro and the dollar indicates that the covered interest rate parity (CIP) condition mostly holds in the global corporate bond market, despite observed CIP deviations for risk-free benchmarks (Du, Tepper and Verdelhan, 2018a). This may indicate the importance of banking regulations in driving the CIP deviations in money markets that are notably absent for large global firms and global investors in credit markets.

Second, we document a dollar safety premium for a subset of corporate bonds with characteristics of safe sovereign bonds — high ratings and short maturities. For these "safe" corporate bonds, the currency-hedged yield of dollar bonds is typically lower than that of similar euro bonds. This observed premium for dollar bonds possibly indicates a residual demand for safety or convenience of dollar assets that has been observed in sovereign bonds.<sup>2</sup> Figure 1 shows the comparison of "safe" corporate basis (green) and sovereign basis (blue). The dollar safety premium was particularly large during the Global Financial Crisis and the European debt crisis. More recently during the COVID-19 market turmoil of March and April 2020, however, this measure of dollar safety premium did not increase.<sup>3</sup>

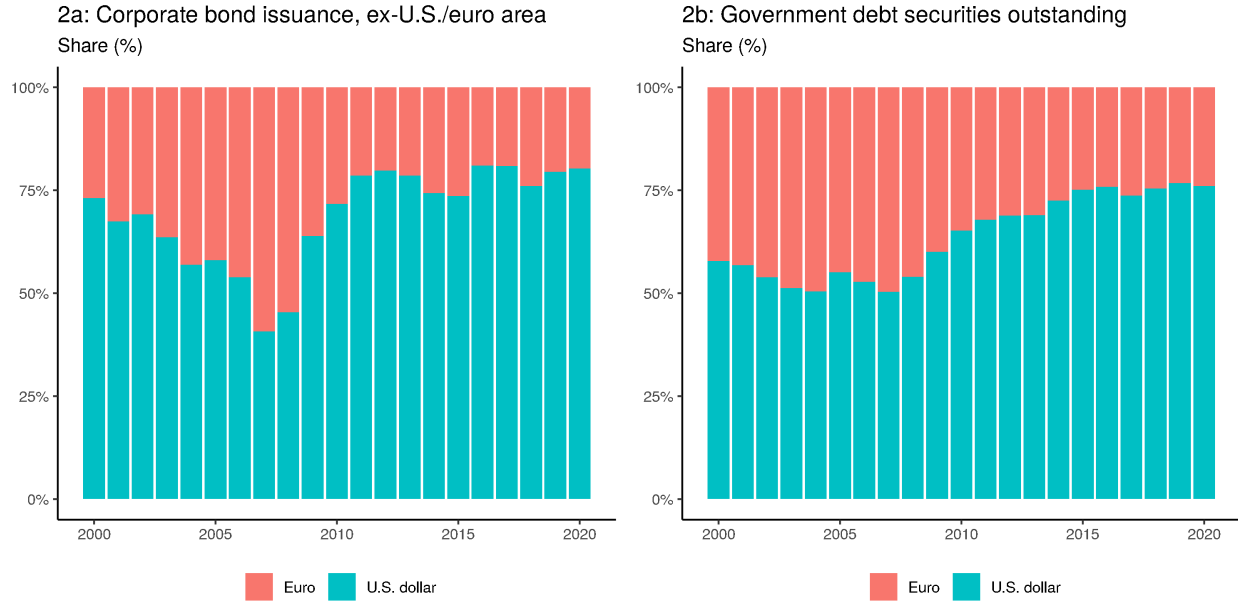
Third, we find that global firms actively switch their issuance to the cheaper currency for borrowing on both a currency hedged and unhedged basis. This type of issuance currency optimization and the associated arbitrage of CIP deviations is studied in-depth in Liao (2020), which uses a sample of firms issuing debt in their home and foreign currencies. This paper focuses on firms in "third party" countries in assessing the benefits of issuing in the U.S. dollar. Understanding the behavior of these global firms helps us assess the extent of the entrenchment of dollar hegemony as firms seek a lower borrowing cost between

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<sup>2</sup>See, for instance, Du et al. (2018b), Jiang et al. (2018).

<sup>3</sup>The absence of a safety premium in the corporate bond market during the COVID-19 market selloff likely reflected a "dash for cash" that led to investors selling safe and risky bonds alike for dollar cash. For instance, He, Nagel and Song (2021) discuss the emergence of a Treasury inconvenience yield due to the unusually large demand for dollar cash during the COVID-19 market turmoil.

Figure 2: Global corporate and government debt in the euro and dollar



Panel A shows the share of new bond issuance in the euro and U.S. dollar by firms whose ultimate parent nationality is outside of the U.S. and Eurozone. The sample is from 2000 to 2020 at an annual frequency, using the Dealogic bond issuance dataset. Panel B shows the share of government securities outstanding in the euro and U.S. dollar. Dollar securities are those issued by the United States. Euro securities are those issued by one of the six "core" euro area sovereigns: Austria, Belgium, Finland, France, Germany and the Netherlands. The sample is from 2000 to 2020 at an annual frequency, from the Bank for International Settlements debt securities database.

international currencies. This optimization behavior of firms allows the relative borrowing cost to stay roughly on par between the euro and the dollar. Additionally, the active choice of debt denomination ensures that a greater amount of dollar debt is issued to meet the larger demand for dollar debt.

We combine our price analysis with observations on debt issuance levels in the two currencies to evaluate the dollar currency premium. Given the relatively large size of dollar corporate and sovereign bond issuance compared to euro bond issuance (as shown in Figure 2), the fact that currency hedged borrowing rates are mostly equalized suggests a large demand for dollar bonds all else equal. This is in line with the arguments in [Gopinath and](#)

[Stein \(2018\)](#). That is, the exorbitant privilege of the U.S. dollar shows up mainly as larger dollar debt issuance relative to euro debt issuance in equilibrium.

In terms of methodology, we leverage a dataset with a large panel of global corporate bond secondary market prices and bond attributes. To quantify the currency effect, we remove fundamental differences in credit risk by selecting on bonds issued by large, global firms that issue in multiple currencies and control for differences in firm risk and bond rating and maturity. We regress the unhedged and hedged borrowing costs on a set of covariates in the cross-section at each observation date. This methodology isolates the currency fixed effects in borrowing cost as a time series.

