Fickle Emerging Market Flows, Stable Euros, and the Dollar Risk Factor*

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Abstract

Policymakers fear the potentially destabilizing impact of fickle global investors on emerging markets. Euro area investors are significant participants in emerging bond markets and exhibit volatile flows, but their fickleness does not result in indiscriminate periods of surge and flight. Instead, we find differentiation based on currency denomination and issuer-level risk factors. First, euro area investors exhibit a strong home currency bias that manifests itself both as a cross-sectional preference and in the form of relatively stable flows to Euro-denominated bonds over time. Second, volatile flows to USD and local-currency-denominated bonds are most robustly related to fluctuations in the broad dollar exchange rate. Investors differentiate among USD-denominated bonds based on balance sheet factors (and credit ratings) such that flows to currency mismatched (and less creditworthy) sovereigns and corporates are more sensitive to the broad dollar. In contrast, differentiation by issuer-level characteristics is less apparent for local currency bonds suggesting investors are primarily concerned with currency rather than issuer-specific credit risk for this asset class.

Key words: global risk; capital flows; global financial cycle; US dollar; exchange rates; currency mismatch; portfolio choice; spillovers; emerging market bonds; securities holdings statistics; home currency bias.

JEL codes: E52, F21, F3, F31, F32, G11, G15.

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1. Introduction

Academics and policymakers are increasingly concerned about the possibility of global factors inducing a boom-bust cycle on capital flows to emerging market economies (EMEs). Prominent expositions of global spillovers include the global financial cycle (Rey 2013, 2016), the risk-taking channel of monetary policy (Bruno and Shin 2015a; Chari, Dilts-Stedman and Lundblad 2021), and the dollar risk factor (Avdjiev et al. 2019a; Krishnamurthy and Lustig 2019; Adrian and Xie 2020).

Much of the literature on the transmission of global financial shocks points to a special role for the US dollar (USD). A significant relationship between the dollar, cross-border flows, and several measures of risk aversion has been documented (Lilley et. al. forthcoming; Hassan et al. 2021). To better understand the mechanisms driving international spillovers researchers have turned to disaggregated data sources. For example, Avdjiev et al. (2020) document significant and often countervailing differentiation between public and private debt flows. And Hassan et al. (2021) study the impact of global and country-specific risk on capital flows, exchange rates, and firm-level behavior. Yet most studies examine aggregate flows at the country level and lack data on currency denomination. In this study we employ security-level data to analyze the degree to which cross-border investors differentiate based on currency denomination and issuer-level risk factors.

We contribute to the evolving understanding of global spillovers by analyzing euro area (EA) investors' participation in EME bond markets. We utilize the Securities Holdings Statistics (SHS) from the European System of Central Banks, which provide high quality security-level data on EA investment in EME bonds. The

dataset allows for several novel and important contributions. First, by focusing on EA investors we offer an alternative perspective relative to the primarily US-centric literature (McQuade and Schmitz 2019). For example, we evaluate whether USD dominance extends to European holdings of EME bonds. Second, we use the transactions component of SHS to analyze gross flows over the sample period 2013:Q4-2020:Q1 which includes important variation in global factors including major fluctuations in the USD and a global financial shock related to the Covid-19 pandemic. Third, the data set allows us to identify currency denomination and other security or issuer-level characteristics of EME bonds held by EA investors. As a result, we provide a novel analysis of investor decisions with, essentially, a three-dimensional currency choice: Euro v. USD v. local-currency-denominated bonds. Perhaps most importantly, we uncover significant heterogeneity in the response of European investment to global factors based on currency denomination and issuer-level risk factors.

We begin our study by providing a descriptive summary of EA investment in EME bonds. In the aggregate we find EA investors are prominent participants in EME bond markets, and for some countries EA portfolio weights approach ICAPM allocations. We take advantage of the granular nature of our data by providing a security-level cross-sectional analysis of EME bond holdings as of 2019:Q4. Contrary to the dollar dominance literature, but consistent with previous findings of a home currency bias, we find EA investors exhibit a strong preference for Euro-denominated bonds (Boermans and Vermeulen 2016; Burger, Warnock, and Warnock 2018; Maggiori, Neiman, and Schreger 2020). In fact, when trying to explain the extent to which EA investors hold a particular EME bond, we show it is

more important to consider the currency denomination of the bond rather than the issuing country or location of issuance.

We next turn to an investigation of how EA investors adjust their EME bond holdings over time. Remarkably, given our focus on European investors, we find the broad (trade-weighted) USD is the most robust covariate with aggregate flows to EME bonds. This result is consistent with the USD acting as an indicator for global risk appetite, based on the dollar's role during "flight to safety" episodes. We proceed to leverage our security-level data to discern differentiation by currency and issuer-level risk characteristics with the goal of shedding light on potential mechanisms for the dollar risk factor. Specifically, we consider three categories of risk characteristics: currency returns, balance sheet factors, and credit risk.

We find important differentiation by currency denomination. Flows to USD and local-currency denominated bonds are sensitive to the broad dollar but flows to EUR-denominated bonds appear insulated from the dollar risk factor. The relative stability of flows to EUR-denominated bonds adds a new element to previous cross-sectional studies of home currency bias. The lack of direct currency risk and a clustering of investment in highly rated (creditworthy) issuers likely explains the stability of flows to EUR-denominated bonds.

In sharp contrast to EUR-denominated bonds, currency risk is of first order importance for investment in local-currency-denominated bonds. Consistent with the literature's finding that EME currencies load heavily on global risk factors, we find flows to local-currency EME bonds are highly sensitive to the broad USD. Within the subset of local-currency bonds we fail to find significant differentiation by issuer-level risk characteristics. Currency risk appears to dominate concerns about

issuer-specific credit risk and leads to general flight from EME local currency bonds during periods of reduced risk appetite.

For USD-denominated bonds we find significant investor differentiation by issuer-level characteristics which provides further evidence on the mechanisms of the dollar risk factor. First, we find evidence that investors differentiate based on credit ratings and risk spreads. Flows to the most creditworthy sovereigns and corporates appear immune from the dollar risk factor. Second, consistent with the importance of a balance sheet mechanism, we find that flows to EME sovereigns with large foreign currency debt burdens and/or low reserve balances experience flows that are most sensitive to the broad USD. Further evidence in favor of the balance sheet mechanism is found in flows to private sector bonds. Sensitivity of flows to the broad USD is significant for corporates in non-tradable sectors but not for firms in "hard-currency" sectors. Importantly, the results indicate that global "risk-off" shocks do not induce indiscriminate flight from all EME bonds, rather EA investors differentiate based on currency and issuer-level risk characteristics.

We conclude with a case study of the Covid-19 shock to global financial markets during 2020:Q1. As expected, we observe aggregate outflows from EME bonds in response to the global shock, but the currency breakdown is informative. Outflows were concentrated in local currency bonds suggesting currency mismatches on USD-denominated bonds were not of first order concern to EA investors. And flows to EUR-denominated bonds were quite stable providing further evidence of a home currency bias even in the face of a large global shock.

The paper proceeds as follows. Section 2 provides a descriptive view of EME bond holdings by EA investors and Section 3 presents cross-sectional analysis.

Section 4 includes panel analysis of bond flows at the aggregate level while Section 5 investigates the role of the broad USD using issuer-level data. Section 6 presents a case study of the Covid-19 shock and Section 7 concludes.

2. Euro area investors' EME bond portfolio

We use bond-level portfolio holdings data aggregated across all 19 euro area countries from the Securities Holding Statistics (SHS) database compiled by the European System of Central Banks (ESCB). The data are collected by central banks through direct reporting by investors and indirect reporting by custodians, mainly for households. Each position is identified with a unique International Securities Identification Number (ISIN) and recorded at market value. Our focus is on bonds rather than short term money market instruments, so we include only holdings of securities with original maturity greater than one year. The data are collected on a quarterly basis and we use holdings and transactions data over the period 2013:Q4-2020:Q1.

The holdings are merged with reference data on bonds from the ESCB Centralized Securities Database (CSDB). We obtain the country of the issuer based on residency principle, an indicator for government bonds, coupon type, the residual maturity, the nominal amount outstanding and the currency of denomination. In addition, we retrieve from the CSDB the bond prices and yields. Short positions are dropped as well as bonds with an amount outstanding of less than 5 million euros. We use the constituency list of the JP Morgan GBI-EM Global

Diversified Index (based on openness of local currency bond markets) to define our baseline sample of 19 emerging market economies.[1]

Although we focus our analysis on euro area investment in EME bonds, for context, Table 1 provides a broad overview of the EA bond portfolio over the period 2013:Q4 – 2020:Q1. Table 1 confirms the finding in the literature (see e.g. Koijen et al. 2017 and Bergant, Fidora, and Schmitz 2020) that during this period of unconventional ECB policy European investors decreased their portfolio weight on home bonds (from 80% to 72.5%) and increased the weight on US bonds (from 4.6 to 8.0%). Less attention has been paid to the fact that the portfolio shift by EA investors into foreign bonds also includes a significant increase in EME bond holdings. Figure 1 displays increased holdings across currency denominations and suggests that EA investors' holdings of EME bonds are relatively evenly distributed across USD, EUR, and local-currency-denominated bonds, with a trivial amount of other currency denominations. Over our sample total EA holdings of EME bonds increased from 278 billion to a pre-Covid peak of 442 billion (as of 2019:Q4) which represents an increase in the EME portfolio weight from 2.0% to 2.4%.[2]

A 2.4% portfolio weight on EME bonds might appear modest, but relative to the size of EME bond markets these positions are quite significant. In an ICAPM

[1] Our baseline emerging market sample includes Argentina, Brazil, Chile, Colombia, Czech Republic, Dominican Republic, Hungary, Indonesia, Malaysia, Mexico, Peru, Philippines, Poland, Romania, Russia, South Africa, Thailand, Turkey and Uruguay. As a robustness check (see online Appendix Table A2) we consider a much broader sample based on the JP Morgan EMBIG constituency list, but for the additional countries most bonds are USD-denominated and in many cases there are barriers to cross-border investment in local bond markets. Therefore, we proceed with the smaller GBI-EM sample as our baseline.

[2] These figures for total holdings of EME bonds are likely somewhat understated as they exclude bonds issued by EMEs via offshore financial centers and indirect holdings through non-EA funds. Table 5 in Coppola et al. (2021) suggests EA investors hold a non-trivial quantity of offshore bonds that can be traced back to entities in Brazil, Russia, and South Africa.

world investors would hold securities in proportion to their weight in the global market portfolio. We know from the home bias literature that investors tend to overweight domestic securities and underweight foreign securities. For example, the EA portfolio weight of 72.5% on home bonds far exceeds the weight of European bonds in the global bond market. One way to evaluate portfolio positions relative to ICAPM allocations is to calculate the ratio of investors' portfolio weights to global market weights as employed frequently in the home bias literature (e.g. Ahearne, Griever, and Warnock 2004):

(1) $$Relative\ Weight\ on\ EME\ bonds = \frac{EA\ port\ wgt\ on\ EME\ bonds}{Mkt\ wgt\ of\ EME\ bonds} = \frac{EA\ holdings\ of\ EME\ bonds/total\ EA\ bond\ portfolio}{EME\ bond\ Mcap\ /global\ bond\ market}$$

For example, as of 2019:Q4, EME bonds represented 2.4% of the EA bond portfolio while the EME bond markets in our sample made up roughly 4.7% of the global bond market.[3] We therefore calculate a relative weight of 0.52, indicating EA investors held EME bonds at approximately half of ICAPM weights. Repeat the calculation for US bonds and we find a relative weight of 0.25 (8.1% portfolio weight relative to 32% global market weight). These calculations indicate that once we account for the relative size of US and EME bond markets we find EA investors assign a much higher relative weight to EME bonds compared to US bonds.