This paper contributes to several streams of literature. A number of papers have studied the exorbitant privilege of the U.S. dollar ([Gourinchas et al., 2010](#); [Curcuro, Dvorak and Warnock, 2008](#); [Gourinchas and Rey, 2007](#); [Eichengreen, 2011](#)). Earlier papers have documented a special privilege that the U.S. enjoyed in borrowing cheaply and investing in foreign assets with higher returns ([Gourinchas et al., 2010](#); [Lane and Milesi-Ferretti, 2007](#); [Eichengreen, 2011](#)). [Gourinchas and Rey \(2007\)](#) highlights the unique balance sheet structure of the U.S. serving as "venture capitalist" of the world. [Curcuro et al. \(2008\)](#) noted that the differences in returns earned by U.S. investors in foreign assets versus those earned by foreign investors in U.S. assets might not be as large as previously documented. Relative to this work, we take a granular approach in carefully constructing measures of relative borrowing costs that capture the specialness of the U.S. dollar while controlling for country and other fundamentals.

Our paper is also related to a strand of literature on the dominance of the U.S. dollar in trade and finance. [Gopinath and Stein \(2018\)](#) studies the synergistic relationship between the usage of the U.S. dollar in financing and invoicing. [Gopinath, Boz, Casas, Díez, Gourinchas and Plagborg-Møller \(2020\)](#) studies the key features of dominant currency paradigm. This paper focuses on understanding the pricing differences for dollar-denominated debt and euro-denominated debt by third party issuers in global capital markets.



Finally, our paper relates to recent work that has examined U.S. sovereign safety premium and convenience yield relative to those from other countries. [Du et al. \(2018b\)](#); [Jiang et al. \(2018\)](#) noted the specialness of the dollar in global sovereign yields. Compared to earlier work, we dissect the specialness in borrowing cost by focusing on global firms in "third-party" countries that regularly borrow in both the dollar and the euro, thus isolating the currency effect from sovereign and country effects.

The paper proceeds as follows. Section 1 discusses the methodology for measuring the cost differentials of dollar and euro debt. Section 2 describes the data for the empirical analyses. Section 3 discusses the overall result comparing the cost of borrowing in the dollar versus the euro for global firms outside of the two currency regions. Section 4 focuses the analysis on the subset of bonds that exhibit qualities of safety and demonstrates a safety premium for safe dollar bonds. Section 5 discusses firms' role in actively choosing the currency of issuance and equilibrating the marginal cost of debt. The behavior of issuers supports our overall finding that firms issue more in the dollar to meet the greater demand for dollar bonds, thereby equilibrating the cost of borrowing.

## 1 Methodology

### **Unhedged relative borrowing cost**

We calculate the relative borrowing cost for global firms issuing dollar- and euro-denominated bonds using two large panels of secondary market bond yield and price data. The bonds in our sample are issued by firms located in third countries outside of the two currency regions. Note that our calculation of the borrowing cost in the global bond market relies on secondary market yields as a proxy for the cost of issuance in the primary market. The underlying assumption is that if a firm were to issue a bond on a given observation date, it would be issued at a yield that does not deviate much from the yield curve of the firm's outstanding debt trading on that observation date. While there can be some spread between the primary

and secondary market, our assumption is that the spread is small for large global firms with strong access to capital markets and large, liquid issuances, and that this spread does not vary systematically by the currency of denomination (Fridson and Gao, 1996; Gabbi and Sironi, 2005).

As an illustrative example, Petrobras, a Brazilian oil firm, has bonds outstanding in the euro and the dollar that are *pari passu* with the same legal standings. We compare the secondary market bond yields from the euro-denominated bonds and dollar-denominated bonds while controlling for maturity and rating differences between the bonds. Additionally, we calculate the currency hedged yield difference between the euro- and dollar- denominated bonds by adjusting the bond yield difference by the cost of currency swaps used for hedging. Through a cross-sectional regression methodology, we control for the firm fixed effect in addition to other bond-level observables, thus isolating the difference in bond yields due to currency denomination alone.

More concretely, to calculate the unhedged yield differential, we assume that the nominal exchange rate follows a random walk. This implies that the exchange rate in expectation is unchanged. This assumption allows us to compare the yields in the euro versus the dollar directly. We estimate the following regression at each date  $t$ <sup>4</sup>

$$y_{it} = \alpha_t \mathbb{1}_{EUR,i} + \beta_{ft} + \gamma_{mt} + \delta_{rt} + \epsilon_{it}. \quad (1)$$

$y_{it}$  is the yield for bond  $i$  traded in the secondary market at time  $t$ .  $\alpha_{EUR,t}$  is the coefficient on the indicator variable  $\mathbb{1}_{EUR,i}$ , which equals one if bond  $i$  is denominated in the euro.  $\beta_{ft}$ ,  $\gamma_{mt}$  and  $\delta_{rt}$  are fixed effects for firm  $f$ , maturity bucket  $m$  and rating bucket  $r$  at date  $t$ . The regressions are estimated in the cross-section at each date  $t$ . The estimated coefficient  $\hat{\alpha}_t$  is the euro minus dollar yield differential at time  $t$  controlling for other factors. In alternative

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<sup>4</sup>In this regression, and in the regression in Equation 4, the data is winsorized on the dependent variable with a 95% window at each month to control for outliers.

regressions, we also include other controls such as bond liquidity proxies and bond price volatility in the regression. These additional factors do not have material impact on  $\hat{\alpha}_t$ .

### Hedged relative borrowing cost

To calculate the currency hedged borrowing cost differential, we calculate a FX-hedged yield differential. The objective is to measure a corporate covered interest rate parity basis  $\psi$  (deviation from covered interest rate parity), defined as the FX-hedged bond yield differential between euro- and dollar-denominated bonds:

$$\psi_t \equiv \underbrace{(y_t^\epsilon - y_t^\$)}_{\text{risky yield diff.}} + \underbrace{(f_t - s_t)}_{\text{forward premium}}, \quad (2)$$

where  $y_t^\epsilon$  and  $y_t^\$$  are risky euro- and dollar-denominated bond yields, and  $f_t$  and  $s_t$  are forward and spot exchange rates at time  $t$ .

As currency forwards are less liquid at greater than one year to maturity, we construct the corporate basis with currency swaps, which are more liquid than forwards for maturities greater than one year. By subtracting the risk free rates  $r_t^\epsilon$  and  $r_t^\$$  from Equation 2, we can rewrite  $\psi_t$  as

$$\psi_t = \underbrace{(y_t^\epsilon - r_t^\epsilon)}_{\text{€ credit spread}} + \underbrace{[r_t^\epsilon - r_t^\$ + (f_t - s_t)]}_{\text{cross-currency basis}} - \underbrace{(y_t^\$ - r_t^\$)}_{\text{\$ credit spread}}. \quad (3)$$

This decomposition allows us to measure the corporate basis by using observable market prices of the cross-currency basis swap and the euro and dollar risk-free rates. The currency basis is also known as the covered interest rate parity deviation based on risk-free rates.

In Equation 3,  $\psi_t$  is then the difference between the CIP-adjusted euro credit spread (the first two terms) and the dollar credit spread (the last term). Empirically, we are able to measure each of these two terms. We define and calculate a CIP-adjusted credit spread for

each bond  $i$  in currency  $c$  as

$$S_{it}^{FXhedged} \equiv y_{it} - r_t^c + \mathbb{1}_{EUR,i} [r_t^{\text{€}} - r_t^{\text{\$}} + (f_t - s_t)], \quad (4)$$

where  $r_t^c$  is the euro or dollar risk-free rate.<sup>5</sup>

To estimate the currency effect, we then regress each bond's CIP-adjusted credit spread  $S_{it}^{FXHedged}$  on the same set of covariates as in Equation 1:

$$S_{it}^{FXHedged} = \alpha_t \mathbb{1}_{EUR,i} + \beta_{ft} + \gamma_{mt} + \delta_{lt} + \epsilon_{it} \quad (5)$$

This regression approach enables us to measure the currency-hedged relative borrowing cost  $\psi_t$ , which is estimated as  $\hat{\alpha}_t$ . [Liao \(2020\)](#) provides additional details on this method of estimating the corporate basis.

## 2 Data

### Monthly bond price dataset (2003-2020)

Secondary market bond yields at the monthly level are sourced from Bloomberg. The sample consists of euro- and U.S. dollar-denominated fixed- and zero-coupon non-callable corporate bonds with at least \$50 million in notional value and at least one year to maturity. We only consider bonds issued by firms based outside the U.S. and euro area.

To construct the sample, we first exclude bonds whose issuer's country of risk is in the United States or euro area.<sup>6</sup> We then narrow down the sample to include only bonds where the issuer has a qualifying bond trading in both currencies at some point in the sample period.

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<sup>5</sup>We linearly interpolate the risk-free rate curve and the cross-currency basis curve to match to the maturity of each bond at each observation date  $t$ .

<sup>6</sup>The Bloomberg field "country of risk" is a proprietary variable primarily based on four firm characteristics: country of management's domicile, country of primary listing, country of largest revenue and reporting currency.

We also exclude supranationals such as regional development banks. The final result is a dataset of 3,452 bonds issued by 172 firms. The sample period is August 2003 to September 2020. Table 1 provide summary statistics for the dataset, and Table 2 provides a breakdown of the dataset by country.

INSERT Table 1

### **Daily bond price dataset (2014-2020)**

Additionally, we supplement the monthly bond data with daily secondary market bond prices from Bloomberg's BVAL database. This data set has a shorter sample period from January 2014 to September 2020 but more granularity at the daily level. Using the prices, we estimate the yield of each bond with its duration and coupon rate. The bond prices are a mixture of quoted prices and evaluated prices calculated by Bloomberg's proprietary evaluated pricing service BVAL. This evaluated data is high-quality and is routinely used for regulatory purposes, and its depth allows for a deeper sample over a shorter time period. The bonds are selected and filtered in the same manner as the monthly bonds. The final dataset consists of 4,485 bonds issued by 190 firms. Table 3 provides summary statistics of the monthly bond dataset.

INSERT Table 3

The bonds in our datasets are issued by some of the largest global firms outside of the U.S. and euro area. They are headquartered in a diverse set of geographies and industries. As global corporate issuers, the debt of these firms often have pari passu clauses that put the bonds on equal legal footing despite differences in currency denomination. Though there might be other idiosyncrasies with respect to covenants or disclosure requirements, as long as these idiosyncrasies do not systematically vary with the currency of denomination, they would not bias the result of our estimation for the currency effect.

## Bond issuance: Dealogic (2000-present)

We source bond issuance data from Dealogic. We include only bonds with a maturity at issuance greater than one year, where the issuer's nationality is outside the U.S. and euro area.<sup>7</sup> The coverage consists of 82,185 euro- and dollar-denominated bonds issued from 2000 to 2020. The sum notional value of this dataset is \$12.4 trillion, with \$8.8 trillion issued in the dollar and \$3.6 trillion issued in the euro.

### 3 Relative borrowing cost

Our first empirical finding is that the U.S. dollar dominates in the quantity of global corporate issuance but it does not generally offer lower yields for borrowers. Figure 2 shows that the issuance share of dollar bonds has been much higher than euro bonds for firms in "third-party" countries for the majority of the past two decades since the introduction of the euro. While the euro's share of issuance steadily grew and briefly surpassed the dollar's share through the mid-2000s, this trend was sharply reversed during the onset of the GFC and the European sovereign debt crisis. Since then, about 75% of euro and dollar corporate issuance outside the U.S. and euro area has been denominated in dollars. This rise of the dollar usage during the post-GFC period has been noted by other papers such as [Maggiori, Neiman and Schreger \(2019\)](#).

We show that the higher issuance of dollar-based debt does not correspond with a lower cost of funding in the dollar for global borrowers. Figure 3 shows the unhedged and hedged relative borrowing costs constructed following Equation 1 and Equation 5, plotted monthly from August 2003 to September 2020. Between the launch of the euro and the global financial crisis, the unhedged basis widened to about -180 basis points (positive indicating cheaper dollar borrowing cost), while the hedged basis stayed just under zero. Following the crisis,

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<sup>7</sup>"Nationality" is a Dealogic field similar to Bloomberg's "country of risk", taking into account a firm's business operations, headquarters, revenue and other factors.

the unhedged basis steadily fell as far as -320 basis points, before rising in 2019 and quickly tightening to about -100 basis points during the onset of COVID-19. The hedged corporate basis, despite dipping in March 2020, has otherwise held consistently close to zero.

INSERT FIG 3

We can quantify the aggregated borrowing cost difference over the length of the sample period using Fama-Macbeth regressions, which present the average cross-sectional regression coefficient over the sample period. Table 4 shows the regression result with the euro-currency indicator variable and other covariates. The table summarizes the results from the time series plotted in Figure 3. On average, the hedged borrowing costs between the two currencies are similar — column 1 shows that the euro coefficient is -5.5 basis points and not significant at the 5% level. In contrast, the unhedged borrowing cost difference substantially favors the euro. On average, the euro borrowing cost is 103 basis points less than the dollar borrowing cost as shown in column 2.