The relative weight of 0.52 is an aggregate measure for EME bonds, but some country-level weights are significantly higher. As we drill down into country-level (and eventually security-level) holdings it is useful to rearrange the terms of relative weight as follows:

(2) $$Relative\ Weight_j = \frac{EA\ holdings\ of\ bond\ market\ j}{Mcap\ of\ bond\ market\ j} * \frac{global\ bond\ market}{total\ EA\ bond\ portfolio}$$

[3] Using BIS data we estimate the global bond market to be 106.6 trillion euros and the total size of the 19 EME bond markets in our sample to be 5.0 trillion euros.

In the cross section, variation in relative weight is completely determined by the first term which represents the share of outstanding bonds from destination country *j* held by EA investors. For example, as of 2019:Q4, EA investors held 89.5 billion of Mexican bonds representing 12.4% of the Mexican bond market, which translates into a relative weight of 0.72. A lack of reliable market cap data for EME bond markets prevents this calculation from being performed precisely for each country in our sample.[4] But Mexico is not an outlier, we estimate that as of end-2019 EA investors held 11% of the South African bond market, 13.4% of the Turkish bond market, and 13.8% of the Hungarian bond market. And remarkably, for Colombia, Poland, Czech Republic, and Romania portfolio weights exceed the ICAPM benchmark. These summary statistics suggest that EA investors are prominent participants in EME bond markets.

3. Cross-sectional analysis

For our cross-sectional analysis we construct a security-level variable called *EA share* which is defined as EA investors' holdings of bond *i* as a fraction of the amount outstanding (disregarding time subscripts for this cross-sectional analysis):

(3) $$EA\ share_i = \frac{EA\ holdings\ of\ security\ i}{Mcap\ of\ security\ i} * 100$$

Table 2 (Panel A) provides summary statistics for *EA share* (along with explanatory variables) and in Table 3 we present a cross-sectional analysis of EA

[4] The BIS reports three sets of debt securities statistics: domestic debt securities, international debt securities, and total debt securities. Unfortunately, country coverage varies across these three categories and many countries do not distinguish between bonds and short-term instruments in their domestic and total debt securities data. For aggregate EME relative weight calculations we provide a rough estimate based on our own calculations and we only report country-level relative weights for countries with long-term bond splits reported by BIS or country-level sources.

holdings of EME bonds as of 2019:Q4.[5] Our dependent variable *EA share* (as defined in Equation 3) is motivated by the relative weight concept (see Equations 1 and 2). *EA share* is equivalent to the security-level share of holdings measure used by Maggiori, Neiman, and Schreger (2020), and, in the cross section, is a linear transformation of relative weight. Larger *EA share* values for a given bond imply a higher portfolio weight relative to ICAPM allocations.[6] In column (1) of Table 3 we demonstrate that the currency denomination of EME bonds – being EUR, USD or other - explains 36% of the cross-sectional variation in EA holdings at the bond-level. Consistent with the literature we find a strong preference for home currency bonds (Boermans and Vermeulen 2016; Burger, Warnock, and Warnock 2018; Maggiori, Neiman, and Schreger 2020).

In column (2) we introduce more detailed security-level characteristics and find that EA investors demonstrate a preference for bonds with longer maturity and fixed coupons. The regression reported in column (2) also includes a *yield spread* that is calculated as the difference between the security-level EME bond yield and a benchmark risk-free security.[7] The marginally significant negative coefficient on *yield spread* suggests a preference for safer bonds.

The powerful preference for home currency bonds found in columns (1) and (2) could be driven by a preference for bonds issued by EMEs in European financial

[5] We chose 2019:Q4 as our baseline since it represents the last pre-Covid quarter. Online Appendix Table A1 demonstrates that the results presented in Table 3 are highly robust to alternative quarterly cross-sections.
[6] If investors held a global market-weighted portfolio *EA share* would be identical across bonds.
[7] For Euro- and local-currency-denominated EME bonds we calculate *yield spread* by subtracting maturity-matched euro area sovereign bond rates of Triple A-rated countries from the yield to maturity of a given bond. We do the same for USD-denominated bonds but using US Treasury bonds as the benchmark.

markets. In column (3) we add an indicator variable that takes the value of one for bonds issued within the euro area.[8] The results indicate that EA investors do exhibit a preference for bonds issued within their home jurisdiction, but even after controlling for location of issuance, we continue to find evidence of a strong preference for euro-denominated bonds.[9]

In column (4) we introduce issuer-country dummy variables and find that, holding all else constant, EA investors exhibit a strong preference for bonds from Colombia, Czech Republic, Poland, South Africa, and Uruguay, while holding a significantly smaller share from Argentina, Indonesia, Malaysia, Philippines, Romania and Thailand. The progression of R^2 across columns (1) to (4) suggests that the currency denomination of bonds has much more explanatory power relative to country fixed effects. For a more transparent comparison, in column (5) we estimate a model including only country fixed effects and find that the explanatory power (R^2= 12%) falls far below that of column (1) (R^2= 36%), which includes only currency denomination dummies. In other words, when trying to explain the extent to which EA investors hold a particular EME bond it is far more important to consider the currency denomination of the bond rather than the country of issuance.

[8] We assign the EA bond status using the prefix of the ISIN code. If the first two letters of the ISIN correspond to an EA country code or start with "XS" then it is designated as a bond issued within the EA. The "XS" prefix implies the clearing and settlement run through Euroclear and Clearsteam, two EA banks that act as international central securities depositories.

[9] Our finding that home currency preference goes beyond a locational (market) preference is analogous to Ammer et al. (2012) who find the cross-listing effect for equities is not fully explained by market accessibility.

4. Aggregate bond flows analysis

Having analyzed the cross-section of bond holdings in Section 3, we next analyze the impact of global factors on flows to EME bonds over time. Most of the capital flows literature focuses on country-level flows, so we begin at an aggregate level before drilling down to issuer-level flows in Section 5.

Our measure of bond flows is based on the security-level transactions component of the SHS database which is recorded by the ECB to reflect changes in positions net of price and exchange rate variation. Summing these security-level transactions at the country level yields the equivalent of IMF BOP bond flows.[10] In addition we contribute a novel decomposition of gross bond flows by currency.

In Figure 2a we display aggregate bond flows from EA investors to our sample of 19 EMEs by currency. One takeaway from the currency decomposition is that flows to USD and local currency bonds appear more volatile than flows to Euro-denominated bonds. For example, flows to USD and LC bonds surged during 2017 (averaging 6.4 and 8.7 billion/quarter respectively) before reversing to gross outflows during 2018Q2-2018Q3. Meanwhile, flows to Euro-denominated EME bonds remained relatively steady averaging 3.3 billion per quarter for 2017-2018. Over our sample, a simple comparison of standard deviations reveals that flows to Euro-denominated bonds were significantly more stable (stdev = 1.9) compared to USD (stdev = 3.3) and local currency bonds (stdev = 4.4). The relative stability of home currency bond flows is consistent with the Bergant and Schmitz (2019)

[10] Bergant and Schmitz (2018) demonstrate aggregation of security-level flows closely matches the IMF's BOP outflows for the euro area.

finding that EA investor flows to EUR-denominated securities are less momentum-driven compared to foreign currency denominated securities.

For a formal analysis of aggregate flows, we construct our dependent variable by dividing quarterly flows at the country(j)-currency(c) level by the lagged level of bond positions (also at country-currency level):

$$(4) \qquad flow\ ratio_{j,c,t} = \frac{flow_{j,c,t}}{holdings_{j,c,t-1}} * 100$$

We plot *flow ratio* for EME bond flows in Figure 2b and note, as an example, that the 2017:Q2 surge represents a flow of 6.9% to USD-denominated and 8.8% to LC-denominated bonds relative to previous quarter positions.

We estimate country-level fixed effects regressions of the form in Equation (5) for a total sample of 19 EMEs (indexed by j). The country-level fixed effects (μ_j) account for country-specific, time-invariant factors that are unrelated to global (X_t) or local (Z_{jt}) factors.

$$(5) \qquad flow\ ratio_{jt} = \alpha + \beta_1 X_t + \beta_2 Z_{jt} + \mu_j + \varepsilon_{jt}$$

Our primary interest is the sensitivity of EA investor flows to global factors (β_1). Koepke (2019) provides a survey of the literature on capital flows to emerging markets and concludes there is robust evidence that portfolio flows are affected by global risk aversion and mature economy interest rates. As global factors we therefore include VIX and changes in ECB and Fed shadow rates in all specifications.[11] Our ability to split flows by currency denomination (a contribution relative to conventional capital flows regressions) prompts an interest in the

[11] Given the importance of unconventional monetary policy (and the effective lower bound) during our sample we employ the change in shadow short rates provided by Krippner (2016).

relationship between global and bilateral (local) currency fluctuations and flows to EME bonds. Although one might assume that fluctuations in the exchange rate of the Euro will be most relevant for EA investors, we are motivated by recent studies to consider USD exchange rates as a potential barometer for global investors' risk bearing appetite or capacity (Avdjiev et al. 2019a; Krishnamurthy and Lustig 2019; Adrian and Xie 2020; Cerutti, Obstfeld and Zhou 2021).

In the left panel of Table 4 we present results from panel fixed effects estimation of Equation (5) using aggregate flows at the country level. In addition to the traditional global factors (VIX, ECB and Fed shadow rates), in column (1) we include the log first difference in the local bilateral exchange rate (v. EUR) as a control for local destination country conditions. Consistent with the literature we find higher levels of VIX are associated with larger outflows from EME bonds and intuitively we find evidence that bond outflows coincide with bilateral EME currency depreciation against the Euro.[12]

In column (2) of Table 4 we add the log difference of the broad (trade-weighted) EUR and find that an appreciating Euro coincides with increased flows to emerging market bonds – perhaps indicative of a confidence effect driven by a positive economic outlook in the euro area. In column (3) we introduce the bilateral USD-EUR exchange rate as an initial test for the USD as a global factor. Impressively, inclusion of the bilateral USD doubles the explanatory power of the regression and we find periods of USD appreciation (v. EUR) are associated with outflows from EME bonds. Also noteworthy in column (3) is the fact that the broad

[12] We also considered VSTOXX (the European version of VIX) but the two measures are very highly correlated (0.79) and when replacing VIX with VSTOXX in Table 4 we fail to find a statistically significant relationship. VSTOXX results available upon request.

Euro becomes negative and loses much of its statistical significance, suggesting that the positive coefficient in column (2) was driven primarily by the USD component of the trade-weighted Euro.

Motivated by recent findings on the global importance of the USD, in column (4) we replace the bilateral USD v. EUR with the broad (trade-weighted) USD. We find a further increase in explanatory power as appreciation in the broad USD coincides with outflows from EME bonds, while there is no relationship between the broad EUR and EME bond flows. Fluctuations in the broad USD and the bilateral USD v. EUR are highly correlated (0.79) but we include them both in column (5) and remarkably the broad USD retains its statistical significance while the bilateral USD-EUR essentially drops out. The significance of the broad rather than bilateral USD suggests the USD is a global factor for EA investors. Finally, in column (6) we include the broad USD, broad EUR, and bilateral USD v. EUR and find that multicollinearity greatly increases the standard errors. However, the coefficient on the broad USD is stable throughout columns (4)-(6) of Table 4 and the results point to an important role for broad USD fluctuations in explaining EME bond flows.[13]

Other traditional global factors (VIX, ECB, FED) are statistically insignificant in all specifications that include the broad USD. However, it is important to note that the quarterly frequency of our data set is not well suited to identify monetary policy shocks and many higher frequency studies demonstrate an important role for monetary policy spillovers (see e.g. Rogers, Scotti, and Wright 2018; Chari, Dilts-

[13] The broad USD retains its significance when we consider a larger sample of EMEs. In online Appendix Table A2 we replicate the left panel of Table 4 for a sample of 66 EMEs based on JP Morgan EMBIG and the pattern of results is qualitatively very similar. One minor difference is the finding that VIX retains marginal significance in columns (4)-(6).

Stedman, and Lundblad 2021). As a robustness check, we attempt to bridge the gap between high frequency identification of monetary policy shocks and our quarterly flows data by calculating a quarterly sum of Fed and ECB policy shocks from Bu, Rogers, and Wu (2021), but fail to find a statistically significant impact on flows (see online Appendix Tables A3 and A4). In our view the results do not rule out a role for monetary policy impacting flows, rather, it seems likely that monetary policy (including expectations of future policy) is one of the factors driving USD exchange rates.[14]

In the right panel of Table 4 (columns 7-9) we analyze our novel decomposition of bond flows by currency.[15] Splitting by currency reveals one important difference: fluctuations in the broad USD are highly significant for flows to USD-denominated and local-currency-denominated bonds but not for flows to EUR-denominated bonds. The size of the coefficients on the broad USD indicates an economically significant impact as a 5% quarterly appreciation in the USD coincides with outflows of approximately 2.5% from USD and local-currency-denominated bonds.[16]

Two takeaways from the aggregate flows analysis in this section are clear. First, over our sample period, fluctuations in the broad USD are highly correlated with flows to EME bonds – during periods of USD appreciation EA investors pull

[14] As an additional robustness check we replace changes in shadow rates with changes in 10-year sovereign bond yields and find some evidence that falling US rates are associated with flows to EME bonds, but the coefficient is marginally significant at best in specifications that include the broad USD (see online Appendix Table A5).
[15] In the USD-denominated column (7) we replace the bilateral EME v. EUR exchange rate with the EME v. USD rate.
[16] For context note that over our sample the broad USD had 7 quarters with large quarterly appreciations ranging from 4.4%-6.8%. A time series plot for fluctuations in the broad USD is presented in online Appendix Figure A1.

back from EME bonds while flows increase during periods of USD depreciation. Second, flows to home currency (Euro) bonds are more stable and appear less influenced by global factors.

5. Broad USD and EME bond flows: Potential Mechanisms

Our finding in Section 4 that EME country-level bond flows are significantly correlated with fluctuations in the broad USD is intriguing when viewed from the perspective of a euro area investor. A possible explanation for the sensitivity of EME bond flows to the broad USD relates to the special role of the USD during global "flight to safety" episodes. The literature has documented a significant relationship between the dollar and several measures of risk aversion (Lilley et. al. forthcoming; Hassan et al. 2021). Cerutti, Obstfeld, and Zhou (2021) conclude the dollar's impact on CIP deviations is based on its role as an indicator for global risk appetite. Krishnamurthy and Lustig (2019) suggest a role for foreign demand for USD-denominated safe assets, and Adrian and Xie (2020) find a causal relationship between foreign bank demand for USD-denominated safe assets and appreciation of the USD. Chari, Dilts-Stedman and Lundblad (2020) document the impact of a global "risk-on/risk-off" cycle for emerging market flows and asset prices.

Our aggregate flows analysis is consistent with the dollar acting as a risk appetite indicator for EA investors who participate in global flight-to-safety or risk-on/off episodes.[17] An open question is whether variation in risk appetite leads to indiscriminate periods of flows/flight or, on the contrary, the extent to which

[17] In Appendix Table A6 we extend our analysis beyond EME bonds and find evidence that EA investors participate in global flight to safety episodes. We find flows to US Treasury bonds and EA Sovereign bonds are positively related to the broad USD.

investors differentiate between EME bonds. To shed light on potential mechanisms for the dollar risk factor, we exploit our security-level data to discern differentiation by currency and issuer-level risk characteristics. Specifically, we consider three categories of risk characteristics:

1. Currency (returns) Risk: The volatility of EME bond returns differs substantially based on currency denomination. EA bond investors can avoid currency risk by opting for EUR-denominated or currency-hedged USD-denominated bonds, but for local-currency EME bonds the cost of hedging currency risk is often prohibitive. As a result, EA investment in EME local currency bonds is generally subject to EME currency fluctuations. We therefore expect flows to local-currency-denominated bonds to be particularly sensitive to the risk-on/risk-off cycle.

2. Balance Sheet Risk: For currency mismatched EME borrowers, fluctuations in the dollar induce balance sheet effects. EA investors may therefore differentiate among EME bonds based on the borrower's balance sheet sensitivity to the dollar. We expect the balance sheet effect to be strongest for flows to USD-denominated bonds issued by currency mismatched borrowers.

3. Credit Risk: In response to changing risk appetite, EA investors may differentiate among EME borrowers based on credit risk. Flows to the least creditworthy EME borrowers are expected to be most sensitive to fluctuations in the broad USD.[18]

[18] The three broad categories of risk are not mutually exclusive. For example, greater exchange rate volatility increases the likelihood that balance sheet imbalances will become relevant. And balance sheet risks will be reflected in measures of credit risk (Amstad, Packer, and Shek 2019).

To explore potential investor differentiation by risk characteristics, in Table 5 we take advantage of the granular nature of our data set by constructing our dependent variable (*flow ratio*) at the issuer(*i*)-currency(*c*)-level as defined in Equation (6):

$$(6) \qquad flow\ ratio_{i,c,t} = \frac{flow_{i,c,t}}{holdings_{i,c,t-1}} * 100$$

By construction *flow ratio* has a natural lower bound of -100 (in the case where EA investors sell 100% of previous quarter issuer-currency holdings), but extreme positive values for *flow ratio* are possible when small holdings in period *t-1* are followed by large purchases in period *t*. For symmetry we cap *flow ratio* at +100.[19] All of our issuer-currency-level *flow ratio* regressions are weighted by the lagged amount of bond holdings.

5.1 Differentiation by currency denomination

For international bond investors, currency risk is of first order importance. Hassan and Zhang (2021) survey the literature and document growing evidence that currency risk characteristics are an important determinant of interest rate differentials and help explain UIP violations. Hassan et al. (2021) construct measures of global and country-specific risk from textual analysis of quarterly earnings calls and find the USD has a positive Beta on global risk (safe-haven effect) while EME currencies tend to load negatively on global risk. Kalemli-Özcan and Varela (2021) find that local currency EME borrowers are charged a risk premium based on country and currency risk factors.

[19] For quantitative context, capping flow ratio at +100 is equivalent to one-sided winsorizing at the 1% level for sovereign bonds and 4.4% level for private bonds.

EA investors can avoid currency risk by opting for EUR-denominated bonds or currency-hedged USD-denominated bonds. Alternatively, the safe-haven characteristics of the USD might make unhedged USD-denominated bonds attractive during a risk-off episode. Although options to hedge currency risk on EME bonds are expanding (Patel and Xia 2019), the costs remain prohibitive, especially at longer maturities (Alfaro, Calani, and Varela 2021). Some advanced economy investors may desire the diversification benefits of unhedged positions in local currency EME bonds. (Committee on the Global Financial System 2021). However, unhedged EME local currency bond returns historically suffer from negative skewness as financial flight during a crisis induces both spiking bond yields (capital losses) and depreciation of the local currency (Burger and Warnock 2007; Burger, Warnock, and Warnock 2012). Given the historical volatility and negative skewness of returns we expect to observe a strong negative relationship between risk appetite and flows to local-currency-denominated bonds.

In Table 5 we provide issuer-level analysis of EA investor flows to EME bonds by currency denomination, further broken down by borrowing sector (Sovereign-5a and Private-5b). The dependent variable, *flow ratio,* is calculated at the issuer(*i*)-currency(*c*)-level as defined in Equation (6). Looking at the broad dollar factor in Table 5a we observe important differentiation by currency denomination. Flows to EUR-denominated bonds (columns 5-8) appear insulated from the broad dollar effect, perhaps because EA investors need not fear any direct impact of foreign exchange fluctuations on returns.

In column (1) of Table 5a we find evidence of EA investor outflows from USD-denominated sovereign bonds during periods of broad USD appreciation.

Perhaps not surprisingly, the safe-haven characteristics of USD-denominated assets do not appear to carry over to EME bonds.

Consistent with the expected importance of currency risk, in column (9) of Table 5a we find that flows to local currency sovereign bonds are quite sensitive to the broad USD. The coefficient estimate suggests a 5 percent appreciation of the broad USD would coincide with an outflow of approximately 2 percent. Further evidence of the importance of currency risk for local-currency-denominated bonds is found in the highly significant coefficient on the bilateral LC/EUR exchange rate. EA investor outflows coincide with EME local currency depreciation against the EUR – consistent with currency momentum effects documented by Bergant and Schmitz (2019).[20] In addition, column (10) of Table 5a provides marginally significant evidence that foreign exchange reserves reduce the sensitivity of local currency bond flows to the dollar risk factor. For EME sovereigns with ample reserves, EA investors presumably anticipate a degree of exchange rate smoothing which alleviates concerns about currency risk. If reserves/gdp is one standard deviation above the mean we estimate the sensitivity to the broad dollar approaches zero, while for reserves/gdp one standard deviation below the mean a 5% USD appreciation is predicted to coincide with a 3.6% outflow.

Turning to local currency bonds issued by private entities (Table 5b columns 7-9) we surprisingly do not observe a statistically significant sensitivity to the broad USD or bilateral LC/EUR exchange rates. However, it is important to note that although there are a large number of issuers in this category (8,351) the total

[20] The sensitivity of local-currency-denominated flows to the dollar risk factor is also consistent with the tight relationship between currency fluctuations and yield spreads documented by Hofmann, Shim, and Shin (2020a) and the Covid-19 analysis of Hofmann, Shim, and Shin (2020b).

amount of holdings is quite small (7.5 Billion in private LC v. 65 Billion in EUR and 126 Billion in USD as of end-2019). In recent decades cross-border investors have become increasingly willing to hold local currency bonds issued by EME *sovereigns*, but participation in EME *private* local currency bond markets remains muted (Maggiori, Neiman, and Schreger 2020).

5.2 Differentiation by balance sheet characteristics

Policymakers and academics have frequently warned of the potential financial fragility associated with currency mismatches on the balance sheets of EME borrowers (see e.g., Acharya et al. 2015; IMF 2015; Kalemli-Özcan, Shim, and Liu 2021). Bruno and Shin (2015b) provide a "double-decker" model of banking where global banks provide USD credit to regional banks who in turn lend to local borrowers. In their model, an appreciation of the USD increases the risk associated with existing USD-denominated loans (on global bank balance sheets) and induces a decrease in the supply of additional USD-denominated lending. Avdjiev et al. (2019a,b) provide evidence that this channel is particularly relevant for USD-denominated bank lending to EMEs. We posit that a similar channel may operate through international bond markets, however it is important to keep in mind that our analysis includes a broader set of creditors (beyond global banks), so the interpretation of balance sheet effects is somewhat different. For global banks, a USD appreciation increases the tail risk in their portfolio of EME loans which in turn reduces their capacity for future lending. For global bond investors a USD appreciation likewise increases the default risk associated with USD-denominated

EME bonds, which might induce investors to sell existing bonds and/or reduce future purchases.

In Tables 5a and 5b we provide separate analysis of flows to sovereign and private bonds. Splitting the analysis by borrowing sector allows us to explore the balance sheet hypothesis more precisely as factors impacting sovereign balance sheets (foreign currency debt and reserves) differ from those impacting private balance sheets (foreign currency income streams). Focusing first on sovereign bonds, column (1) of Table 5a establishes that flows to USD-denominated government bonds are highly sensitive to fluctuations in the broad USD. As a control for the asset side of the sovereign balance sheet we introduce foreign exchange reserves as a share of GDP in column (2). We find an intuitive and marginally significant result: the impact of broad USD fluctuations is tempered by higher levels of foreign exchange reserves. Specifically, the estimated coefficients in column (2) suggest the impact of the broad dollar on flows approaches zero as reserves reach 30% of GDP.

From the liabilities side of the sovereign balance sheet, we include foreign-currency denominated debt as a share of GDP and, in column (3) of Table 5a, find evidence that greater reliance on foreign currency debt increases the sensitivity of bond flows to the broad USD. For a sense of economic magnitudes note that the coefficients in column (3) suggest a 5% appreciation in the broad USD will be associated with outflows of 3.4% from sovereigns with FX debt one standard deviation above the sample average. Collectively, columns (1)-(3) provide support for a sovereign balance sheet mechanism: Currency mismatched governments

(those with high foreign currency debt and/or low reserves) experience flows that are highly sensitive to the broad USD.