The similarity in yields for hedged corporate debt is key to understanding dollar dominance as it demonstrates that the much larger issuance of dollar debt is met with sufficient demand such that the cost of issuance is similar between the two currencies on the margin. Previous research on the role of the dollar and exorbitant privilege often compares country-level yields and returns. This approach mixes the currency effect and country-level structural or sovereign effects. By comparing bonds of global corporate borrowers denominated in different currencies, we are able to better measure a direct effect of denominating debt in the U.S. dollar holding other fundamentals the same.

INSERT TABLE 4

### **3.1 The impact of global dollar shortages during Covid-19 market turmoil**

In addition to the general observation of the similarity in dollar and euro hedged borrowing costs, we find that during times of severe dollar shortages, global firms can experience a

higher borrowing cost in the dollar from a flight-to-safety effect. Figure 4 shows the relative borrowing cost and credit spreads during the onset of the COVID-19 episode in early 2020. During the financial stress of March 2020, the relative borrowing cost between dollar and euro bonds plummeted, with the dollar borrowing cost becoming 100 basis points more expensive than the euro borrowing cost on a hedged basis. In Panel A we see the hedged relative borrowing cost drop by about 100 basis points, before rebounding to slightly above its previous level and stabilizing by June 2020. In Panel B, we find these movements in the relative borrowing cost primarily reflects the asymmetric moves in credit spreads on dollar and euro bonds. During this period, the dollar credit spread spiked sharply upwards relative to the euro credit spread and remained elevated through mid-April.

INSERT FIG 4

The uneven movement in credit spreads was most likely driven by the sudden stop in dollar funding, which exacerbated the sell-off in dollar-denominated securities in a "dash for cash". A similar rise in the relative borrowing cost in the dollar can be seen during the global financial crisis (Figure 3), during which dollar funding markets seized up as investors sold risky dollar bonds for safe assets.

### **3.2 Comparison to benchmark CIP deviations**

In Figure 3, we see that CIP mostly held in the corporate debt market. This stands in contrast with the persistent CIP deviations in risk-free rates, indicating a dollar funding shortage. In Figure 5, we compare the hedged corporate basis with the 5-year benchmark CIP deviation. The deviation from CIP is measured with the cross-currency basis swap, a



market instrument for measuring the cross-currency basis that is more liquid than FX swaps at longer tenors.<sup>8</sup>

INSERT FIG 5

After the onset of the GFC, benchmark CIP deviations have been persistently positive for the dollar against the euro, indicating that it has been expensive to swap euro into dollar. This positive CIP basis in money markets indicates possible financial constraints and a shortage of dollar funding in the money market. In contrast, the hedged corporate basis has fluctuated between negative and positive.

The decoupling of the CIP deviations in corporate bond market and risk-free rates may indicate that the CIP deviation in money markets is related to bank balance sheet frictions, as previously studied by [Du et al. \(2018a\)](#). Related to this distinction, ([Liao and Zhang, 2020](#)) finds that international investment imbalances can explain the cross-section of risk-free CIP deviations — investors in net saver currency regions, like Japan or the euro zone, make currency hedged investments abroad. This investment imbalance requires investors to swap their home currency into dollars in order to invest in dollar assets, resulting in a consistent demand pressure on the cross-currency basis. However, banking regulations limit the ability of arbitrageurs to enter into these swaps as counterparties, which limits the availability of funding and results in a persistent deviation in the cross-currency basis towards dollar shortage ([Du et al., 2018a](#)). This effect is especially pronounced during quarter-end and year-end periods in short tenors, when large banks pare back their FX derivative exposures in order to avoid regulatory penalties like the GSIB surcharge in the United States.

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<sup>8</sup>We measure the CIP deviation in risk-free rates with the cross-currency basis  $b$ , which is defined as the difference between the actual risk-free rate and the risk-free rate implied by foreign exchange contracts:

$$b = (f - s) - s \left( \frac{1 + r^{\$}}{1 + r^{\text{€}}} - 1 \right). \quad (6)$$

$f$  is the forward exchange rate,  $s$  is the spot rate and  $r^{\$}$  and  $r^{\text{€}}$  are the LIBOR rates in the dollar and euro for a given tenor.

In contrast to persistent deviations in CIP in money markets, the hedged corporate basis indicates a general parity between the dollar and the euro borrowing costs when currency hedged. Our finding suggests that global firms are more effective at arbitraging borrowing rate differentials in international debt markets than banks are in arbitraging in the global money market. This observation is bolstered by our finding in Section 5: Issuer currency choice, where we find that firms actively switch their issuance to the cheaper currency.

In this context, it is understandable why the benchmark risk-free CIP deviation and the hedged corporate basis moved in opposite directions during the GFC. During the GFC, the benchmark CIP deviation was positive, indicating a shortage for dollar funding and hedging in money markets. The hedged corporate basis was negative, indicating that the global dollar bond market was much more distressed than the global euro bond market, after adjusting for the cost of FX hedging. Both of these measures indicate a stressed dollar funding condition, with the former focusing on money markets, and the latter focusing on credit markets.

The two bases, however, do not necessarily have to be negatively correlated. Taking a stylized version of Equation 2, we essentially have

$$\text{Hedged corporate basis} = \underbrace{(y_t^\epsilon - r_t^\epsilon)}_{\text{\$ credit spread}} - \underbrace{(y_t^\$ - r_t^\$)}_{\text{\$ credit spread}} + \text{Risk-free CIP deviation}. \quad (7)$$

So in times of severe dollar funding distress, while the benchmark risk-free CIP deviation may rise, the hedged corporate basis can be either positive or negative, depending on the relatively magnitude of the dollar credit spread, the euro credit spread and risk-free CIP deviations.

## 4 Dollar safety premium

Our second set of empirical findings is that corporate bonds with characteristics of safety – a high rating and short maturity – have a cheaper borrowing cost in the dollar. In Figure 6, we aggregate the bonds by rating and plot the hedged relative borrowing cost.<sup>910</sup>

INSERT FIG 6

We find that bonds with a high rating have a cheaper relative borrowing cost in the dollar than in the euro. This is especially true during the GFC, the European sovereign debt crisis and the onset of COVID-19 in March 2020. During the GFC, the AAA corporate basis peaked at about 50 basis points, while the basis for lower-rated corporates sank as low as 100 basis points. Similarly, the gap in the relative hedged borrowing cost between AAA bonds and BBB bonds widened to about 150 basis points during the European sovereign debt crisis. And during the onset of COVID-19, the BBB corporate basis plunged as low as -75 basis points at the end of March 2020. It should be noted that this only partially reflects the severity of the gap during March 2020, as the monthly bond yield uses month-end data. Using our daily data, we find that the BBB basis plunged as low as -175 basis points, with the AAA basis falling to only -50 basis points.

We also separate the bonds by maturity in Figure 7. We find that dollar borrowing is relatively cheaper than euro borrowing for shorter maturities. During the GFC, we find that the corporate basis for longer tenors sunk as low as -225 basis points, while the basis for short maturities stayed roughly zero. Following the GFC, the basis for longer tenors is persistently negative, while the basis for short maturities is zero or positive. As with Figure 6, we find that the lack of price action during March 2020 is because the monthly data reflects month-end yields. Using the daily price dataset, we find that the basis for 10+ year

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<sup>9</sup>Ratings are sourced from Moody's and S&P.

<sup>10</sup>For this figure, we exclude junk bonds (a small fraction of the sample).

bonds sank as far as -225 basis points, while the basis for 1-3 year bonds slid to only about -75 basis points.

INSERT FIG 7

Additionally, we compare the hedged relative borrowing cost for all bonds with the hedged relative borrowing cost for AAA bonds and the 5-year hedged sovereign basis. This comparison is presented in Figure 1. The sovereign basis is the currency hedged yield differential between 5-year German bunds and U.S. Treasuries. We use the 5-year maturity for the sovereign basis because the median maturity in our corporate bond sample is 5 years. This is otherwise known as the Treasury premium against bunds. [Du et al. \(2018b\)](#) details the behavior of a set of Treasury premiums calculated using G10 currencies and sovereign yields of varying maturities. The sovereign basis as defined here is typically positive, indicating a dollar safety premium for U.S. Treasuries relative to German bunds, and the AAA corporate basis is typically higher and more often positive than the broad corporate basis. The sovereign basis and AAA corporate basis also exhibit similar patterns of cheaper dollar borrowing costs during periods of global financial stress – the GFC and onset of COVID-19.

## 5 Issuance currency choice

Our final empirical finding is that global firms flexibly adjust the currency mix of their debt liabilities at the margin, based on the hedged and unhedged relative borrowing costs. In Table 5, we approximate the firm-level hedged and unhedged basis by taking the difference between each firm’s euro and dollar bond yield and CIP-adjusted credit spread. We then regress the monthly dollar issuance share for each firm on the firm-level hedged basis, unhedged basis, and dollar issuance share in the previous period. This regression model reflects the fact that the relative borrowing cost is determined in equilibrium with the quantity of issuance in either currency.

## INSERT TABLE 5

We find that for global firms, a cheaper relative borrowing cost in the dollar corresponds to a higher dollar share of issuance. This is especially true for the relative hedged borrowing cost. In regression (1), we see that with time fixed effects a 1 basis point increase in the hedged basis is associated with a 0.91 percentage point increase in the dollar issuance share. Likewise, in regression (4), we see that with firm fixed effects, a 1 basis point increase in the hedged basis is associated with a 0.50 percentage point increase in the dollar issuance share. When controlling for both the hedged and unhedged basis in regression (6), this increases to 0.86 percentage points.

The strength of the coefficients on the relative hedged borrowing cost may reflect the fact that currency hedging is an integral part of corporate foreign currency borrowing for large global firms with strong access to debt markets. However, it is likely that not all global firms rely on financial instruments to hedge against their currency risk, as some have natural hedges in the form of future cash flows denominated in those currencies. For example, under the petrodollar system, oil is priced almost exclusively in the U.S. dollar. Global oil firms then receive most revenue in dollars, so they do not need to hedge currency risk when issuing dollar debt. Overall, the results suggest that firms are actively responding to variations in borrowing cost differences between the dollar and the euro debt capital market, arbitraging the price fluctuations away from the rough parity in hedged borrowing.

## 6 Conclusion

In this paper, we document several new facts related to the dominance of the U.S. dollar in the global capital market using a detailed comparison of global corporate bond prices.

We find that the costs of comparable corporate debt in the dollar and the euro are similar after the cost of exchange rate hedges, even though it has been more costly to borrow in the dollar on a currency unhedged basis. However, a dollar premium is observed in a subset

of bonds with the highest credit quality and shortest maturities, resembling safe sovereign bonds. Finally, global corporate borrowers flexibly adjust their borrowing cost by switching between issuing in the euro and the dollar depending on the cost of issuance.

Our results suggest that the dominance of the U.S. dollar and the exorbitant privilege it confers in the form of lower borrowing costs for relatively "safe" dollar-denominated assets, like U.S. Treasuries or, in our paper, AAA-rated corporates have not been exhausted at the margin despite much larger issuance. However, setting aside sovereign and "quasi-sovereign" debt, it appears that this privilege may have been exhausted at the margin for FX-hedged corporate debt. That is, while the aggregate demand curve for risky dollar debt lies to the right of the demand curve for risky euro debt, the size of dollar issuance is so much greater than the size of euro issuance that at the margin their price is equalized. This appears to be the case in the global corporate debt market where large issuers actively arbitrage fluctuations from this rough parity in price.

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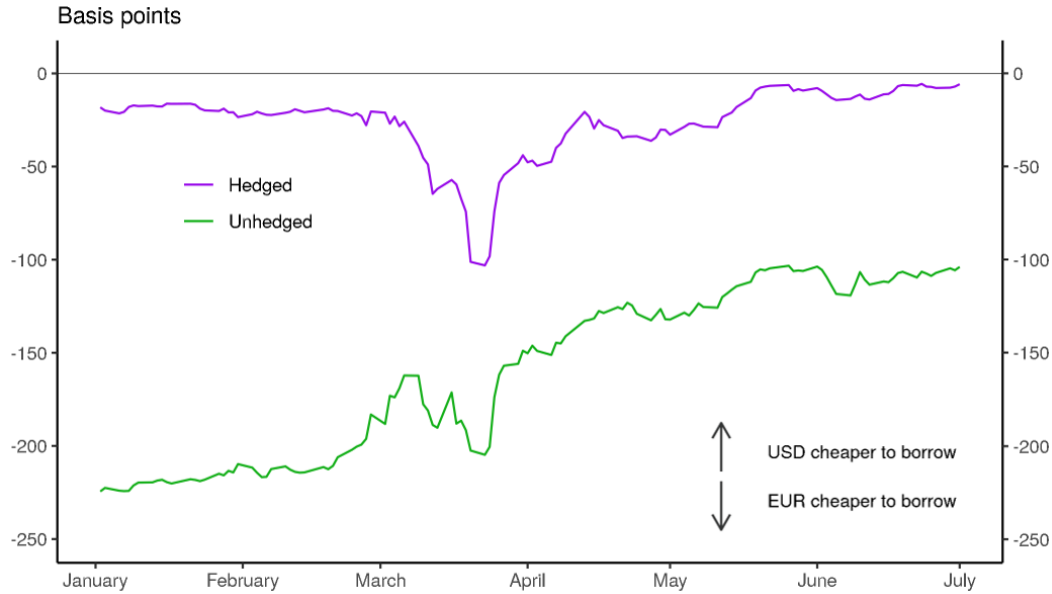
Figure 3: EUR-USD relative borrowing cost



The hedged and unhedged relative borrowing cost between euro- and dollar-denominated bonds. A positive value indicates that euro-denominated bonds have a higher borrowing cost. The sample is from 2003 to 2020 at a monthly frequency, using the monthly bond dataset.