Table 5b expands the analysis to private sector bond flows and provides further support for a balance sheet mechanism. Lacking firm-level data on the currency denomination of assets, liabilities, and income streams, we first employ an issuer-level fixed effect to control for unobservable firm-level characteristics. In column (1) we fail to find a statistically significant impact of the broad dollar which might indicate the firm-level dummies effectively control for balance sheet factors. To unpack further, in column (2) we drop the issuer-level fixed effect and replace with a sectoral classification. Motivated by Chui, Kuruc, and Turner (2016) who designate a set of tradable sectors when exploring currency mismatches, we introduce a dummy variable for sectors that are most likely to have hard currency revenue streams.[21] In theory investors should be less concerned about currency mismatches for firms in these sectors, and in column (2) of Table 5b, we find some support for this hypothesis. The impact of the broad USD on flows to "non-hard currency" sectors is significantly negative while the interaction term suggests this effect goes to zero (or slightly positive) for firms that are more likely to have hard currency revenue.[22]

The balance sheet mechanism (as an explanation for the broad dollar effect) is most directly applicable to USD-denominated bonds. Nonetheless we also provide

[21] We take a broad approach and include the following as hard currency sectors (based on the issuer's first-digit NACE classification): "A - Agriculture, forestry and fishing", "B - Mining and quarrying", "C – Manufacturing", and "D - Electricity, gas, steam and air conditioning supply."

[22] Also notable in columns (1)-(3) of Table 5b is the significance of the VIX and Fed shadow rate. This result is consistent with the findings of Avdjiev et al. (2020) who also find a larger impact of these global factors on private bond flows.

analysis of flows to EUR and local-currency-denominated bonds. For EUR-denominated sovereign (Table 5a columns 5-8) and private bonds (Table 5b columns 4-6) we find little evidence of sensitivity to the broad USD (or the bilateral LC/EUR exchange rate) – matching our aggregate results regarding the relative stability of flows to home currency bonds. Flows to local-currency-denominated sovereign bonds (Table 5a columns 9-12) are highly sensitive to the broad USD but here the balance sheet mechanism is not directly relevant.

Summing up, our security-level data allows us to evaluate the plausibility of a balance sheet mechanism by currency denomination and issuer characteristics. Intuitively we find the broad USD balance sheet mechanism appears to primarily impact flows to USD-denominated bonds. Further, we find that issuer characteristics can either alleviate or accentuate sensitivity to the broad USD. Sovereign borrowers with low FX debt burdens and/or high levels of reserves appear insulated from the broad dollar factor. Likewise for private borrowers in "hard currency" sectors. We conclude that the balance sheet mechanism appears to be a promising explanation for the sensitivity of USD-denominated bond flows to the broad USD.

5.3 Differentiation by credit risk

For government bonds we rely on sovereign credit ratings which we convert into a numerical index where higher values indicate greater credit risk.[23] For private bonds our credit risk proxy is calculated as the bond-level yield spread over a

[23] We use ratings from S&P and assign a credit score varying from 1 for Triple A-rated bonds to 21 for bonds nearing default (C).

benchmark (US or EA) risk-free bond. For USD and EUR-denominated bonds the yield spread isolates credit risk, but for local-currency-denominated bonds it captures a combination of credit and currency risk. Our regressions are at the issuer-currency-level, for issuers with multiple bonds we compute the average (currency-specific) yield spread. To mitigate potential endogeneity concerns we utilize lagged values of our credit risk proxies along with an interaction of the risk proxy with the broad USD.

Focusing first on USD-denominated sovereign bonds, in column (4) of Table 5a we find important heterogeneity by credit risk in the sensitivity of flows to the broad dollar. In column (4) the positive direct coefficient on the broad USD combined with the negative interaction term suggests that highly rated EME sovereigns might expect *inflows* to their USD-denominated bonds during periods of USD appreciation – consistent with a safe-haven and/or currency momentum effect. But for our sample-average-rated EME issuer with a credit score of 9.5 (approaching the investment grade threshold of BBB-) flows are negatively impacted by periods of USD appreciation. For the average rated EME issuer, a quarter with 5% appreciation in the broad USD is predicted to coincide with outflows of 1.2% and for credit risk one standard deviation above the mean outflows are predicted to be 3.8%. Interestingly, investor differentiation by credit risk is highly significant for USD-denominated bonds but we fail to find similar differentiation for EUR and local-currency-denominated sovereign bonds in columns (8) and (12) of Table 5a.

For bonds issued by private entities (Table 5b) we again find evidence of differentiation by credit risk for USD-denominated bonds as wide yield spreads

induce a greater sensitivity to the dollar risk factor. And once again this differentiation by credit risk does not seem to carry over to EUR or local currency bonds. We observe a flipped sign on the interaction term for EUR-denominated private sector bonds which at first seems to indicate a counterintuitive flow into riskier bonds as the dollar appreciates. But closer examination reveals that yield spreads for EUR-denominated private bonds are quite low with a median of 1.7% (compared to median spreads of 4.8% for USD and 6% for LC bonds). Further, the spreads are tightly clustered with half of the observations falling between 1-3%. In that range the coefficient estimates from column (6) of Table 5b suggest minimal impact of the broad dollar on flows to EUR-denominated private bonds.

5.4 Summary of Evidence on Mechanisms for the Dollar Risk Factor

Our analysis of issuer-currency-level bond flows reveals important distinctions in the impact of the broad dollar across currencies and issuer-level risk characteristics. One way to summarize our results is to think of a continuum of risk attributes for EME bonds. Figure 3 provides a visual representation of the variation in the impact of a hypothetical five percent broad dollar appreciation on flows across the risk spectrum. At the top of Figure 3 we see that, consistent with the safe-haven attributes of the USD, an appreciation in the broad USD is predicted to coincide with flows into the safest USD-denominated bonds (highly rated sovereigns and privates in hard-currency sectors). As we move down Figure 3, we see the predicted impact on flows to riskier bonds. For example, USD-denominated bonds issued by private entities in non-hard-currency sectors are predicted to experience outflows, likely motivated by concerns about balance sheet effects. Similarly, our

results predict large (3.4%) outflows from USD-denominated bonds issued by sovereigns with large foreign currency debt burdens. And, consistent with the importance of currency risk, investors appear to classify local-currency-denominated EME sovereign bonds as highly risky, especially when issued by countries with low foreign exchange reserves.

6. Case Study: Covid-19 shock

Although policymakers often fear the possibility of global factors inducing an indiscriminate boom-bust cycle on capital flows to EMEs, the evidence provided in sections 4 and 5 suggests EA investors do not treat EME bonds as a homogeneous asset class but instead differentiate based on currency denomination and issuer-level risk characteristics. As a case study of EA investors' response to a global shock, in this section we provide some descriptive details on EME bond transactions during the Covid-19 shock. As expected, there were significant (4.7 billion) gross outflows from EME bonds during 2020:Q1, but the breakdown by currency denomination is informative. Figure 4a reveals that outflows were highly concentrated in local currency bonds (8.4 billion) while EA investors were net *purchasers* of USD and Euro-denominated bonds. The inflow of 3.6 billion to Euro-denominated EME bonds during 2020:Q1 is greater than the average quarterly flow during our sample period and provides further support for the notion that home currency bonds are special.

Contrary to pre-crisis concerns about the build-up of currency mismatches in EMEs, the observation of positive flows to USD and EUR-denominated EME bonds during the Covid-19 shock suggests EA investors were not focused on balance sheet risks associated with foreign-currency-denominated bonds. Instead, EA investors

concentrated their sales in local-currency-denominated bonds and likely contributed to the depreciation of EME currencies. Our finding that EA investors sold local currency bonds is consistent with the tight relationship between currency fluctuations and yield spreads documented by Hofmann, Shim, and Shin (2020a) and the Covid-19 period analysis of Hoffmann, Shim, and Shin (2020b).

Digging a bit deeper Figure 4b provides a striking comparison of flows by currency and credit rating. During 2020:Q1, EA investors purchased 2.6 billion of EME bonds rated AA- or higher (double the sample average for flows to this category) suggesting highly rated EME issuers were essentially immune from the Covid shock and, further, appear to have benefited from a flight to safety by EA investors. Notably, the purchases of highly rated bonds were distributed across currencies and include 2 billion in local-currency denominated bonds. Next, consider medium-grade bonds where we observe a stark contrast by currency: EA investors purchased 0.75 billion of USD-denominated bonds and 2.7 billion of euro-denominated bonds while selling 7.8 billion of local-currency denominated bonds. Consistent with the importance of currency risk we see that flows to home currency bonds were less sensitive to the global shock while EA investors sold local-currency-denominated bonds from issuers with lower credit ratings.

One takeaway from the Covid-19 case study is that the headline number of 4.7 billion in outflows from EME bonds hides some fascinating underlying investor differentiation. During 2020:Q1 EA investors purchased 3.6 billion of euro-denominated bonds and 2 billion of highly rated local-currency-denominated bonds. The flight from EME bonds was concentrated in lower rated local-currency denominated bonds for which EA investors sold nearly 11 billion. In response to a

large global financial market shock, EA investors demonstrated that they differentiate among EME bonds based on currency denomination and issuer creditworthiness.

7. Conclusion

Euro area investors are prominent participants in emerging economy bond markets who hold a significant share of outstanding bonds. In this study we analyze the security-level characteristics influencing portfolio choice across emerging market bonds as well as factors influencing bond flows over time. Evidence across both dimensions indicates that home (EUR) currency bonds are special: (1) In the cross-section EA investors demonstrate a strong preference for home currency bonds, and (2) Over time flows to Euro-denominated bonds are significantly more stable when compared to USD and local-currency-denominated bond flows. From the perspective of an emerging market borrower the relative stability of EA investment in EUR-denominated bonds points to a potential advantage of issuing bonds in foreign currency, beyond those suggested in the literature (e.g. Richers 2019; Salomao and Varela 2021). Our evidence suggests emerging market borrowers may have an incentive to issue bonds in multiple currencies to exploit global investors' home currency bias, catering to investor demand and thus reducing vulnerability to volatile capital flows.

Consistent with growing evidence for the dollar risk factor, we find the most robust global factor influencing aggregate EA investor flows to EME bonds is provided by fluctuations in the broad (trade-weighted) USD. Further, our security-level data reveal significant differentiation in the impact of the broad dollar by

currency denomination and issuer-level risk characteristics. Some bonds that might be considered relatively "safe" (e.g. highly creditworthy EUR and USD-denominated bonds) are essentially immune from the dollar risk factor. In contrast flows to "risky" bonds (e.g. USD bonds from less creditworthy and/or currency mismatched issuers and local-currency-denominated sovereign bonds) are significantly impacted by the broad dollar. These results are consistent with the broad dollar's role as a proxy for risk appetite and investor differentiation across a continuum of risk characteristics.

Importantly, the results indicate that global "risk-off" shocks do not induce indiscriminate flight from all EME bonds, rather EA investors differentiate based on currency denomination and issuer-level risk characteristics. For EME policymakers this alleviates some concerns about the fickleness of cross-border investors, but also calls attention to the need for detailed data to identify risk factors. For example, our results suggest that not all foreign currency borrowing is sensitive to shifts in global risk appetite, but rather policymakers must focus on issuers that are most vulnerable by identifying issuer-level risk characteristics such as credit risk indicators and balance sheet imbalances. Future research with more detailed issuer-level detail may be useful in more precisely identifying the risk factors to which cross-border investors are most attuned.

In closing it is important to acknowledge several limitations of our study. First, the relatively short time series and quarterly frequency for which SHS data are available limits our ability to precisely pin down the role of global factors influencing flows over time. For example, although we find robust evidence for the influence of USD fluctuations on EME bond flows, our reliance on quarterly data

prohibits a confident identification of the role of the broad USD independent from Federal Reserve monetary policy. Second, we lack data on the extent to which investors hedge currency risk in their EME bond positions. And finally, our examination of the balance sheet channel relies on rough sectoral proxies rather than precise issuer-level data on the extent of currency mismatches. Nonetheless, our investigation of security level flows data reveals important differentiation by EA investors that contributes to our understanding of the transmission of global risk shocks.

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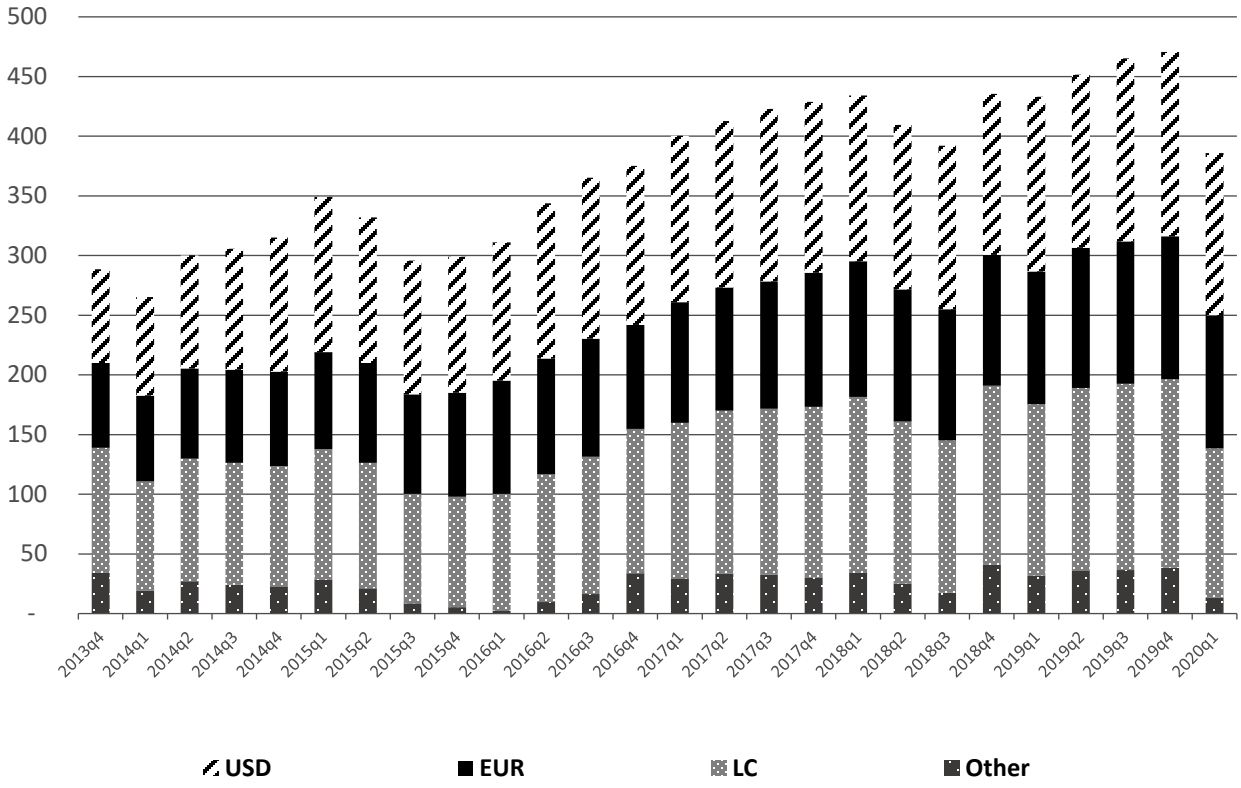
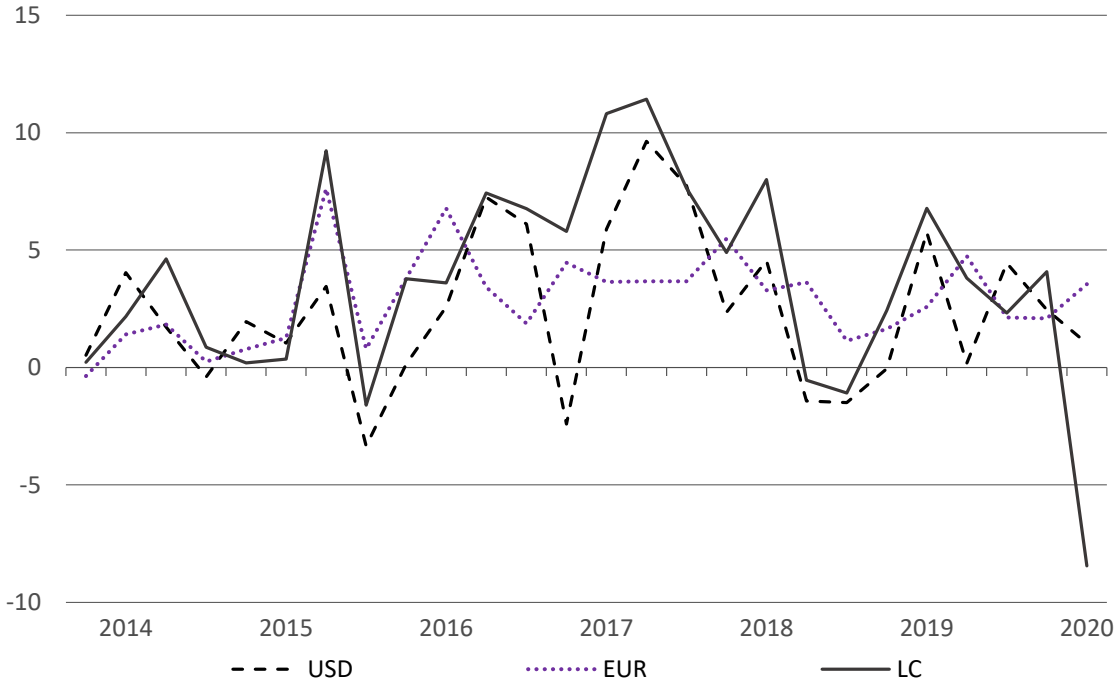
Figure 1 – Euro Area holdings of EME bonds by currency (bln euros)



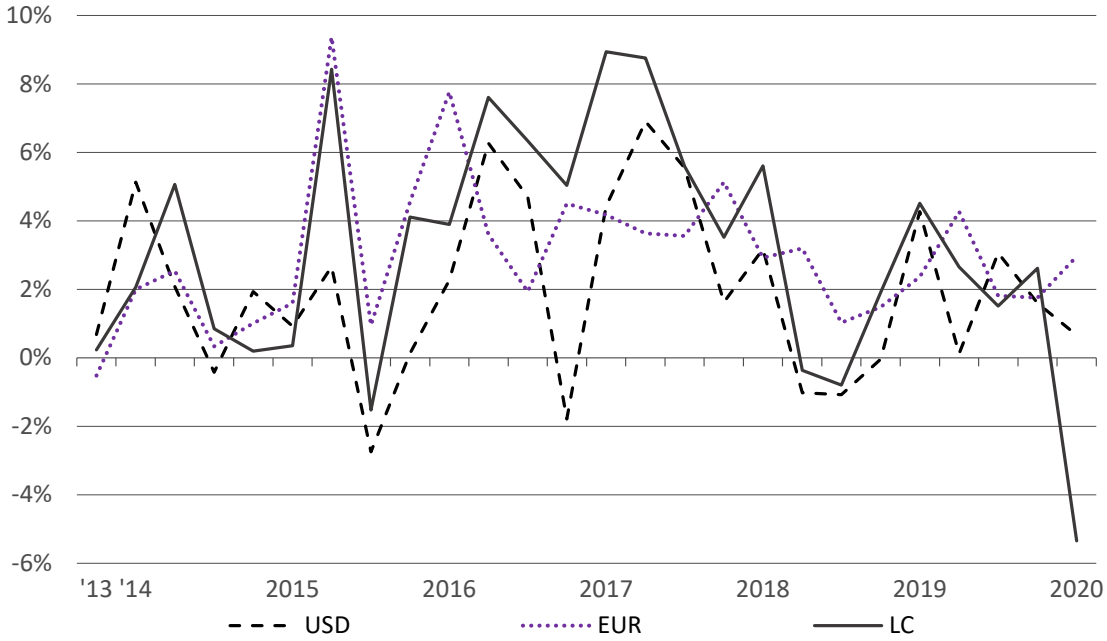
Notes: The figure displays euro area holdings of EME bonds by currency at market value in billions of euros. LC designates the local currency of the EME.

Figure 2a – Aggregate flows to EME bonds by currency (bln euros)



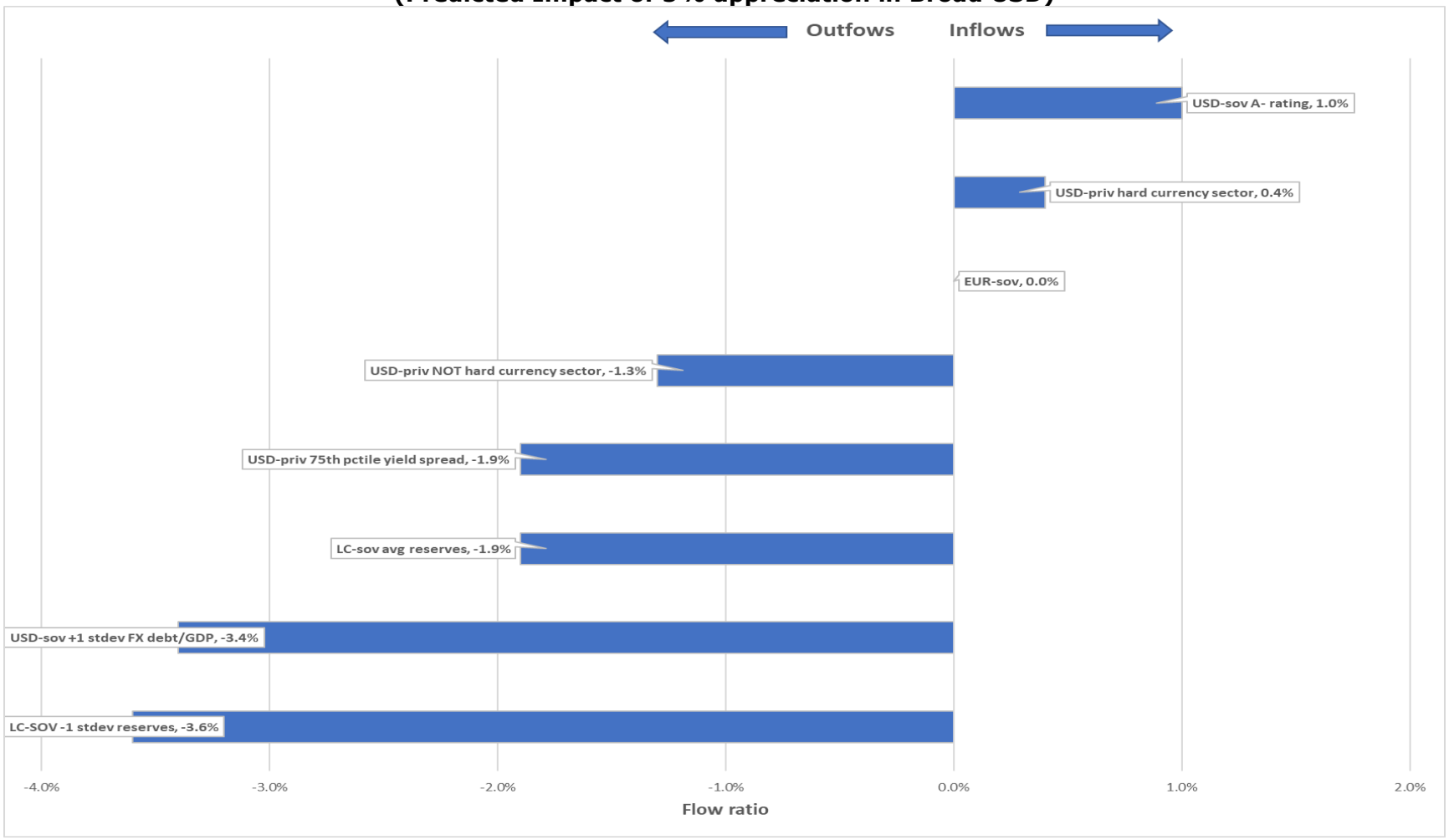
Notes: Flows are calculated from the security-level transactions component of the SHS database and reported by currency denomination in billions of euros.