Figure 4: Credit markets during COVID-19

4a: EUR-USD relative borrowing cost



4b: Credit spread by currency

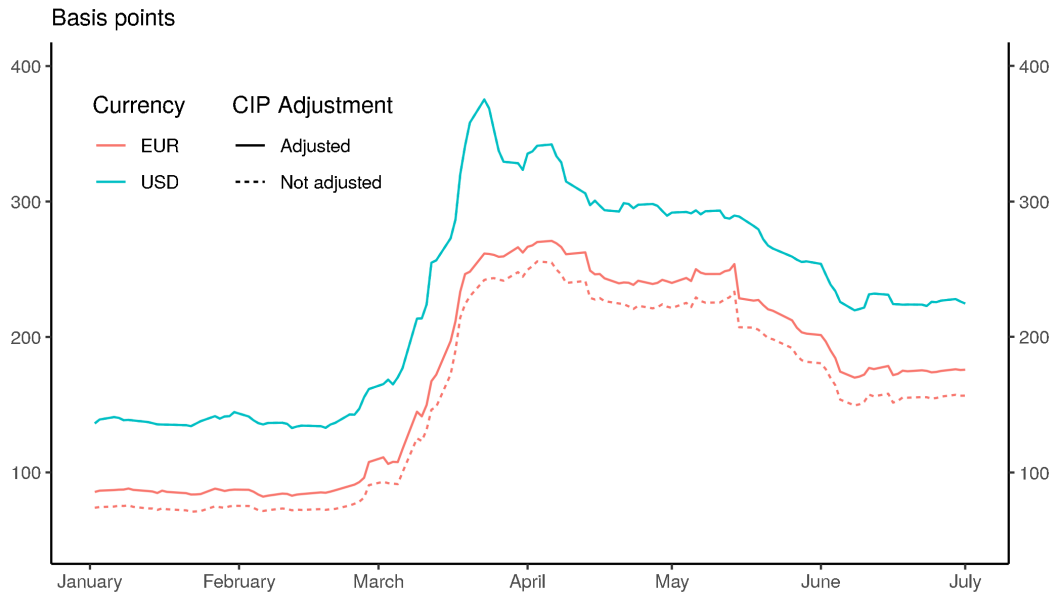
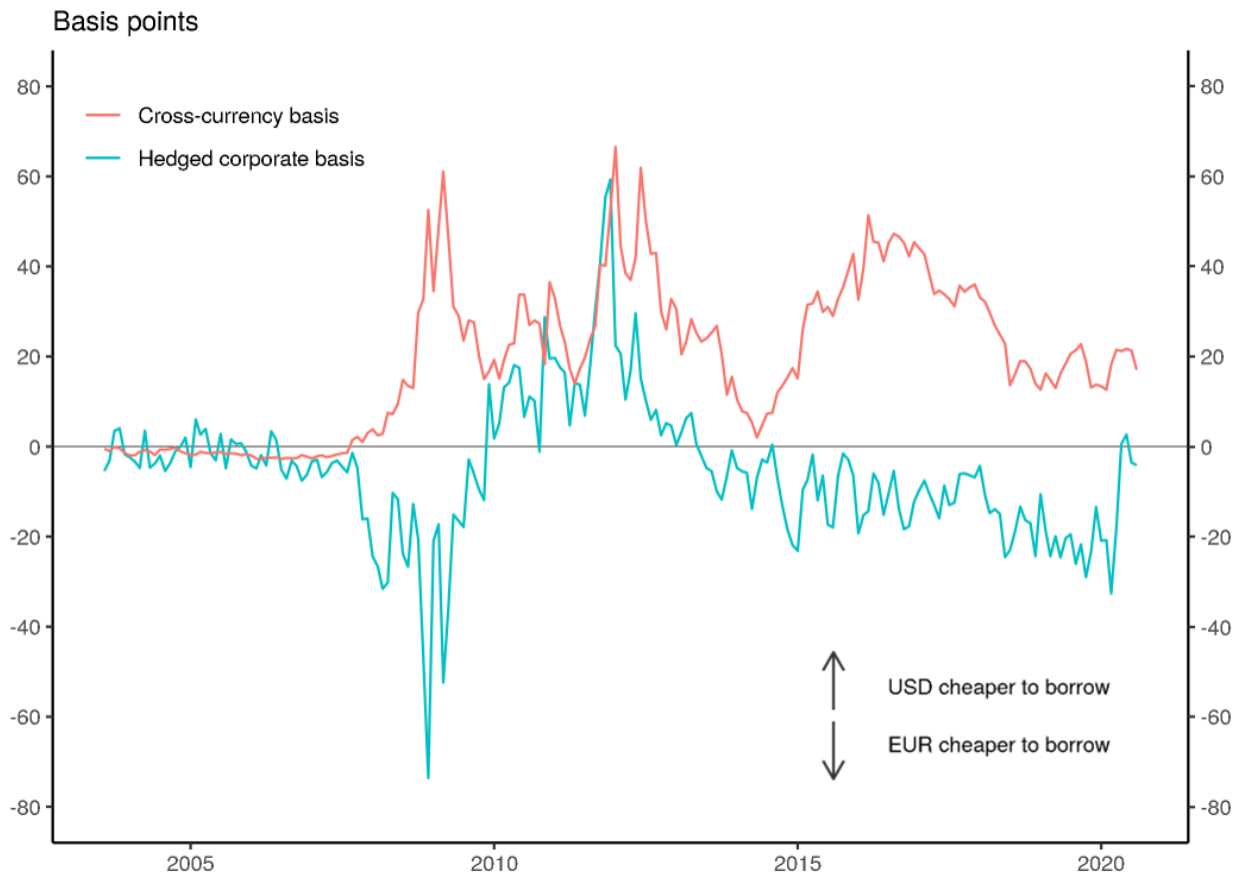