Figure 2b – Aggregate EME *flow ratio* by currency



Notes: *Flow ratio* is calculated as EME bond flows at the country-currency level divided by previous quarter holdings.

Figure 3 – Impact of the Dollar Risk Factor by Bond and Issuer Characteristics
(Predicted Impact of 5% appreciation in Broad USD)



Notes: Each bar in the figure represents the predicted impact of a 5% USD broad appreciation on *flow ratio* at the issuer-currency level as defined in equation (6). Predicted impact is based on point estimates for the USD broad coefficient and interaction terms in Tables 5a and 5b. We interpret a statistically insignificant coefficient on the broad dollar to predict zero impact on flows (as is the case for EUR-denominated Sovereign bonds).

Figure 4a – Covid-19 shock (2020:Q1): EME bond flows by currency

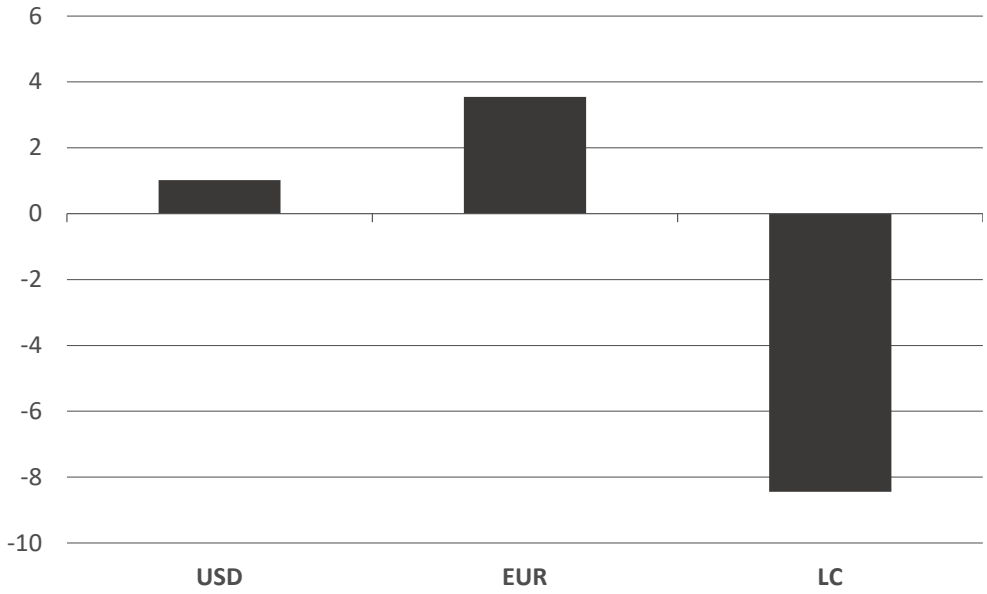
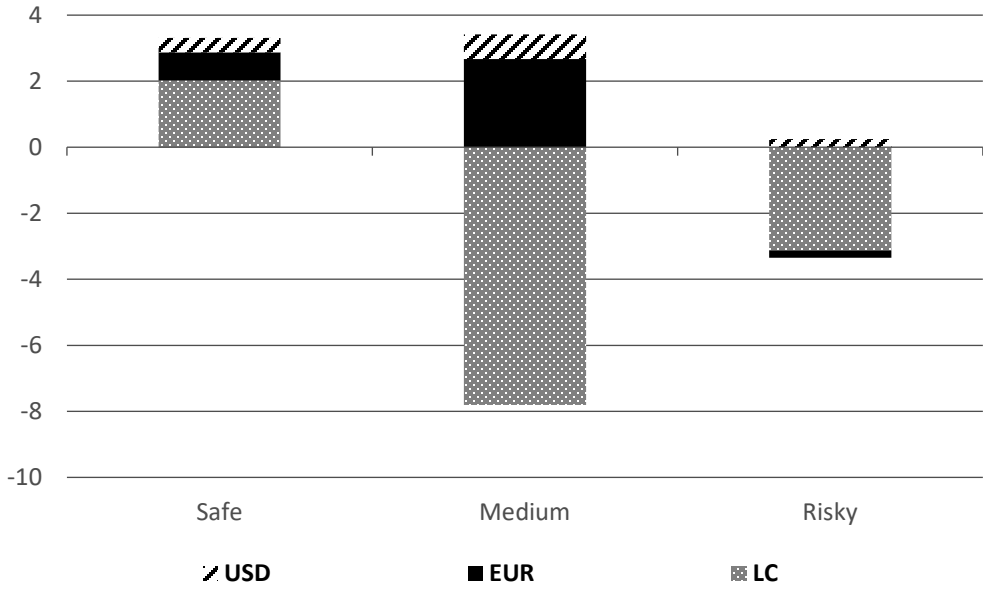


Figure 4b – Covid-19 shock (2020:Q1): EME bond flows by credit rating



Notes: Flows are calculated from the security-level transactions component of the SHS database and reported for 2020:Q1 by currency denomination in billions of euros. "Safe" refers to bonds rated "AA-" or better, "Medium" includes the range from "BBB to A+", while "Risky" includes all bonds rated "BBB-" or below. LC denotes bonds denominated in the EME local currency. Not displayed are 0.9 billion of outflows from bonds denominated in other currencies.

Table 1 – Euro area bond portfolio

	Total	EA positions		Non-EA positions			
	Total	Total	% (EA)	US	% (US)	EME	% (EME)
2013q4	14,436	11,399	80.0%	661	4.6%	278	2.0%
2014q1	14,752	11,578	80.2%	685	4.7%	264	1.8%
2014q2	14,990	11,771	79.8%	721	4.9%	294	2.0%
2014q3	15,229	11,849	79.0%	768	5.1%	304	2.0%
2014q4	15,779	11,954	78.5%	820	5.4%	312	2.0%
2015q1	15,336	12,142	76.9%	960	6.1%	342	2.2%
2015q2	15,441	11,736	76.5%	957	6.2%	334	2.2%
2015q3	15,550	11,850	76.7%	986	6.4%	306	2.0%
2015q4	15,879	11,848	76.2%	1,025	6.6%	309	2.0%
2016q1	16,399	12,079	76.1%	1,067	6.7%	324	2.0%
2016q2	16,563	12,378	75.5%	1,153	7.0%	350	2.1%
2016q3	16,542	12,419	75.0%	1,181	7.1%	363	2.2%
2016q4	16,661	12,365	74.8%	1,218	7.4%	366	2.2%
2017q1	16,755	12,342	74.1%	1,247	7.5%	379	2.3%
2017q2	16,836	12,468	74.4%	1,228	7.3%	386	2.3%
2017q3	16,739	12,510	74.3%	1,229	7.3%	400	2.4%
2017q4	16,977	12,389	74.0%	1,219	7.3%	407	2.4%
2018q1	17,061	12,558	74.0%	1,191	7.0%	410	2.4%
2018q2	17,033	12,571	73.7%	1,227	7.2%	393	2.3%
2018q3	17,106	12,480	73.3%	1,251	7.3%	383	2.3%
2018q4	17,685	12,569	73.5%	1,261	7.4%	403	2.4%
2019q1	18,072	12,883	72.8%	1,317	7.4%	410	2.3%
2019q2	18,576	13,147	72.7%	1,359	7.5%	426	2.4%
2019q3	18,304	13,399	72.1%	1,477	8.0%	439	2.4%
2019q4	18,034	13,132	71.7%	1,479	8.1%	442	2.4%
2020q1	19,022	13,077	72.5%	1,438	8.0%	381	2.1%

Notes: Bond holdings at market value in billions of euros, authors calculations based on the SHS. Emerging market (EME) sample includes Argentina, Brazil, Chile, Colombia, Czech Republic, Dominican Republic, Hungary, Indonesia, Malaysia, Mexico, Peru, Philippines, Poland, Romania, Russia, South Africa, Thailand, Turkey and Uruguay.

Table 2 – Summary Statistics

Panel A: Cross-section variables

	Mean	Std.dev.
EA_share		
All currencies	15.44	22.56
USD	11.78	13.41
EUR	55.78	31.99
LC	10.18	18.62
Security characteristics		
Residual maturity (ln)	7.44	1.16
Floating coupon	0.08	0.28
Sovereign	0.38	0.49
Issued in euro area	0.19	0.39
Yield spread	7.86	7.74

Panel B: Panel variables

	Mean	Std.dev.
Flow ratio		
Aggregate country level	1.10	2.30
Issuer-currency level		
USD-Sovereign	1.33	7.89
EUR-Sovereign	3.42	14.43
LC-Sovereign	4.72	15.43
USD-Private	0.71	23.53
EUR-Private	1.85	20.10
LC-Private	0.78	38.72
Time-series variables		
Broad USD (ln Δ)	0.01	0.03
USD/EUR (ln Δ)	-0.01	0.04
Broad EUR (ln Δ)	0.00	0.02
EME LC/EUR (ln Δ)	0.01	0.06
VIX (ln)	2.72	0.23
ECB shadow rate (Δ)	-0.26	0.95
Fed shadow rate (Δ)	0.09	0.55
Issuer Characteristics		
FX Reserves/GDP	21.77	11.19
Sovereign FX Debt/GDP	12.29	10.68
Sovereign Credit Rating (S&P)	9.46	2.95

Notes: Panel A refers to cross-section of 2019:Q4 as analyzed in Table 3. *EA share* is calculated as in Equation (3). Information on the currency denomination and other security-level characteristics are retrieved from the CSDB. Panel B refers to the full sample period 2013:Q4-2020:Q1. *Flow ratio* is calculated at "aggregate level" as analyzed in Table 4 and at "issuer-currency level" as analyzed in Table 5. Time-series variables are retrieved from FRED, the ECB and Krippner (2016). FX Reserves are from the IMF, FX Debt from World Bank, and Sovereign Credit Rating is from S&P.

Table 3 – Cross sectional results

	(1)	(2)	(3)	(4)	(5)
USD-denominated	2.43***	2.56***	1.61**	1.88**	
	[0.640]	[0.690]	[0.698]	[0.841]	
EUR-denominated	46.78***	48.01***	38.72***	36.45***	
	[1.976]	[1.937]	[2.417]	[2.497]	
Sovereign		0.77	1.06	2.26***	
		[0.707]	[0.703]	[0.735]	
Issued within Euro Area			11.16***	11.62***	
			[1.448]	[1.456]	
Yield spread		-0.09*	-0.15***	-0.07	
		[0.052]	[0.053]	[0.078]	
Residual maturity (ln)		1.24***	1.51***	1.67***	
		[0.294]	[0.290]	[0.290]	
Floating coupon		-2.27*	-2.99**	-5.18***	
		[1.376]	[1.329]	[1.470]	
Country Fixed effects	NO	NO	NO	YES	YES
Observations	2,846	2,654	2,654	2,654	2,846
R-squared	0.364	0.409	0.433	0.473	0.115

Notes: The dependent variable *EA share* is defined as EA investors' holdings of bond *i* as a fraction of amount outstanding (see equation 3). Cross-sectional regressions for 2019:Q4. Results highly robust to alternative cross-sections (see online Appendix Table A1). *USD-denominated, EUR-denominated, Sovereign*, *Issued within Euro Area*, and *Floating coupon* are each indicator variables. *Yield spread* is calculated as the difference between the EME bond yield and a benchmark risk-free security. *Residual maturity* is measured as natural log of days to maturity. Limitations in the availability of *yield spread* reduce the number of observations in columns (2) – (4). Robust standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.1.