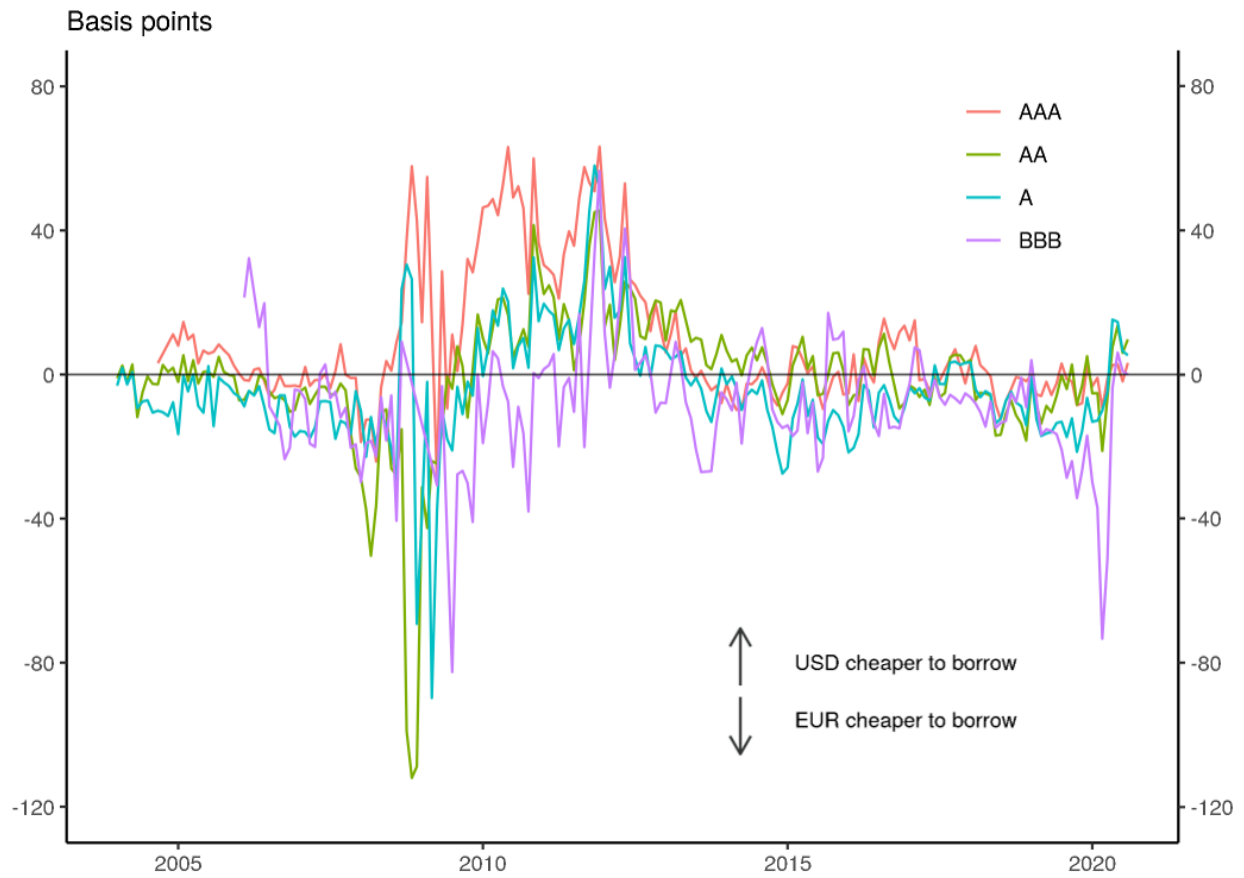
Figure 4a is the hedged and unhedged relative borrowing cost during COVID-19. Figure 4b is the median of the firm-level median credit spread for euro- and dollar-denominated bonds. The euro credit spread is both adjusted and not adjusted for the euro’s CIP deviation relative to the U.S. dollar. The sample is from January 2020 to June 2020 at a daily frequency, using the daily bond dataset.

Figure 5: Comparison to the cross-currency basis



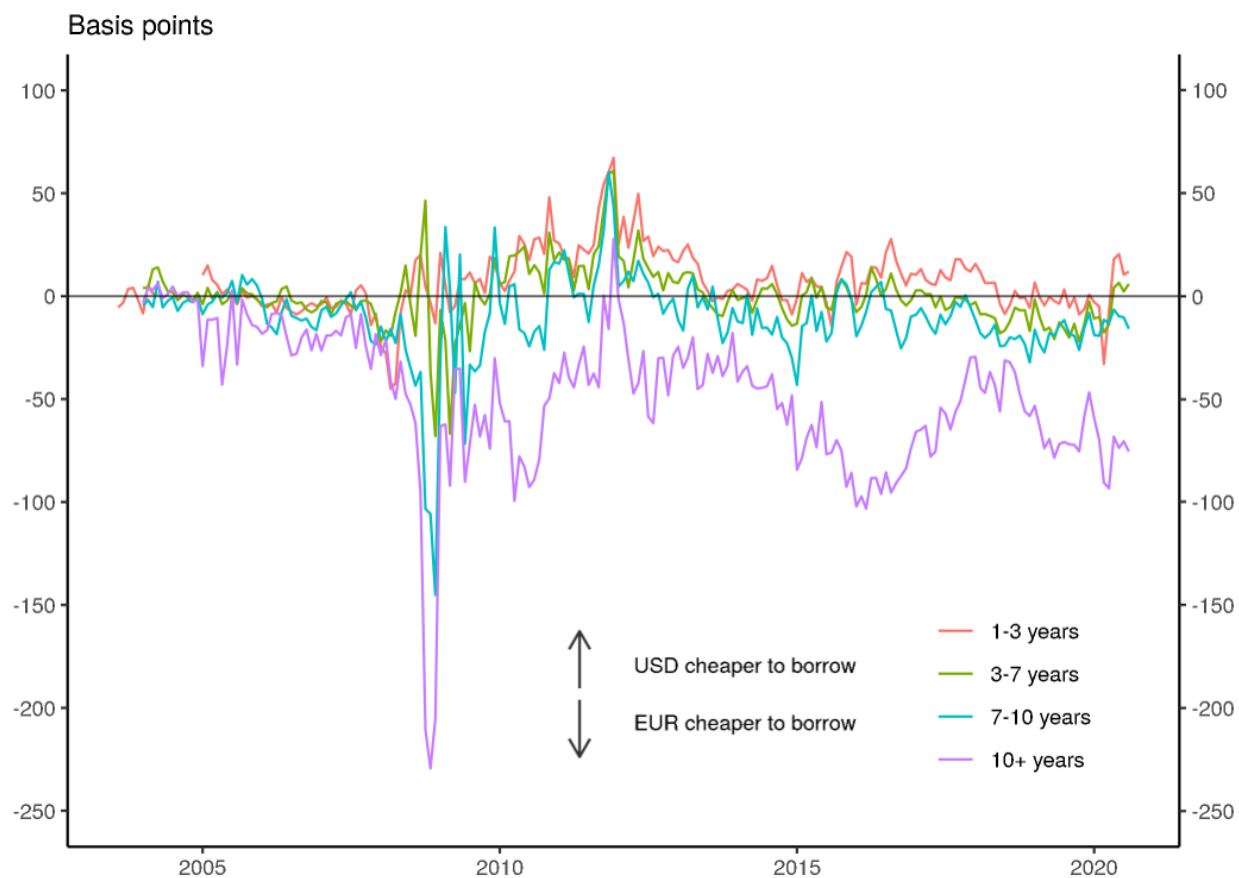
The hedged relative borrowing cost for corporate bonds, compared to the cross-currency basis. The cross-currency basis is the 5-year EUR-USD LIBOR basis, given by the mid price of the cross-currency basis swap, sourced from Bloomberg.