Table 4 – Aggregate Country-Level Bond Flows

	Country-level *Flow Ratio* All Currencies						USD	EUR	LC
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Broad USD (ln Δ)				-20.62***	-19.95**	-21.03	-45.50***	-19.00	-47.49**
				[4.290]	[7.283]	[12.475]	[11.572]	[37.164]	[22.054]
USD/EUR (ln Δ)			17.98***		0.89	-0.45			
			[4.146]		[4.152]	[12.071]			
Broad EUR (ln Δ)		10.47***	-12.35*	1.24		1.62	-3.73	28.38	33.23*
		[2.902]	[6.157]	[3.367]		[11.377]	[11.827]	[40.820]	[18.261]
EME LC/EUR (ln Δ)	-3.06**	-4.77***	-4.03***	-3.28**	-3.22**	-3.27**	-3.22	-12.56	-26.35**
	[1.267]	[1.385]	[1.376]	[1.410]	[1.152]	[1.286]	[3.739]	[8.007]	[9.566]
VIX (ln)	-1.67***	-1.39***	-0.85*	-0.50	-0.52	-0.50	-1.14	6.37	-1.81
	[0.443]	[0.436]	[0.486]	[0.500]	[0.511]	[0.499]	[1.101]	[5.328]	[2.070]
ECB Shadow (Δ)	0.04	0.01	-0.10	-0.07	-0.07	-0.07	-0.27	0.40	0.49
	[0.119]	[0.119]	[0.133]	[0.124]	[0.129]	[0.139]	[0.433]	[0.897]	[0.625]
FED Shadow (Δ)	-0.23	-0.08	-0.06	-0.16	-0.16	-0.16	-0.19	0.10	0.48
	[0.148]	[0.161]	[0.163]	[0.168]	[0.194]	[0.192]	[0.685]	[1.920]	[0.862]
Observations	492	492	492	492	492	492	492	373	463
R-squared	0.031	0.041	0.080	0.090	0.090	0.090	0.034	0.011	0.040
Countries	19	19	19	19	19	19	19	16	18

Notes: The dependent variable, *flow ratio,* is defined as quarterly country-level bond flows divided by previous quarter holdings. Sample includes flows to 19 EMEs over 2013:Q4-2020:Q1. In columns (7)-(9) *flow ratio* is calculated at the country-currency level for USD, EUR, and local currency respectively (see equation 4). Broad USD refers to rate of appreciation in the trade-weighted USD. USD/EUR, Broad EUR, and EME LC/EUR are each defined as rates of appreciation for EUR. First difference of ECB and FED shadow rates are from Krippner (2016) and *VIX* is measured as natural log from FRED. Columns (8) and (9) include fewer observations because EA investors do not hold EUR and LC bonds from all 19 EMEs. Robust standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.1.

Table 5a – Sovereign Issuer-Level Bond Flows by Currency

	USD-denominated bonds				EUR-denominated bonds				Local-currency-denominated bonds			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Broad USD (ln Δ)	-51.83***	-103.33**	-8.69	147.01***	-2.66	0.99	-0.20	16.19	-39.59**	-103.18***	-53.05*	37.31
	[17.570]	[49.552]	[22.511]	[51.957]	[15.023]	[32.179]	[19.508]	[29.667]	[17.413]	[37.764]	[28.614]	[75.199]
VIX (ln)	-0.86	-0.75	-0.55	-0.90	-0.42	-0.53	-0.41	-0.59	-2.45	-2.29	-3.19	-2.58
	[2.369]	[2.359]	[2.235]	[2.163]	[2.117]	[2.239]	[2.098]	[2.144]	[2.024]	[2.017]	[2.127]	[2.065]
ECB Shadow (Δ)	-0.51	-0.48	-0.56	-0.52	0.16	0.16	0.13	0.15	0.65	0.61	0.60	0.60
	[0.452]	[0.440]	[0.405]	[0.400]	[0.410]	[0.412]	[0.411]	[0.415]	[0.467]	[0.468]	[0.457]	[0.467]
FED Shadow (Δ)	0.57	0.64	0.37	0.66	-0.21	-0.26	-0.18	-0.22	0.73	0.79	0.45	1.07
	[0.832]	[0.850]	[0.828]	[0.822]	[0.847]	[0.898]	[0.846]	[0.816]	[0.952]	[0.897]	[1.016]	[0.943]
EME LC/EUR (ln Δ)	-1.36	-1.26	-3.46	-1.62	-2.63	-2.59	-2.79	-8.28	-22.56***	-21.34***	-14.48*	-28.59***
(LC/USD col 1-4)	[7.183]	[7.083]	[6.464]	[6.137]	[9.287]	[9.170]	[8.821]	[9.746]	[6.996]	[7.104]	[7.791]	[8.198]
FX Reserves/GDP		0.11				-0.02				0.11		
		[0.114]				[0.039]				[0.089]		
ΔUSD*Reserves		2.99*				-0.02				2.77*		
		[2.069]				[0. 967]				[1.594]		
FX Debt/GDP			-0.14				-0.17*				0.03	
			[0.104]				[0.088]				[0.049]	
ΔUSD*FX Debt			-2.97**				-0.23				0.72	
			[1.540]				[1.719]				[2.219]	
Credit Rating				-0.27				-0.65				-1.05
				[0.439]				[0.448]				[0.864]
ΔUSD*CR				-18.04***				-0.86				-4.86
				[5.144]				[4.723]				[8.009]
Observations	409	409	409	409	345	345	345	345	427	427	427	427
R-squared	0.136	0.150	0.175	0.222	0.080	0.080	0.091	0.087	0.168	0.183	0.102	0.182
Fixed Effect	COUNTRY	COUNTRY	COUNTRY	COUNTRY	COUNTRY	COUNTRY	COUNTRY	COUNTRY	COUNTRY	COUNTRY	COUNTRY	COUNTRY

Notes: The dependent variable, *flow ratio,* is defined as quarterly issuer-currency-level flows divided by previous quarter holdings. All columns estimated over 2013:Q4-2020:Q1 sample. Broad USD refers to rate of appreciation in the trade-weighted USD. EME LC/EUR and LC/USD refer to bilateral appreciation of the EUR or USD v. local EME currency. *FX Reserves/GDP* is foreign exchange reserves relative to GDP (from IMF; sample average=21.8%). FX Debt/GDP is foreign currency sovereign debt relative to GDP (World Bank; sample average=12.3%). *Credit Rating* is a numerical score where higher values indicate more credit risk (S&P sovereign rating). Sample average *Credit Rating* score is 9.5 (equivalent to BBB/BBB-). *FX debt/GDP,* FX *Reserves/GDP,* and *Credit Rating* are lagged one quarter to mitigate potential endogeneity and are each interacted with rate of appreciation in broad USD. Robust standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.1.

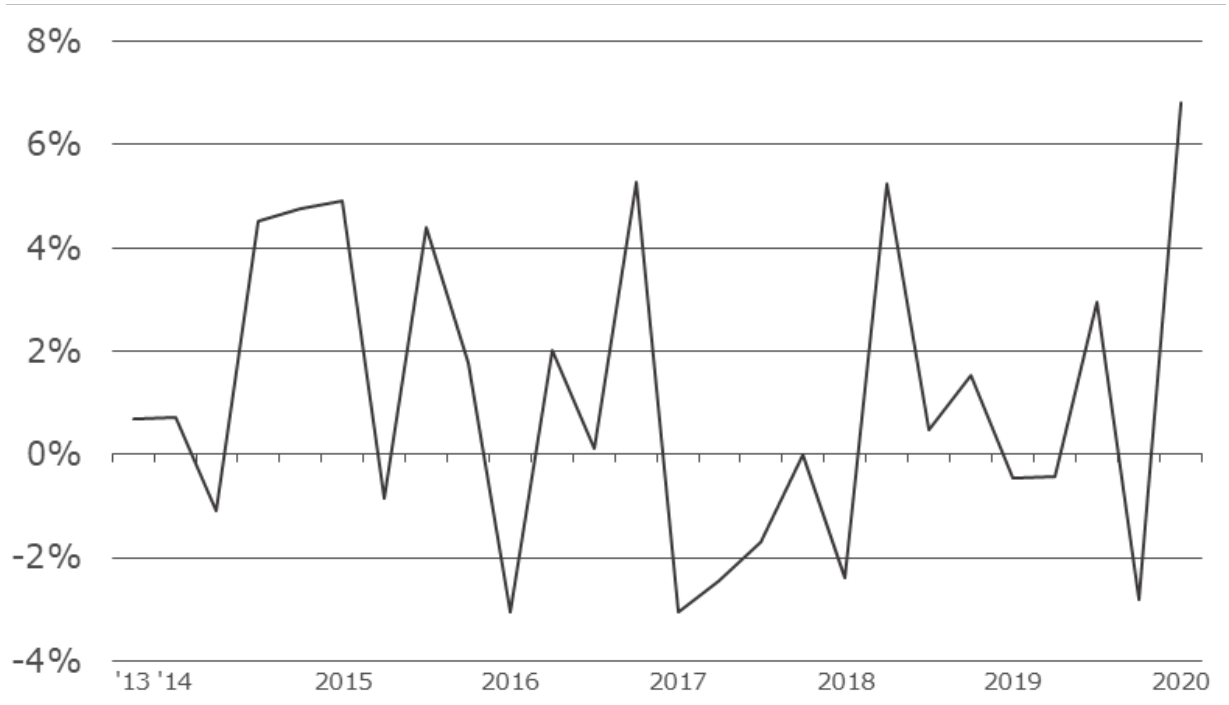
Table 5b – Private Issuer-Level Bond Flows by Currency

	USD-denominated bonds			EUR-denominated bonds			Local-currency-denominated bonds		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Broad USD (ln Δ)	-10.89	-25.43**	-12.20	-16.13	-26.97	-34.23*	-4.18	-15.31	-9.99
	[10.710]	[11.266]	[10.722]	[19.331]	[20.386]	[20.664]	[26.978]	[30.195]	[53.198]
VIX (ln)	-4.15***	-4.47***	-4.90***	-2.79	-3.03	-2.89	2.27	4.01	3.30
	[1.345]	[1.328]	[1.398]	[2.571]	[2.449]	[2.485]	[4.755]	[4.707]	[4.821]
ECB Shadow (Δ)	0.27	0.32	0.35	0.72	0.78	0.69	0.89	0.61	0.58
	[0.262]	[0.256]	[0.263]	[0.957]	[0.910]	[0.935]	[0.764]	[0.800]	[0.825]
FED Shadow (Δ)	-1.93***	-2.05***	-2.50***	0.71	0.65	0.57	3.66**	4.67***	4.77***
	[0.618]	[0.560]	[0.625]	[0.858]	[0.777]	[0.779]	[1.739]	[1.609]	[1.694]
EME LC/EUR (ln Δ)	-4.62	-3.91	-8.27*	14.91	14.38	13.37	-4.30	4.37	4.83
(LC/USD col 1-3)	[3.802]	[3.192]	[4.361]	[9.303]	[8.986]	[9.123]	[9.460]	[11.047]	[11.715]
Hard currency sector		1.22**			0.20			2.80**	
		[0.596]			[1.178]			[1.401]	
ΔUSD*Hard currency		32.93*			28.16			4.11	
		[19.727]			[28.524]			[39.994]	
Yield spread			-0.12			-0.25*			-0.03
			[0.073]			[0.150]			[0.211]
ΔUSD*Yield spread			-5.38***			9.28**			-0.45
			[1.789]			[4.140]			[4.806]
Observations	8,243	8,243	6,837	1,273	1,273	1,020	8,351	8,351	4,877
R-squared	0.081	0.028	0.026	0.099	0.052	0.053	0.323	0.129	0.137
Fixed Effect	ISSUER	COUNTRY	COUNTRY	ISSUER	COUNTRY	COUNTRY	ISSUER	COUNTRY	COUNTRY

Notes: The dependent variable, *flow ratio,* is defined as quarterly issuer-currency-level flows divided by previous quarter holdings. All columns estimated over 2013:Q4-2020:Q1 sample. Broad USD refers to rate of appreciation in the trade-weighted USD. EME LC/EUR and LC/USD refer to bilateral appreciation of the EUR or USD v. local EME currency. *Hard currency* is an indicator variable for sectors that are more likely to have hard currency revenue streams (18.5% of issuers). *Yield spread* enters with a one quarter lag and is calculated as the difference between the EME bond yield and a benchmark risk-free security (averaged across bonds at issuer-currency-level). *Hard currency* and *Yield spread* are each interacted with rate of appreciation in broad USD. Limitations in the availability of *yield spread* reduce the number of observations in columns (3), (6), and (9). Robust standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.1.