Figure 6: EUR-USD hedged relative borrowing cost by rating



The hedged relative borrowing cost for bonds bucketed by bond rating. The sample is from 2003 to 2020 at a monthly frequency, using the monthly bond dataset.

Figure 7: EUR-USD hedged relative borrowing cost by maturity



The hedged relative borrowing cost for bonds bucketed by years to maturity. The sample is from 2003 to 2020 at a monthly frequency, using the monthly bond dataset.

Table 1: Monthly bond data summary statistics by currency

	All bonds			USD			EUR		
	Median	Mean	SD	Median	Mean	SD	Median	Mean	SD
Not. amt.	750.0	878.4	582.2	887.0	975.1	650.1	664.8	716.9	397.0
Maturity	5.0	7.6	5.8	5.0	7.8	6.8	7.0	7.3	3.7
<i>N</i> per firm	9.0	20.1	25.6	6.0	12.8	17.5	3.0	7.4	10.6
<i>N</i>	3,452			2,184			1,268		

Summary statistics for the monthly bond dataset. The variables are the notional amount (\$ billion), number of bonds per ultimate parent and the maturity at issuance (years). The statistics reported are the median, mean and standard deviation. The sample period is from August 2003 to September 2020 at a monthly frequency. Data is sourced from Bloomberg.

Table 2: Monthly bond data summary statistics by country

Country	Amt. issued	Bonds	Firms
United Kingdom	748.1	836	30
Australia	417.4	523	15
Canada	340.9	314	8
Japan	319.5	417	12
Switzerland	237.7	236	12
Sweden	176.0	197	7
China	138.4	236	24
Norway	115.4	136	7
Brazil	98.7	72	5
Mexico	69.7	104	2
Russia	67.1	93	8
U.A.E.	41.1	56	5
Singapore	24.1	37	7
Israel	22.5	17	1
India	19.8	34	5
Other	195.9	144	24
<i>Total</i>	3,032.3	3,452	172

Summary statistics for the monthly bond dataset by country. The variables are the amount issued (billion U.S. dollars), number of bonds and number of firms by country.

Table 3: Daily bond data summary statistics by currency

	All bonds			USD			EUR		
	Median	Mean	SD	Median	Mean	SD	Median	Mean	SD
Not. amt.	750.0	879.6	680.1	750.0	895.1	683.5	724.9	834.5	668.4
Maturity	5.0	6.9	6.1	5.0	7.0	6.6	5.1	6.4	4.5
<i>N</i> per firm	12.0	23.6	27.9	8.5	17.8	22.4	2.0	6.1	8.7
<i>N</i>	4,485			3,341			1,144		

Summary statistics for the daily bond dataset. The variables are the notional amount (\$ USD), number of bonds per ultimate parent and maturity at issuance (years). The statistics reported are the median, mean and standard deviation. The sample is from January 2014 to September 2020 at a daily frequency. Data is sourced from the Bloomberg BVAL database.



Table 4: Fama-Macbeth Regression of Borrowing Costs and Returns

	(1) Hedged cost	(2) Unhedged cost
Euro	-5.551* (3.185)	-102.7*** (24.55)
4-6 years	28.23*** (3.003)	62.81*** (10.11)
7-9 years	54.29*** (5.002)	140.3*** (15.91)
10+ years	87.38*** (7.779)	218.3*** (22.67)
AA	42.83*** (8.027)	42.99*** (8.691)
A	65.91*** (15.09)	65.97*** (16.20)
BBB	94.01*** (17.84)	96.23*** (18.64)
High yield	132.9*** (28.52)	135.5*** (30.00)
Not rated	74.13*** (14.98)	78.50*** (15.97)
Firm FE	✓	✓
$N$	135,210	134,986
$R^2$	0.864	0.922

Firm clustered standard errors in parentheses.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Fama-Macbeth regression of the unhedged yield, hedged corporate basis and log return of each bond on their currency, maturity and rating. The data is winsorized on the dependent variable with a 95% window at each month to control for outliers. The sample is from 2003 to 2020 at a monthly frequency using the monthly bond dataset.

Table 5: Firm-level issuance flows

	USD share of issuance (%)					
	(1)	(2)	(3)	(4)	(5)	(6)
Hedged basis	0.091*** (0.018)		0.053* (0.027)	0.050** (0.024)		0.086*** (0.024)
Unhedged basis		0.060*** (0.011)	0.033* (0.018)		-0.007 (0.011)	-0.022* (0.013)
USD share $t_{-1}$	0.237*** (0.024)	0.234*** (0.023)	0.233*** (0.024)	0.094** (0.038)	0.094** (0.036)	0.090** (0.035)
Time FE	✓	✓	✓			
Firm FE				✓	✓	✓
$N$	2,682	2,679	2,666	2,682	2,679	2,666
Adjusted $R^2$	0.103	0.103	0.105	0.206	0.202	0.209

Clustered standard errors in parentheses. Standard errors are clustered on the fixed effect variable.

\*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

Regression of monthly firm-level dollar share of issuance on the firm-level hedged and unhedged corporate basis, controlling for the dollar share of issuance at  $t - 1$ . The dollar share of issuance is the dollar share of euro and dollar issuance from a given firm over the monthly period. We exclude bonds with less than one year to maturity at issuance. The firm-level hedged and unhedged basis is the difference between a firm's median euro and median dollar bond yield or hedged credit spread. The sample is from 2003 to 2020 at a monthly frequency. The hedged and unhedged corporate bases are calculated using the monthly bond dataset. The dollar share of issuance is calculated using data sourced from Dealogic.