Online Appendix

Figure A1 – Broad USD fluctuations (ln Δ)



Notes: The Broad USD index is the trade-weighted US Dollar Index: Broad, Goods and Services (DTWEXBGS) provided by FRED.

Table A1 – Alternative Cross-sectional Results

	Baseline			
	2019:Q4	2018:Q4	2017:Q4	2016:Q4
USD-denominated	1.88**	2.40***	2.62***	1.43**
	[0.841]	[0.822]	[0.837]	[0.718]
EUR-denominated	36.45***	40.93***	44.79***	47.80***
	[2.497]	[2.466]	[2.523]	[2.622]
Sovereign	2.26***	1.85**	3.66***	2.75***
	[0.735]	[0.730]	[0.822]	[0.779]
Issued within Euro Area	11.62***	8.44***	6.35***	6.46***
	[1.456]	[1.323]	[1.202]	[1.315]
Yield spread	-0.07	0.19**	0.35***	0.02
	[0.078]	[0.093]	[0.131]	[0.077]
Residual maturity (ln)	1.67***	0.84***	0.76***	0.39
	[0.290]	[0.311]	[0.277]	[0.334]
Floating coupon	-5.18***	-4.21***	-1.62	-3.97**
	[1.470]	[1.511]	[1.725]	[1.723]
Country Fixed effects	YES	YES	YES	YES
Observations	2,654	2,573	2,523	2,267
R-squared	0.473	0.496	0.474	0.475

Notes: The dependent variable *EA share* is defined as EA investors' holdings of bond *i* as a fraction of amount outstanding (see equation 3). This table compares cross-sectional regressions for our baseline 2019:Q4 (see Table 3) with alternative time periods. Robust standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.1.

Table A2 – Aggregate Flows Regressions for Broad EME sample

	(1)	(2)	(3)	(4)	(5)	(6)
Broad USD (ln Δ)				-26.65***	-35.86**	-16.94
				[9.961]	[17.868]	[28.888]
USD/EUR (ln Δ)			25.66***		-12.32	10.71
			[8.739]		[12.931]	[26.665]
Broad EUR (ln Δ)		-8.07	-39.11***	-17.76		-27.18
		[11.783]	[13.961]	[11.691]		[24.358]
EME LC/EUR (ln Δ)	0.21	0.55	0.12	0.24	0.08	0.17
	[1.136]	[1.163]	[1.216]	[1.195]	[1.191]	[1.195]
VIX (ln)	-5.02**	-5.23**	-4.40**	-4.01*	-3.83*	-4.11*
	[1.999]	[2.007]	[2.062]	[2.081]	[2.078]	[2.084]
ECB Shadow (Δ)	0.63	0.65	0.50	0.54	0.56	0.52
	[0.391]	[0.397]	[0.390]	[0.384]	[0.398]	[0.405]
FED Shadow (Δ)	-0.04	-0.19	-0.18	-0.31	-0.25	-0.27
	[0.732]	[0.752]	[0.753]	[0.752]	[0.806]	[0.801]
Observations	1,650	1,650	1,650	1,650	1,650	1,650
R-squared	0.016	0.016	0.019	0.019	0.019	0.019
Countries	66	66	66	66	66	66

Notes: This table replicates aggregate country-level flows regressions from Table 4 using a broader sample of 66 EMEs based on the JP Morgan EMBIG constituency list. Pattern of results is consistent with the baseline. The dependent variable, *flow ratio,* is defined as quarterly country-level bond flows divided by previous quarter holdings. Sample includes flows to 19 EMEs over 2013:Q4-2020:Q1. Broad USD refers to rate of appreciation in the trade-weighted USD. USD/EUR, Broad EUR, and EME LC/EUR are each defined as rates of appreciation for EUR. Robust standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.1.

Table A3 – Aggregate Flows Regressions with Fed Policy Shocks

	(1)	(2)	(3)	(4)	(5)	(6)
Broad USD (ln Δ)				-20.31***	-18.56***	-19.60*
				[4.128]	[6.077]	[11.125]
USD/EUR (ln Δ)			17.61***		2.02	0.76
			[4.225]		[3.274]	[11.138]
Broad EUR (ln Δ)		10.33***	-11.77*	2.18		1.51
		[2.588]	[5.977]	[3.030]		[11.097]
EME LC/EUR (ln Δ)	-2.94**	-4.78***	-4.13***	-3.35**	-3.34***	-3.37**
	[1.246]	[1.311]	[1.296]	[1.380]	[1.132]	[1.241]
VIX (ln)	-1.37***	-1.31***	-0.77	-0.28	-0.31	-0.29
	[0.424]	[0.430]	[0.483]	[0.517]	[0.530]	[0.532]
ECB Shadow (Δ)	0.04	0.01	-0.10	-0.07	-0.07	-0.07
	[0.116]	[0.117]	[0.132]	[0.122]	[0.127]	[0.137]
FED shocks	-0.08	-0.07	-0.03	-0.01	-0.01	-0.01
	[0.055]	[0.055]	[0.056]	[0.054]	[0.052]	[0.050]
Observations	492	492	492	492	492	492
R-squared	0.035	0.045	0.082	0.090	0.090	0.090
Countries	19	19	19	19	19	19

Notes: This table replicates aggregate country-level flows regressions from Table 4 replacing the Fed shadow rate with FED policy shocks from Bu, Rogers, and Wu (2021). A positive FED shock indicates contractionary policy. The dependent variable, *flow ratio,* is defined as quarterly country-level bond flows divided by previous quarter holdings. Sample includes flows to 19 EMEs over 2013:Q4-2020:Q1. Broad USD refers to rate of appreciation in the trade-weighted USD. USD/EUR, Broad EUR, and EME LC/EUR are each defined as rates of appreciation for EUR. Robust standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.1.

Table A4 – Aggregate Flows Regressions with Fed and ECB Policy Shocks

	(1)	(2)	(3)	(4)	(5)	(6)
Broad USD (ln Δ)				-26.34***	-23.41**	-18.31
				[5.997]	[10.258]	[13.444]
USD/EUR (ln Δ)			24.52***		2.54	8.96
			[5.617]		[6.347]	[12.626]
Broad EUR (ln Δ)		9.34*	-21.33**	-0.43		-8.66
		[4.663]	[8.976]	[5.576]		[11.731]
EME LC/EUR (ln Δ)	-3.98**	-5.25***	-4.92***	-3.78*	-4.25**	-4.11**
	[1.627]	[1.683]	[1.543]	[1.836]	[1.590]	[1.659]
VIX (ln)	-2.01***	-1.69***	-0.70	-0.30	-0.26	-0.36
	[0.452]	[0.465]	[0.600]	[0.610]	[0.644]	[0.588]
ECB Shocks	0.18**	0.09	0.00	-0.03	-0.05	-0.03
	[0.083]	[0.111]	[0.115]	[0.110]	[0.117]	[0.108]
FED shocks	-0.15*	-0.09	0.01	0.05	0.05	0.04
	[0.076]	[0.093]	[0.095]	[0.087]	[0.089]	[0.082]
Observations	378	378	378	378	378	378
R-squared	0.037	0.043	0.102	0.108	0.108	0.110
Countries	19	19	19	19	19	19

Notes: This table replicates aggregate country-level flows regressions from Table 4 replacing the Fed and ECB shadow rates with monetary policy shocks from Bu, Rogers, and Wu (2021). Positive policy shocks indicate contractionary policy. The ECB shock series is only available through 2018:Q3 leading to a somewhat truncated sample compared to the Table 4 baseline. The dependent variable, *flow ratio,* is defined as quarterly country-level bond flows divided by previous quarter holdings. Broad USD refers to rate of appreciation in the trade-weighted USD. USD/EUR, Broad EUR, and EME LC/EUR are each defined as rates of appreciation for EUR. Robust standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.1.

Table A5 – Aggregate Flows Regressions with EA and US 10-yr rates

	(1)	(2)	(3)	(4)	(5)	(6)
Broad USD (ln Δ)				-19.47***	-18.94**	-20.27
				[4.136]	[6.620]	[12.509]
USD/EUR (ln Δ)			17.58***		0.74	-0.89
			[3.972]		[3.710]	[12.228]
Broad EUR (ln Δ)		8.51**	-11.93*	1.14		1.88
		[3.154]	[5.801]	[3.361]		[11.638]
EME LC/EUR (ln Δ)	-3.83***	-5.08***	-4.13***	-3.53**	-3.46***	-3.51**
	[1.193]	[1.337]	[1.354]	[1.306]	[1.118]	[1.229]
VIX (ln)	-2.09***	-1.95***	-1.20***	-0.77	-0.78	-0.76
	[0.374]	[0.366]	[0.416]	[0.461]	[0.476]	[0.497]
EA 10-yr rate (Δ)	1.01**	0.65	-0.13	0.24	0.24	0.26
	[0.355]	[0.418]	[0.465]	[0.425]	[0.463]	[0.514]
US 10-yr rate (Δ)	-1.22***	-0.97**	-0.48	-0.64	-0.64*	-0.65*
	[0.323]	[0.385]	[0.370]	[0.373]	[0.369]	[0.367]
Observations	492	492	492	492	492	492
R-squared	0.044	0.050	0.085	0.094	0.094	0.094
Countries	19	19	19	19	19	19

Notes: This table replicates aggregate country-level flows regressions from Table 4 replacing the Fed and ECB shadow rates with 10-year bond rates from US and EA. The dependent variable, *flow ratio,* is defined as quarterly country-level bond flows divided by previous quarter holdings. Sample includes flows to 19 EMEs over 2013:Q4-2020:Q1. Broad USD refers to rate of appreciation in the trade-weighted USD. USD/EUR, Broad EUR, and EME LC/EUR are each defined as rates of appreciation for EUR. Robust standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.1.

Table A6 – Flows to global sovereign bonds

	(1)	(2)	(3)
Broad USD (ln Δ)	-40.00***	-45.20***	-44.64***
	[11.946]	[12.650]	[12.560]
VIX (ln)	-4.00**	-3.99**	-3.99**
	[1.837]	[1.834]	[1.834]
ECB Shadow (Δ)	0.24	0.24	0.24
	[0.334]	[0.333]	[0.333]
FED Shadow (Δ)	-0.78	-0.77	-0.77
	[0.664]	[0.663]	[0.663]
Safe Asset	-1.11**		
	[0.546]		
ΔUSD*Safe Asset	36.23**		
	[17.727]		
US Treasury		3.68***	
		[1.152]	
ΔUSD*US Treasury		55.84*	
		[32.581]	
EA bond		-2.63***	
		[0.443]	
ΔUSD*EA bond		55.20***	
		[13.920]	
EA bond (non-stressed)			-3.30***
			[0.444]
ΔUSD*EA bond (non-stressed)			48.77***
			[13.764]
EA bond (vulnerable)			-1.59***
			[0.611]
ΔUSD*EA bond (vulnerable)			64.72***
			[19.428]
Observations	3,132	3,132	3,132
R-squared	0.011	0.015	0.014

Notes: The dependent variable, *flow ratio,* is defined as quarterly issuer-level flows for all sovereign bonds (including entire EA bond portfolio). All columns estimated over 2013:Q4-2020:Q1 sample. Broad USD refers to rate of appreciation in the trade-weighted USD. *Safe Asset* is an indicator variable for any sovereign issuer that attained a AAA rating at some point within the sample period. *US Treasury* is an indicator variable for US Sovereign bonds and *EA bond* indicates euro area sovereigns. *Vulnerable* EA sovereigns include: Cyprus, Greece, Ireland, Italy, Portugal, Slovenia, and Spain. Interaction terms are with rate of appreciation in broad USD. Robust standard errors in brackets, *** p<0.01, ** p<0.05, * p<0.1.